SPECIAL THANKS

SPECIAL THANKS TO STSA
63RD ANNUAL MEETING CORPORATE SUPPORTERS

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FUTURE MEETINGS

November 8-11, 2017
JW Marriott San Antonio Hill Country Resort & Spa
San Antonio, TX

November 7-10, 2018
Omni Amelia Island Plantation Resort
Amelia Island, FL

November 6-9, 2019
JW Marriott Marco Island Beach Resort
Marco Island, FL
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THE ANNALS OF THORACIC SURGERY
G. Alexander Patterson, St. Louis, MO
WEDNESDAY, NOVEMBER 9, 2016

3:00 pm – 8:00 pm  Registration – Meeting Planner Office

5:00 pm – 6:00 pm  2016 STS Cardiothoracic Surgery Jeopardy Competition for North America
In the General Session Room – Royal Palm Ballroom IV-VIII

7:45 pm – 10:00 pm  STSA CTSNET Surgical Motion Pictures – Royal Palm Ballroom IV-VIII

THURSDAY, NOVEMBER 10, 2016

6:30 am – 5:00 pm  Registration – Meeting Planner Office

6:30 am  Continental Breakfast – Royal Palm Foyer

7:00 am – 8:40 am  Postgraduate General Session: Special Topics in Cardiothoracic Surgery
Royal Palm Ballroom IV-VIII

8:40 am – 8:55 am  Break

8:55 am – 10:15 am  Postgraduate General Session: Teaching the Technical Aspects of Cardiothoracic Surgery
Royal Palm Ballroom IV-VIII

10:15 am – 10:45 am  Break & Visit Exhibits – Orchid Ballroom/Foyer

10:45 am – 12:15 pm  Postgraduate Subspecialty Breakout Sessions
Adult Cardiac Breakout – Royal Palm Ballroom IV-VIII
General Thoracic Breakout – Royal Palm Ballroom II-III
Congenital Breakout – Acacia I-III
Interdisciplinary Care Provider Breakout – Mangrove I-II

12:15 pm – 1:30 pm  Break & Visit Exhibits – Orchid Ballroom/Foyer

12:00 pm – 4:00 pm  Exhibits Open – Orchid Ballroom/Foyer

1:30 pm – 2:30 pm  Ethics Debate
Should Hospital Policy Forbid Surgeons to Schedule Concurrent Cases in the Operating Room?
Royal Palm Ballroom IV-VIII

2:30 pm – 3:00 pm  Break & Visit Exhibits – Orchid Ballroom/Foyer

3:00 pm – 5:30 pm  First Scientific Session – Royal Palm Ballroom IV-VIII

5:30 pm – 6:00 pm  2016 STS Cardiothoracic Surgery Jeopardy Competition for North America
Finals in the General Session Room – Royal Palm Ballroom IV-VIII

FRIDAY, NOVEMBER 11, 2016

6:30 am – 5:30 pm  Registration – Meeting Planner Office

6:30 am  Continental Breakfast – Royal Palm Foyer

7:00 am – 7:50 am  Basic Science Forum – Royal Palm Ballroom IV-VIII

7:45 am – 12:00 pm  Exhibits Open – Orchid Ballroom/Foyer

7:50 am – 8:00 am  Break

8:00 am – 10:00 am  Second Scientific Session – Royal Palm Ballroom IV-VIII

10:00 am – 10:30 am  Break & Visit Exhibits – Orchid Ballroom/Foyer

10:30 am – 10:50 am  Kent Trinkle Education Lectureship
William A. Baumgartner, MD
Evolution of Thoracic Surgical Training in the US
Royal Palm Ballroom IV-VIII
10:50 am – 11:20 am  
**President’s Invited Lecturer**  
Michael J. Mack, MD  
The Future of Cardiothoracic Surgery: Why and How to Embrace Innovation  
*Royal Palm Ballroom IV-VIII*

11:20 am – 12:00 pm  
**Presidential Address**  
Andrea J. Carpenter, MD  
We Stand on the Shoulders of Giants: Let’s Look Up  
*Royal Palm Ballroom IV-VIII*

12:00 pm  
**All Attendee Lunch** – *Sunset Veranda*

12:45 pm – 4:00 pm  
**Exhibits Open** – *Orchid Ballroom/Foyer*

1:00 pm – 2:00 pm  
**Dessert Served in the Exhibit Hall** – *Orchid Ballroom/Foyer*

2:00 pm – 3:30 pm  
**Third Scientific Session A** – *Simultaneous Subspecialty Breakout Sessions*  
Adult Cardiac Breakout – *Royal Palm Ballroom IV-VIII*  
General Thoracic Breakout – *Royal Palm Ballroom II-III*  
Congenital Breakout – *Acacia I-III*

3:30 pm – 4:00 pm  
**Break & Visit Exhibits** – *Orchid Ballroom/Foyer*

4:00 pm – 5:00 pm  
**Third Scientific Session B** – *Simultaneous Subspecialty Breakout Sessions*  
Adult Cardiac Breakout – *Royal Palm Ballroom IV-VIII*  
General Thoracic Breakout – *Royal Palm Ballroom II-III*  
Congenital Breakout – *Acacia I-III*

5:00 pm – 6:00 pm  
**STSA Annual Business Meeting**  
STSA Members Only – *Royal Palm Ballroom IV-VIII*

6:00 pm – 7:00 pm  
**Resident’s Reception** – *Acacia IV-VI*

7:00 pm – 9:00 pm  
**President’s Mixer** – *Sunset Veranda*

**SATURDAY, NOVEMBER 12, 2016**

6:45 am – 11:00 am  
**Registration** – *Meeting Planner Office*

6:30 am  
**Continental Breakfast** – *Royal Palm Foyer*

7:00 am – 8:00 am  
**Coding Update** – *Royal Palm Ballroom IV-VIII*

8:00 am – 9:00 am  
**Fourth Scientific Session A** – *Simultaneous Subspecialty Breakout Sessions*  
Adult Cardiac Breakout – *Royal Palm Ballroom IV-VIII*  
General Thoracic Breakout – *Royal Palm Ballroom II-III*  
Congenital Breakout – *Acacia I-III*  
Transplant Breakout – *Mangrove I-II*

9:00 am – 9:30 am  
**Break**

9:30 am – 9:50 am  
**Harold Urschel History Lectureship**  
Robert M. Sade, MD  
A Surprising Alliance: Two Giants of the 20th Century  
*Royal Palm Ballroom IV-VIII*

9:50 am – 10:50 am  
**Fourth Scientific Session B** – *Royal Palm Ballroom IV-VIII*

10:50 am – 11:50 am  
**How To Do It** – *Royal Palm Ballroom IV-VIII*

12:00 pm  
**Program Adjourns**

12:50 pm – 6:00 pm  
**Various Social & Sporting Events** – See page 8 & 9 for details

7:00 pm – 11:00 pm  
**Annual Awards Dinner & Dance** – *Royal Palm Ballroom IV-VIII*
SCHEDULE OF ACTIVITIES

THURSDAY, NOVEMBER 10

Spouse/Guest Hospitality Suite – Chill Out Lounge
Time: 8:30 am – 11:30 am
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring Naples.

FRIDAY, NOVEMBER 11

Spouse/Guest Hospitality Suite – Chill Out Lounge
Time: 8:30 am – 12:00 pm
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring Walt Disney World® Resort.

All Attendee Lunch – Sunset Veranda
Time: 12:00 pm (Followed by dessert in the Exhibit Hall)
Cost: Complimentary

Resident’s Reception – Acacia IV-VI
Time: 6:00 pm – 7:00 pm
Residents, fellows, and medical students attending the meeting are invited to join STSA leaders for this hour-long networking event. Spouses/guests are welcome.

President’s Mixer – Sunset Veranda
Time: 7:00 pm – 9:00 pm
Cost: Complimentary
Attendees receive two tickets with registration. Additional tickets may be purchased for $25.00. Visit the registration desk for details.

SATURDAY, NOVEMBER 12

Spouse/Guest Hospitality Suite – Chill Out Lounge
Time: 8:30 am – 12:00 pm
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring Naples.

Golf Tournament
Location: Naples Grande Golf Course
Time: Tee times begin at 12:50 pm
Cost: $210.00 (Price includes roundtrip transportation, greens fees, and box lunch.)

Advanced registration is required. Subject to cancellation if registration is insufficient. Registrants will be notified in advance and refunds will be issued if this event is cancelled.

Voted one of the 10 best new golf courses in Florida, come enjoy the private Naples Grande golf course designed for players of all skill levels. Acclaimed golf architect Rees Jones designed a par 72 championship course that proves both interesting and challenging. Each hole at this demanding golf course promises an exhilaratingly new experience. With extraordinary elevations and unique water features expertly incorporating the indigenous Florida foliage, this course offers stunning fairways for year-round play.

Please note the following dress code: Men must wear collared shirts with long pants or Bermuda length shorts. Ladies must have a collar or sleeves on their top. Dresses, shorts or skirts of appropriate length are allowed. Only soft-spiked shoes are allowed on the course.
Rental clubs are available for $70.00, and soft spike golf shoes may be rented for $15.00. Rental items are not included in the golf tournament cost. Confirmed golfers will be contacted after advance registration closes on October 10 to collect rental needs.

**Annual Awards Dinner & Dance**
- **Reception:** 7:00 pm - 8:00 pm
- **Dinner:** 8:00 pm - 11:00 pm
- **Cost:** $100.00 per adult / $40.00 per child (ages 12 and younger)

Conclude your 63rd Annual Meeting experience with the always-memorable Annual Awards Dinner & Dance. Join fellow meeting attendees and their families for an evening of dinner and music. Advanced registration is recommended. A limited number of tickets will be sold on site.

We will have the return of WOOSAH!!!, a great band to include special jam sessions from our members’ talent to play for us all night long. We shortened the award presentation to maximize the time to socialize and enjoy your friends at STSA. Although black tie is always in fashion, you are welcome to wear cocktail attire. Be comfortable and have fun! It will be the perfect finale to a great meeting.

**NEW THIS YEAR! – Private Childcare During Awards Dinner & Dance**
- **Time:** 7:00 pm - 10:00 pm
- **Cost:** $50.00 per child

This private childcare option is for STSA guests only, and will offer games, entertainment and fun for children ages 4-11. Price includes childcare from 7:00 pm – 10:00 pm and a child-friendly dinner. Conveniently located near the Awards Dinner & Dance for easy drop-off and pick-up.

**Naples Grande Loggerheads Kid’s Club**
- **Cost:** $40.00 plus tax per child, daytime
  $50.00 plus tax per child, evening

The Loggerheads Kids Club invites children ages 4 to 11 to experience a fun-filled day set to inspire all of their senses. Children will enjoy a variety of arts and crafts, water activities, video games and movies. The Loggerheads Kids Club is conveniently located adjacent to the Mangrove Pool. Reservations must be made by 9:00 pm the previous day and may be billed to your room. Please call 239-594-6787 for more information and reservations, or visit www.naplesgrande.com/resort/kids-club for additional details.

This service is limited, please make reservations in advance.

**Childcare Services**
The Naples Grande Beach Resort recommends the following childcare providers:

- **My Naples Nanny**
  239-595-1922
  www.mynaplesnanny.com

- **TLC**
  239-598-1515
  www.atlcservice.com
DISCUSSION OF PAPERS
Discussions of papers at the Annual Meeting are considered for publication in The Annals of Thoracic Surgery. Please review the program outline carefully to determine if you have a particular interest in some of the topics, then be prepared to discuss them at the meeting. If you wish, you may request a copy of the manuscript in advance of the meeting by contacting the author directly. Each session has a limited amount of time reserved for discussion. Assigned discussants are limited to two minutes and two questions.

PRESENTATION AND PUBLICATION
Authors of oral presentations are required to submit a manuscript for consideration for publication in The Annals of Thoracic Surgery before noon on Saturday, November 12, 2016. Manuscripts must be submitted via The Annals online manuscript submission system at www.atseditorialoffice.org. A paper copy of the manuscript will not be accepted for consideration. Primary authors and co-authors that are delinquent in submitting their manuscript to The Annals on time will not have their presentations considered for publication in The Annals. In addition, these authors will not have abstracts considered by the Program Committee of the STSA for two (2) subsequent meetings.

ACCREDITATION
The Southern Thoracic Surgical Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The STSA designates this live activity for a maximum of 21.25 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

STSA CME MISSION
The continuing medical education mission of the Southern Thoracic Surgical Association is to design and deliver high-quality, practical, innovative, and scientifically rigorous educational programming at its Annual Meeting in the areas of cardiovascular, general thoracic, and congenital heart surgery, as well as ethics and professionalism, leadership, and practice management.

Such educational programming is meant to advance the overall competence of cardiovascular, general thoracic, and congenital heart surgeons, and ultimately to help them improve their patient outcomes and promote patient safety.

Continuing medical education activities are presented in a variety of formats at an STSA Annual Meeting: these include presentations of peer-reviewed scientific abstracts, updates on relevant scientific research, didactic presentations, debates, video presentations, and sub-specialty-specific break-out sessions. All educational sessions include the opportunity for questions, answers and discussion to further support the educational needs of the meeting attendees and the program learning objectives.

STSA educational activities are developed and provided with the intent of confirming an existing knowledge base, imparting new knowledge, enhancing competence in the content areas covered, and addressing identified professional practice gaps. The expected results include participants’ reporting greater confidence in their clinical care skills and a willingness to change their behavior or adapt new strategies as appropriate.

ELECTRONIC CME EVALUATION
The STSA 63rd Annual Meeting evaluation and CME credit claim process is electronic. Registrants who wish to receive CME credit for sessions they attend will be required to complete the electronic evaluation for the session. This is the only way physicians can earn CME credit for their attendance.

Using the electronic evaluation system, registrants can complete the meeting evaluation, claim CME credit, and print CME certificates. Certificates of Attendance are also available for non-physician attendees.
The electronic evaluation provides attendees the opportunity to offer feedback to the STSA Council and Program Committee regarding content offered, including information about applicability of the content to current practice, quality of the material presented, and recommendations for future programming. This information is invaluable in the planning of future STSA educational programs.

In addition to being useful for program planning, program evaluation and future needs assessment are important components of the requirements that the STSA must meet to maintain accreditation through the Accreditation Council for Continuing Medical Education (ACCME). It is by meeting the requirements set forth by the ACCME that the STSA is able to award CME credit for educational programming.

The electronic evaluation can be completed by meeting registrants onsite at computer kiosks located in the Royal Palm Foyer. Attendees can also access evaluations by visiting the online evaluation website through personal computers or handheld devices at https://www.xcdsystem.com/stsa. In order to make this process more convenient for attendees, the meeting evaluations will be available online through Saturday, November 26, 2016.

Attendees can log in to the evaluation website with the following information: Username: E-mail Address (note, your username is the e-mail address that you used to register for the Annual Meeting) Password: STSA User ID (your user ID is printed on the bottom of your meeting badge)

This process will allow STSA to maintain an electronic record of CME earned by physicians. Files will be maintained for a minimum of six years. Any questions regarding this procedure should be directed to STSA Headquarters at (312) 202-5892 or via e-mail at stsa@stsa.org.

STSA POLICY REGARDING DISCLOSURE
The Southern Thoracic Surgical Association will seek thorough financial and commercial disclosure information, according to ACCME requirements and recommendations, from all presenters, discussants, and moderators participating in an STSA Annual Meeting. Failure or refusal to provide disclosure information automatically disqualifies participation. All disclosure information will be communicated to the learners through appropriate means, including but not limited to the Annual Meeting Program Book.

STSA leadership, planning committee members, and staff will also provide disclosure information to be kept on file and communicated to meeting attendees through the STSA Annual Meeting Program Book.

All abstracts and disclosure statements will be reviewed approximately three (3) months prior to the Annual Meeting by staff for unidentified conflicts of interest. Any such potential conflicts will be brought to the attention of the STSA President, Chairman, and CME Committee Chair for review and resolution. Any potential conflicts of interest must be resolved before presentation. If a conflict is deemed unresolvable, the paper cannot be presented at the Annual Meeting.

The STSA Disclosure Policy (as outlined on page XX) will be communicated to the learner via the Annual Meeting Program Book.

STSA EDUCATION DISCLOSURE POLICY
As a sponsor of continuing medical education accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Southern Thoracic Surgical Association requires that any individual who is in a position to control the content of an educational activity must disclose all relevant financial relationships (including known relationships of his or her immediate family, department, and partners) with any healthcare-related business or other
entity whose products or services may be discussed in, or directly affected in the marketplace by, the educational content. The ACCME defines a “relevant financial relationship” as a relationship of any amount occurring within the previous twelve (12) months. The question of whether a disclosed conflict situation could represent undue influence on the educational activity by a commercial interest, or whether the disclosed information is sufficient to consider an abstract, presentation, or other educational enduring material to represent potentially biased information must be resolved prior to an individual’s involvement in STSA educational programming.

Required disclosures include (1) financial interest of any amount (e.g., through ownership of stock, stock options, or bonds) (2) the receipt of any amount of cash, goods or services within the current 12-month period (e.g., through research grants, employment, consulting fees, royalties, travel, or gifts) or (3) a non-remunerative position of influence (e.g., as officer, director, trustee or public spokesperson). NOTE: To avoid confusion with regard to the question of “relevance,” STSA requires that anyone in a position to control content (planners, speakers, authors, volunteer leaders, staff) must review the content they are addressing and disclose relationships with companies that have a material interest in the content being covered regardless of the division of the company for which that relationship exists. For instance, if a speaker will be referencing a product made by the X division of ABC company, but his relationship is with the Y division, he must still disclose the relationship. EXCLUDED from this disclosure requirement are blind trusts or other passive investments such as mutual funds. In the case of a financial or other relationship disclosure, the company, product/service, and specific nature of the relationship must be noted. Disclosure is mandatory for any person involved in the planning, management, presentation, and/or evaluation of STSA educational activities.

Failure to disclose relevant financial relationships disqualifies the individual from being a planning committee member, a teacher, or an author of CME materials, and this individual cannot have any responsibility for the development, management, presentation, or evaluation of STSA CME activities. This requirement is intended neither to imply any impropriety of such relationships nor to prejudice any individual presenter or author. It is merely to identify such relationships through full disclosure, and to allow the STSA to assess and resolve potential influences on the educational activity prior to the planning and implementation of an educational activity. All abstracts and presentations are reviewed for potential conflicts of interest. All conflicts of interest must be resolved prior to presentation. Any abstract/paper with a conflict that is deemed unresolvable will not be presented at the Annual Meeting. If no relevant financial relationships exist, the individual must indicate this on the disclosure form.

Additionally, the fact that the presentation, paper, or other educational product describes (a) the use of a device, product, or drug that is not FDA approved or (b) an off-label use of an approved device, product, or drug must also be disclosed. This requirement has been adopted in response to FDA policy and recent case law involving medical societies, and is not intended to prohibit or inhibit independent presentation or discussion regarding the uses of devices, products, and drugs as described in (a) or (b) above. For live presentations, all disclosures must be stated orally or on a slide at the beginning of the presentation and will be noted in published material related to the activity. Slides, handouts, and other materials utilized as part of an educational activity cannot contain any advertising, trade names, or a product group message. Speakers are required to disclose that they have nothing to disclose if this is the case.
Authors listed with a D next to their names have indicated, in accordance with the ACCME Standards and the STSA Disclosure Policy, that they have a financial or other relationship with a healthcare-related business or other entity to disclose; or their paper’s content describes the use of a device, product or drug, that is not FDA approved, or the off-label use of an approved device, product or drug. Please refer to the Relationship Disclosure Index on page 382 for a listing of all disclosure information.

OVERALL MEETING OBJECTIVES
To present recent advances in research, surgical techniques, patient management, and the diagnosis and treatment of cardiothoracic disease to cardiothoracic specialists and related health care professionals; and to provide a forum for cardiothoracic surgeons and related healthcare professionals to exchange ideas through open discussion periods and question-and-answer sessions related to the practice of cardiothoracic surgery.

After attending the STSA Annual Meeting, participants should have a broader understanding of new and standard techniques and current research specifically related to adult cardiac surgery, general thoracic surgery, congenital heart surgery, and related transplant procedures. Attendees can utilize knowledge gained from the STSA Annual Meeting to help select appropriate surgical procedures and interventions and integrate state of the art knowledge into their own practices.

TARGET AUDIENCE
The STSA Annual Meeting is intended for all professionals involved in delivery of cardiothoracic care with particular emphasis on cardiothoracic surgeons. Cardiothoracic residents, fellows, nurse practitioners, research scientists, and other health care professionals may also benefit from various sessions and interactions with cardiothoracic colleagues.

SPEAKER READY ROOM
The Speaker Ready Room is located in Banyan I-II. Speakers are requested to go to this room upon arrival, or at least four hours prior to the opening of their session to upload slides. Speakers will not be allowed to bring their laptop to the podium.
SCHEDULE OF EVENTS*  

*SCHEDULE OF EVENTS IS SUBJECT TO CHANGE.
2016 Cardiothoracic Surgery Jeopardy Competition for North America in the General Session Room
5:00 pm – 6:00 pm
Royal Palm Ballroom IV-VIII

WEDNESDAY, NOVEMBER 9, 2016
7:45 pm – 10:00 pm
Royal Palm Ballroom IV-VIII
(Presentations are limited to ten minutes, followed by five minutes of discussion.)

CME Credits Available: 2.25
Moderators: *HelenMari Merritt and D*Richard L. Lee

7:45 pm - 8:00 pm (page 44)
1V. Robotic Repair of Mitral Commissural Endocarditis With a Bridging Patch Technique
Takashi Murashita, Kevin J. Tveter, D*J.S. Rankin, Lawrence M. Wei,
*Vinay Badhwar
West Virginia University Medical Center, Morgantown, WV

8:00 pm - 8:15 pm (page 46)
2V. Extracardiac Valved Conduit for Calcific Mitral Stenosis
Justin Van Meeteren, *Hartzell Schaff
Mayo Clinic, Rochester, MN

8:15 pm - 8:30 pm (page 48)
3V. Management of the Small Aortic Root Using the ‘Floating Valve Technique’
Jonathan M. Hemli, Yuriy Dudiy, Derek R. Brinster
Lenox Hill Hospital, New York, NY

8:30 pm - 8:45 pm (page 50)
4V. Combined Pulmonary Artery Sleeve Resection / Left Upper Lobectomy and Extended Resection of the Thoracic Aorta After TEVAR For T4 Lung Cancer
Raymond Lee, Gopal Singh, John Vandenberge, Jason Glotzbach, DIsaac George, DJoshua R. Sonett
NY Presbyterian Hospital / Columbia University, New York, NY

8:45 pm - 9:00 pm (page 52)
5V. Tetralogy of Fallot With Ebstein’s Anomaly Correction in a Neonate
Shu-Chien Huang, Ling-Yi Wei
National Taiwan University Hospital, Taipei, Taiwan

9:00 pm - 9:15 pm (page 54)
6V. Right Axillary Thoracotomy for Transatrial Repair of Congenital Heart Defects: VSD, Partial AV Canal With Mitral Cleft, PAPVR / Warden, Cor Triatriatum and ASD
*Ali Dodge-Khatami, *Jorge D. Salazar
Children’s Heart Center, University of Mississippi Medical Center, Jackson, MS

9:15 pm - 9:30 pm (page 56)
7V. Repair of Aortic Valve, Large Periaortic Abscess and LV-PA Fistula in a 5 Year-Old With Acute Bacterial Endocarditis
Wake Forest University, Winston-Salem, NC

*STSA Member  D Relationship Disclosure
8V. Repair of Incarcerated Type IV Hiatal Hernia With Intrathoracic Stomach, Herniated Omentum, Small Bowel and Transverse Colon Can be Safely Achieved via Laparoscopic Approach
Farzaneh Banki
University of Texas Health Science Center Houston, Memorial Hermann Southeast Esophageal Disease Center. Houston, TX

9:45 pm - 10:00 pm
9V. Video-Assisted Thoracoscopic Resection of Right Upper Lobe Lung Cancer With Chest Wall Involvement
Erin A. Gillaspie, *Shanda H. Blackmon
Mayo Clinic, Rochester, MN

THURSDAY, NOVEMBER 10, 2016

POSTGRADUATE PROGRAM
7:00 am – 12:15 pm
The first portion of the Postgraduate Program is the General Session, which will feature Special Topics in Cardiorthoracic Surgery presentations and Teaching the Technical Aspects of Cardiothoracic Surgery. Concurrent breakout sessions in adult cardiac, general thoracic, congenital heart surgery and interdisciplinary care provider which includes a panel discussion will take place between 10:45 a.m. and 12:15 p.m.

CME Credits Available: 4.5

GENERAL SESSION Royal Palm Ballroom IV-VIII
Special Topics in Cardiothoracic Surgery
Moderators: D*Scott A. LeMaire and *Paul J. Chai
Educational Objectives: Upon completion of this program participants will be able to:
• Understand how contemporary ECMO centers have evolved due to technological advancements and improved outcomes.
• Appreciate the importance of team development and ECMO specialist training when developing or expanding an ECMO program.
• Understand complications related to blood transfusion.
• Define benefits of transfusion and address bleeding complications.
• Recognize patients at high and low risk from perioperative transfusion and from perioperative bleeding.

7:00 am - 7:30 am
Managing an Expanding ECMO Program
Presenter: D*Joseph B. Zwischenberger
University of Kentucky, Lexington, KY

7:30 am – 8:00 am
Blood Conservation: Best Practices for Reducing Bleeding and Transfusion Requirements
Presenter: D*Victor A. Ferraris
University of Kentucky, Lexington, KY

8:00 am – 8:40 am
General Thoracic Surgery Legends Lecture
Esophageal Surgery 1973-2016 - Evolution and Regression
Presenter: Mark B. Orringer
University of Michigan, Ann Arbor, MI

8:40 am - 8:55 am
Break
Teaching the Technical Aspects of Cardiothoracic Surgery
Moderators: D*Scott A. LeMaire and *Paul J. Chai

8:55 am – 9:15 am
Challenges of Teaching Cardiothoracic Operations
Presenter: *John S. Ikonomidis
Medical University of South Carolina, Charleston, SC

9:15 am – 9:35 am
How I Teach It: Thoracoscopic Lobectomy
Presenter: D*Joshua R. Sonett
NY Presbyterian Hospital / Columbia University, New York, NY

9:35 am – 9:55 am
How I Teach It: Mitral Valve Repair
Presenter: Steven F. Bolling
University of Michigan, Ann Arbor, MI

9:55 am – 10:15 am
How I Teach It: Neonatal Cardiac Repair
Presenter: *E. Dean McKenzie
Texas Children's Hospital, Houston, TX

10:15 am – 10:45 am
Break- Visit Exhibits
Orchid Ballroom/Foyer

10:00 am – 3:30 pm
EXHIBITS OPEN
Orchid Ballroom/Foyer

ADULT CARDIAC BREAKOUT Royal Palm I Ballroom IV-VIII

Avoiding and Managing Problems in Adult Cardiac Surgery
Moderators: D*Anthony L. Estrera and *Neal D. Kon
Educational Objectives: Upon completion of this program participants will be able to:
• Distinguish between aortic intramural hematoma, penetrating ulcer, and dissection on CT scan.
• Determine the best course of treatment for acute intramural hematoma of the aorta.
• Appreciate patients that are high risk for complications during TAVR.
• Review and describe solutions for complications during TAVR.
• Describe the construction and makeup of the multidisciplinary “Heart Team”, and its influence in improving patient outcomes and fostering communication between specialties to minimized complications during TAVR.
• Avoid complications of limited access incisions.
• Patient assessment and strategy for limited access incisions.

10:45 am – 11:15 am
Challenges in Managing Acute Ascending Aortic Intramural Hematoma
Presenter: *Chad N. Stasik
University of Texas San Antonio, San Antonio, TX

11:15 am – 11:45 am
Trouble During TAVR: Prevention and Management
Presenter: D*Vinod H. Thourani
Emory University, Atlanta, GA

*STSA Member  D Relationship Disclosure
11:45 am – 12:15 pm
Dealing With Problems During Minimally Invasive Valve Procedures
Presenter: *Kevin Accola
Cardiovascular Surgeons PA, Orlando, FL

GENERAL THORACIC BREAKOUT Royal Palm Ballroom II-III

Getting Out of Trouble During General Thoracic Operations
Moderators: *Richard K. Freeman and *Melanie A. Edwards
Educational Objectives: Upon completion of this program participants will be able to:
• Discuss the management of inadequate operative exposure
• Discuss the management of immediate graft dysfunction
• Determine options for recipient-donor size mismatch
• Recognize potential pitfalls before they occur.
• Identify methods for salvage once an event has occurred.

10:45 am - 11:15 am
Managing Complications During Reoperative Lung Surgery
*David C. Rice
University of Texas MD Anderson Cancer Center, Houston, TX

11:15 am - 11:45 am
Dealing With Problems During Lung Transplantation
*G. Alec Patterson
Washington University School of Medicine, St. Louis, MO

11:45 am - 12:15 pm
Handling Misadventures During Minimally Invasive Esophagectomy
*Wayne L. Hofstetter
University of Texas, MD Anderson Cancer Center, Houston, TX

CONGENITAL BREAKOUT Acacia I-III

Handling Complications During Congenital Heart Surgery
Moderators: *Robert J. Dabal and *Paul J. Chai
Educational Objectives: Upon completion of this program participants will be able to:
• Identify techniques and methods to prevent and treat complications related to single ventricle palliation surgery.
• Demonstrate the modified single-patch operation for patients with cAVSD.
• Describe the differences between the single-patch, two-patch, and modified single-patch techniques.
• List the advantages of the modified single-patch technique.
• Identify different strategies for dealing with bilateral superior venae cavae.
• Recognize strategies for dealing with excessive pulmonary blood flow during transplantation for children with a previous Fontan procedure.
• Describe techniques for dealing with abnormalities of situs.

10:45 am - 11:15 am
Navigating Through Challenges During Norwood Procedures
*James Jaggers
Children’s Hospital Colorado, Aurora, CO

11:15 am - 11:45 am
Dealing With Problems During AV Canal Defect Repair
*Carl L. Backer
Ann & Robert H. Lurie Children’s Hospital, Chicago, IL

*STSA Member  D Relationship Disclosure
18 STSA 63rd Annual Meeting
Technical Challenges With Pediatric Heart Transplantation
*Kirk R. Kanter
Emory University School of Medicine, Atlanta, GA

INTERDISCIPLINARY CARE PROVIDER BREAKOUT Mangrove I-II
Management of the Postoperative Cardiothoracic Patient: The First 24 Hours
Moderator: *James St. Louis
Educational Objectives: Upon completion of this program participants will be able to:
  • Apply goal directed hemodynamic management to optimize cardiac output.
  • Discuss the open chest protocol.
  • Assess the requirements for an APP to function in the CVICU to be successful.
  • Identify the value of competency requirements for APPs in the CVICU.
  • Describe specific ways in which changing traditional practice patterns to data-driven protocols can lead to improved patient outcomes.
  • Identify components of the cardiac output and factors that impact cardiac output (preload, afterload, contractility).
  • List the components of oxygen delivery vs oxygen consumption and how this is monitored.
  • Recognize routine issues that impact post-operative care of the pediatric patient who has undergone cardiac surgery.

10:45 am - 10:50 am
Introduction
*James St. Louis
Children's Mercy Hospital, Kansas City, MO

10:50 am - 11:05 am
Principles of Postoperative Management of the Cardiothoracic Patient: The First 24 Hours
Nevin M. Katz
Johns Hopkins University, Baltimore, MD

11:05 am - 11:20 am
Postoperative Management of the Adult Cardiac Patient: A Practical Perspective
Jason Lucas
Piedmont Heart Institute, Atlanta, GA

11:20 am - 11:35 am
Postoperative Management of the Thoracic Patient: A Practice Perspective
*Benjamin Wei
University of Alabama, Birmingham, AL

11:35 am - 11:50 am
Postoperative Management of the Congenital Patient: A Practice Perspective
Stacy Reynolds
Children's Mercy Hospital, Kansas City, MO

11:50 am - 12:15 pm
Panel Discussion
*James St. Louis, Nevin M. Katz, Jason Lucas, Benjamin Wei, Stacy Reynolds

12:15 pm - 1:30 pm
Break – Visit Exhibits
Orchid Ballroom/Foyer
ETHICS DEBATE

Royal Palm Ballroom IV-VIII

1:30 p.m. – 2:30 p.m.

Educational Objectives: Upon completion of this program participants should be able to:
- Describe the arguments for and against double booking operations;
- Work with hospital administrators to develop appropriate OR scheduling procedures.

CME Credits Available: 1.0

Should Hospital Policy Forbid Surgeons to Schedule Concurrent Cases in the Operating Room

Moderator: *Robert M. Sade, Medical University of South Carolina, Charleston, SC

Pro: Richard Whyte
Beth Israel Deaconess Medical Center, Boston, MA

Con: D*Vinod H. Thourani
Emory University, Atlanta, GA

2:05 pm – 2:30 pm
Discussion

2:30 pm - 3:00 pm

Break – Visit Exhibits
Orchid Ballroom/Foyer
THURSDAY, NOVEMBER 10, 2016

3:00 pm - 5:30 pm
Royal Palm Ballroom IV-VIII
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

CME Credits Available: 2.5
Moderators: *Andrea J. Carpenter and DDaniel L. Miller

3:00 pm – 3:15 pm  (page 62)
1. Early Surgical Intervention in Patients With Mitral Valve Infective Endocarditis and Acute Stroke: Implications for Timing of Surgery
Mehrdad Ghoreishi, Nate Foster, Sam Maghami, Chetan Pasrija, Brody Wehman, Murtaza Dawood, Bartely P. Griffith, DJames S. Gammie
University of Maryland School of Medicine, Baltimore, MD
Discussant: *Vinay Badhwar, West Virginia University Hearth and Vascular Institute, Morgantown, WV

3:15 pm - 3:30 pm  (page 64)
2. Outcomes of Adult Extracorporeal Membrane Oxygenation With Outside Facility Transfer: A Regional Referral Center Experience
Duke University Medical Center, Durham, NC
Discussant: DJoseph B Zwischenberger, University of Kentucky, Lexington, KY

3:30 pm - 3:45 pm  (page 66)
3. Aortic Root Replacement for Children With Loeys-Dietz Syndrome
Johns Hopkins Medical Institutions, Baltimore, MD
Discussant: *Jorge D. Salazar, Boston Children’s Hospital, Boston, MA

3:45 pm - 4:00 pm (page 68)
4. Neonatal Aortic Arch Reconstruction With Splanchnic and Cerebral Perfusion Avoids Deep Hypothermia and Supports Recovery of Extracardiac Organs
*David Bichell, Clinton D. Morgan, Venessa L. Pinto, Ashly Westrick, Chevis N. Shannon, *Karla Christian, *Bret A. Mettler
Vanderbilt University, Nashville, TN
Discussant: *E. Dean McKenzie, Texas Children’s Hospital, Houston, TX

4:00 pm – 4:15 pm (page 70)
5. The Changing Spectrum of Tracheostomy Related and Post Intubation Tracheal Stenosis: Implications for Surgical Treatment
Samuel Kim, Charles Hsu, Alex G. Little
University of Arizona, Tucson, AZ
Discussant: DDaniel L. Miller, WellStar Health System, Marietta, GA

4:15 pm - 4:30 pm (page 72)
6. Contemporary Practice Patterns and Outcomes of Surgery for Acute Type A Aortic Dissection: An Analysis of a Multi-Institutional Regional STS Database
*Robert B. Hawkins, Emily A. Downs1, J.H. Mehaffey1, Lily Johnston1, Damien LaPar2, Clifford Fonner2, Leora Yarboro1, Dgorav Ailawadi2, Ravi Ghanta1
1University of Virginia, Charlottesville, VA; 2Virginia Cardiac Surgery Quality Initiative, Falls Church, VA
Discussant: DOurania Preventza, Baylor College of Medicine/Texas Heart Institute, Houston, TX

*STSA Member  D Relationship Disclosure
7. Determinants of Hospital Variation in Pneumonia Rates After Coronary Artery Bypass Grafting: An Analysis of 324,085 Consecutive CABG Patients

Alexander A. Brescia, D.J.S. Rankin, Derek Cyr, Jeffrey P. Jacobs, Richard L. Prager, Min Zhang, Roland Matsouaka, Steven D. Harrington, Rachel S. Dokholyan, Steven Bolling, Astrid Fishstrom, David M. Shahian, Donald S. Likosky

1 University of Michigan, Ann Arbor, MI; 2 Cardiothoracic Surgery Associates, Nashville, TN; 3 Duke Clinical Research Institute, Durham, NC; 4 Johns Hopkins University School of Medicine, Baltimore, MD; 5 Henry Ford Macomb Hospitals, Clinton Township, MI; 6 Harvard Medical School, Boston, MA

Discussant: D.Jay D. Pal, University of Washington, Seattle, WA

8. Improved Lymph Node Staging in Early Stage Non-Small Cell Lung Cancer in the National Cancer Database

Seth B. Krantz, Waseem Lutfi, Kristine Kuchta, Chi-Hsiung Wang, Ki Wan Kim, John Howington

1 NorthShore University Health System, Evanston, IL; 2 University of Chicago Pritzker School of Medicine, Chicago, IL; 3 Saint Thomas Healthcare, Nashville, TN

Discussant: D. Robert J. Cerfolio, University of Alabama, Birmingham, AL

9. Causes and Patterns of Unplanned Readmissions After Anatomic Lung Resection: Comparison of Thoracoscopic vs. Open Approaches

Rohun Bhagat, Austin N. Ward, Elizabeth Juarez-Colunga, Michael R. Bronsert, Natalia O. Glebova, William G. Henderson, David A. Fullerton, Michael J. Weyant, John D. Mitchell, Jeremiah Martin, Robert Meguid

1 University of Colorado School of Medicine, Aurora, CO; 2 University of Kentucky, Lexington, KY; 3 University of Colorado School of Public Health, Aurora, CO; 4 University of Colorado School of Medicine, Aurora, CO; 5 University of Rochester, Rochester, NY

Discussant: Richard K. Freeman, St. Vincent Hospital and Health System, Indianapolis, IN

10. Bilateral Internal Mammary Artery Use Can Be Safely Taught Without Increasing Morbidity or Mortality

Chetan Pasrija, Mehrdad Ghoreishi, Aakash Shah, Michael Rouse, Zachary Kon, Bradley S. Taylor

University of Maryland, Division of Cardiac Surgery, Baltimore, MD

Discussant: John S. Ikonomidis, Medical University of South Carolina, Charleston, SC

2016 Cardiothoracic Surgery Jeopardy Competition for North America Final in the General Session Room – Royal Palm Ballroom IV-VIII
FRIDAY, NOVEMBER 11, 2016

7:45 am – 12:00 pm
EXHIBITS OPEN
Orchid Ballroom/Foyer

Basic Science Forum
7:00 am - 7:50 am
Royal Palm Ballroom IV-VIII
(Presentations are limited to five minutes, followed by two minutes of discussion from a selected discussant and an additional one minute of discussion open to the audience.)

CME Credits Available: 0.75
Moderators: *Min P. Kim and *T. Brett Reece
Resident Moderator: Lily Johnston

7:00 am - 7:08 am (page 82)
1B. Serum-Based Biomarker Panel May Predict Recurrence in Resected T1-2N0 Non-Small Cell Lung Cancer
Christopher W. Seder, Andrew Arndt, Lia Jordano, Sanjib Basu, Cristina Flhied, Selina Sayidine, Gary Chmielewski, William H. Warren, Michael Liptay, Jeffrey Borgia
Rush University Medical Center, Chicago, IL
Discussant: Virginia Litle, Boston University, Boston, MA

7:08 am - 7:16 am (page 84)
2B. Ex Vivo Lung Perfusion Rehabilitates Sepsis-Induced Lung Injury
University of Virginia, Charlottesville, VA
Discussant: D*Joshua Sonett, New York Presbyterian Hospital/Columbia University, New York, NY

7:16 am - 7:24 am (page 86)
3B. A Novel Murine Model of Marfan Syndrome Accelerates Aortopathy and Cardiomyopathy
Nicholas Cavanaugh, Lan Qian, William J. Kutschke, Ella J. Born, *Joseph W. Turek
University of Iowa Carver College of Medicine, Iowa City, IA;
Discussant: *Luca Vricella, Johns Hopkins University, Baltimore, MD

7:24 am - 7:32 am (page 88)
4B. Erythropoietin Attenuation of Spinal Cord Ischemia Injury is βcR-Receptor Dependent
Lisa S. Foley, Joshua Mares, DJoseph C. Cleveland, Michael J. Weyant, David A. Fullerton, *T.B. Reece
University of Colorado, Aurora, CO
Discussant: D*Scott LeMaire, Baylor College of Medicine, Houston, TX

7:32 am - 7:40 am (page 90)
5B. Selective Localization of a Novel Dendrimer Nanoparticle in an Ischemia-reperfusion Model of Myocardial Infarction
J. Trent Magruder, Todd C. Crawford, Yi-An Lin, Fan Zhang, Joshua C. Grimm, Rangaramanujam Kannan, Sujatha Kannan, *Christopher M. Sciortino
Johns Hopkins University School of Medicine, Baltimore, MD
Discussant: *John W. Hammon, Wake Forest University School of Medicine, Winston-Salem, NC

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BASIC SCIENCE FORUM
BASIC SCIENCE FORUM

7:40 am - 7:48 am (page 92)

6B. C-kit+ Cardiac Stem Cells Enhance Neonatal Right Ventricular Performance After Pulmonary Artery Banding

Brody Wehman, Nicholas Pietris, Osama T. Siddiqui, Tieluo Li, Rachana Mishra, Sudhish Sharma. *Sunjay Kaushal
University of Maryland School of Medicine, Baltimore, MD

Discussant: *John Mayer, Boston Children’s Hospital, Boston, MA

7:50 am - 8:00 am

Break – Visit Exhibits

Orchid Ballroom/Foyer
FRIDAY, NOVEMBER 10, 2016

8:00 am - 10:00 am
Royal Palm Ballroom IV-VIII
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

CME Credits Available: 2.0
Moderators:  Charles B. Huddleston and  Himanshu J. Patel

8:00 am - 8:15 am (page 94)
11. Variability in Integrated Cardiothoracic Surgery Training Program Curriculum
Elizabeth H. Stephens1, Dustin Walters2, Asad Shah3, Walter DeNino4, Amanda Eilers5, Vakhtang Tchantchaleishvili6, Andrew Goldstone7, Ryan Shelstad8, Tarek Malas9, Erin A. Gillaspie10, Marisa Cevasco11, Amy Fiedler12, Scott Halbreiner13, Kevin Kooma Singh14, Damien LaPar15
1Columbia, New York, NY; 2Duke, Durham, NC; 3University of Washington, Seattle, WA; 4MUSC, Charleston, SC; 5University of Texas San Antonio, San Antonio, TX; 6University of Rochester, Rochester, NY; 7University of Pennsylvania, Philadelphia, PA; 8University of Colorado, Denver, CO; 9Ottawa Heart Institute, Ottawa, Ontario, Canada; 10Mayo Clinic, Rochester, MN; 11Brigham and Women’s Hospital, Boston, MA; 12Massachusetts General Hospital, Boston, MA; 13Cleveland Clinic, Cleveland, OH; 14Cedars Sinai, Los Angeles, CA; 15University of Virginia, Charlottesville, VA
Discussant:  Richard Lee, St. Louis University, St. Louis, MO

8:15 am - 8:30 am (page 96)
12. Concomitant Atrial Fibrillation Ablation Remains Underutilized Despite No Additive Risk
Lily E. Johnston1, Emily A. Downs1, Damien LaPar1, Irving L. Kron1, Jeffrey B. Rich, 2Alan Speir, 3Mohammed Quader, 4Jonathan Philpott, 5Gorav Ailawadi
1University of Virginia, Charlottesville, VA; 2Sentara Heart Hospital, Norfolk, VA; 3INOVA Heart and Vascular Institute, Fairfax, VA; 4Virginia Commonwealth University, Richmond, VA
Discussant:  Theresa Luu, Marietta, GA

8:30 am - 8:45 am (page 98)
13. Impact of DiGeorge Syndrome on Early and Late Outcomes of Surgical Repair of Conotruncal Cardiac Anomalies
Bahaaldin Alsoufi, Courtney McCracken, Kirk R. Kanter, Subhadra Shashidharan, Brian Kogon
Emory University School of Medicine, Atlanta, GA
Discussant:  Andrew Lodge, Duke University Medical Center, Durham, NC

8:45 am - 9:00 am (page 100)
14. Pulmonary Artery Aneurysms: Presentation and Operative Outcomes
Janani Reisenauer, Sameh Said, Hartzell Schaff, Heidi Connolly, Joseph Maleszewski, Joseph Dearani
Mayo Clinic, Rochester, MN
Discussant:  Brian Kogon, Emory University, Atlanta, GA

9:00 am - 9:15 am (page 102)
15. Surgical Outcomes in Clinical Stage IIIA – N2 Positive, Older Lung Cancer Patients in The Society of Thoracic Surgeons Database
Daniel J. Boffa1, Felix Fernandez2, Andrzej Kosinski2, Sunghee Kim3, Mark Onaitis1, Patricia Cowper3, Jeffrey P. Jacobs4, Cameron Wright5, Joe B. Putnam6, Anthony P. Furnary7

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STSA 63rd Annual Meeting 25
SECOND SCIENTIFIC SESSION

9:15 am - 9:30 am (page 104)

16. Pilot Study to Incorporate Patient Reported Outcomes Associated With Lung Cancer Surgery into The Society of Thoracic Surgeons Database

*Onkar V. Khullar, Mohammad H. Rajaei, Seth Force, Jose Binongo, Yi Lasanajak, Scott Robertson, Allan Pickens, Manu S. Sancheti, Joseph Lipscomb, Theresa W. Gillespie, Felix Fernandez, Emory University School of Medicine, Atlanta, GA; Rollins School of Public Health, Emory University, Atlanta, GA; Georgia Tech, Atlanta, GA; Rollins School of Public Health, Emory University, Atlanta, GA.

Discussant: *David R. Jones, Memorial Sloan Kettering Cancer Center, New York, NY

9:30 am - 9:45 am (page 106)


Julius I. Ejiofor, Anthony V. Norman, Siobhan McGurk, James Rawn, Hari R. Mallidi, Sary F. Aranki, Prem Shekar, Tsuyoshi Kaneko, Brigham and Women's Hospital, Harvard Medical School, Boston, MA

Discussant: *D. J. Scott Rankin, WVU Heart & Vascular Institute, West Virginia University, Morgantown, WV

9:45 am - 10:00 am (page 108)

18. Contemporary Outcomes for Low-risk Surgical Aortic Valve Replacement: A Benchmark for Evaluating Transcatheter Aortic Valve Technology

Lily E. Johnston, Emily A. Downs, Robert B. Hawkins, Mohammed Quader, D’Alan Speir, Jeffrey B. Rich, Ravi Ghanta, Leora Yarboro, Gorav Ailawadi, University of Virginia, Charlottesville, VA; Virginia Commonwealth University, Richmond, VA; Inova Heart and Vascular Institute, Fairfax, VA; Sentara Heart Hospital, Norfolk, VA

Discussant: *Chad Stasik, University of Texas Health Science Center, San Antonio, TX

10:00 a.m. – 10:30 a.m.

Break – Visit Exhibits

Orchid Ballroom/Foyer
FRIDAY, NOVEMBER 11, 2016
10:30 am – 12:00 pm
Royal Palm Ballroom IV-VIII

CME Credits Available: 1.5
Moderator: *S. Adil Husain

10:30 am - 10:50 am
Kent Trinkle Education Lectureship: Evolution of Thoracic Surgical Training in the US
*William A. Baumgartner
Johns Hopkins University, Baltimore, MD

10:50 am – 11:20 am
President’s Invited Lecturer: The Future of Cardiothoracic Surgery: Why and How to Embrace Innovation
*Michael J. Mack
Baylor Health Care System, The Heart Hospital Baylor Plano Research Center, Plano, TX

11:20 am – 12:00 pm
Presidential Address: We Stand on the Shoulders of Giants: Let’s Look Up
*Andrea J. Carpenter
University of Texas Health Science Center, San Antonio, TX

12:00 pm
All Attendee Lunch
Sunset Veranda

12:45 pm – 4:00 pm
EXHIBITS OPEN

12:45 pm – 2:00 pm
Break – Visit Exhibits

1:00 pm – 2:00 pm
Dessert in the Exhibit Hall
Orchid Ballroom/Foyer

*STSA Member D Relationship Disclosure
FRIDAY, NOVEMBER 11, 2016
2:00 pm – 3:30 pm
Simultaneous Cardiac, General Thoracic, and Congenital Breakout Sessions

CME Credits Available: 1.5

Attendees select to participate in one of the following three breakout sessions:

ADULT CARDIAC BREAKOUT Royal Palm Ballroom IV-VIII
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Moderators: Dawn S. Hui and *Chad N. Stasik
Resident Moderator: Scott Johnson

2:00 pm - 2:15 pm (page 110)
19. Risk Factors for Late Aortic Valve Dysfunction Following the David V 
   Valve Sparing Root Replacement
   Jiro Esaki, D*Brad Leshnower, Jose Binongo, Yi Lasanajak, LaRonica McPherson, "Robert Guyton, "Edward P. Chen
   1Otsu Red Cross Hospital, Otsu, Japan; 2Emory University, Atlanta, GA
   Discussant: John S. Ikonomidis, Medical University of South Carolina, Charleston, SC

2:15 pm - 2:30 pm (page 112)
20. Whole Body Perfusion Strategy for Aortic Arch Repair Under Moderate 
   Hypothermia: Simultaneous Antegrade Cerebral Perfusion and Lower 
   Body Perfusion
   Christopher L. Tarola, Katie L. Losenno, Jill J. Gelinas, Philip M. Jones, Phil Fernandes, Stephanie A. Fox, Bob Kjaji, DMichael Chu
   Western University, London, Ontario, Canada
   Discussant: Joseph Coselli, Baylor College of Medicine/Texas Heart 
   Institute, Houston, TX

2:30 pm - 2:45 pm (page 114)
21. Moderate Hypothermia and Unilateral Selective Antegrade Cerebral 
   Perfusion is a Safe Perfusion Strategy for Extended Arch Replacement in 
   Patients With Acute Aortic Dissection
   "William B. Keeling, D*Brad Leshnower, Jose Binongo, "Eric L. Sarin, "Ed Chen
   Emory University, Atlanta, GA
   Discussant: Anthony Estrera, University of Texas Houston Medical School, 
   Houston, TX

2:45 pm - 3:00 pm (page 116)
22. Frozen Elephant Trunk is Not the “Bad Boy” Compared With the 
   Traditional Elephant Trunk: Current Trends and Lessons Learned Using 
   the Simplified US Version of the FET
   D*Ourania Preventza, Jessica Mayor, Katherine Simpson, Julius Carillo, Matt D. Price, "Kim I. de la Cruz, "Lorraine D. Cornwell, Shuab 
   Omer, Arin C. Jobe, D*Scott A. LeMaire, DJoseph S. Coselli
   1Texas Heart Institute, Houston, TX; 2Baylor College of Medicine, Houston, TX
   Discussant: Tomas Martin, Cardiovascular Surgeons PA, Orlando, FL

3:00 pm - 3:15 pm (page 118)
23. Transcatheter Aortic Valve Implantation for Patients With Bicuspid Aortic 
   Valves: Still a Contraindication?
   Mirko Doss, DWon Kim, Thomas Walther
   Kerckhoff Heart Center, Bad Nauheim, Germany
   Discussant: Vinod Thourani, Emory University, Atlanta GA

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28 STSA 63rd Annual Meeting
3:15 pm - 3:30 pm (page 120)

24. Statewide Impact of Transcatheter Aortic Valve Replacement on Surgical Aortic Valve Replacement

*Robert B. Hawkins\(^1\), Lily Johnston\(^3\), Emily A. Downs\(^3\), J.H. Mehaffey\(^3\), Clifford Fonner\(^1\), Damien LaPar\(^3\), Leora Yarboro\(^3\), Ravi Ghanta\(^3\), Mohammed Quader\(^3\), D*Alan Speir\(^4\), Jeffrey B. Rich\(^4\), D*Gorav Ailawadi\(^3\)

\(^1\)Virginia Cardiac Surgery Quality Initiative, Falls Church, VA; \(^3\)University of Virginia, Charlottesville, VA; \(^4\)INOVA Heart and Vascular Institute, Falls Church, VA

Discussant: *Richard Prager, University of Michigan, Ann Arbor, MI

GENERAL THORACIC BREAKOUT Royal Palm Ballroom II-III

(Presentations are limited to seven minutes, followed by eight minutes of discussion.)

Moderators: *Elizabeth A. David and *Richard K. Freeman

Resident Moderator: David Ranney

2:00 pm - 2:15 pm (page 122)

25. Multi-institutional Validation of a Modified Thoracic Revised Cardiac Risk Index (m-ThRCRI) for Predicting Cardiac Complications Following Lung Resection

Daniel C. Thomas, Brian N. Arnold, Joshua E. Rosen, Michelle C. Salazar, D*Frank C. Dettnerbeck, Justin D. Blasberg, Daniel J. Boffa, Anthony W. Kim

Yale School of Medicine, New Haven, CT

2:15 pm - 2:30 pm (page 124)

26. Is Repeat Pulmonary Metastasectomy Indicated for Soft Tissue Sarcoma?


Memorial Sloan Kettering Cancer Center, New York, NY

2:30 pm - 2:45 pm (page 126)

27. Pilot Study Percutaneous Cryotherapy for Stage IA Lung Cancer

Frank A. Baciewicz\(^1,2\), Lance K. Heilbrun\(^2\), Deborah Hackstock\(^2\), Fulvio Lonardo\(^4\), Peter Littrup\(^2,3\)

\(^1\)WSU, Detroit, MI; \(^2\)Karmanos Cancer Center, Detroit, MI; \(^3\)Brown Medical Center, Providence, RI; \(^4\)Wayne State University, Detroit, MI

2:45 pm - 3:00 pm (page 128)

28. Evaluation of Esophageal Anastomotic Integrity With Serial Pleural Amylase Levels


WellStar Health System, Marietta, GA

3:00 pm - 3:15 pm (page 130)

29. Management of Anastomotic Leaks After Esophagectomy

Joshua L. Manghelli, David Blitzer, Adam Hicks, Karen Rieger, *DuyKhanh Ceppa, Thomas J. Birdas

Indiana University School of Medicine, Indianapolis, IN

3:15 pm - 3:30 pm (page 132)

30. Hospitalization Costs Following Surgery in High-Risk Patients With Early Stage Lung Cancer


Emory University, Atlanta, GA

*STSA Member  D Relationship Disclosure
THIRD SCIENTIFIC SESSION A

CONGENITAL BREAKOUT  Acacia I-III
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Moderators: *James St. Louis and *Mark Plunkett

2:00 pm - 2:15 pm (page 134)

31. Need for Pulmonary Arterioplasty at the Time of Bidirectional Cavopulmonary Anastomosis is an Independent Predictor of Poor Surgical Outcome
John D. Cleveland1,2, Susana Tran3, Cheryl Taka0, Winfield J. Wells4, Vaughn A. Starnes1,2, S.R. Kumar1,2
1Children’s Hospital, Los Angeles, Los Angeles, CA; 2University of Southern California, Los Angeles, CA
Discussant: *Carl Backer, Ann and Robert H. Lurie Children’s Hospital of Chicago, Chicago, IL

2:15 pm - 2:30 pm (page 136)

32. Major Aortopulmonary Collateral Arteries in Patients With Anatomy Other Than Pulmonary Atresia With Ventricular Septal Defect
William L. Patrick, *Richard D. Mainwaring, Olaf Reinhartz, Rajesh Punn, Theresa Tacy, Frank L. Hanley
Stanford University School of Medicine, Stanford, CA
Discussant: *Jeffrey P. Jacobs, Johns Hopkins All Children’s Heart Institute, St. Petersburg, FL

2:30 pm - 2:45 pm (page 138)

33. Current Results of Multistage Single Ventricle Palliation of Patients With Double Inlet Left Ventricle
Emory University School of Medicine, Atlanta, GA
Discussant: *Ross M. Ungereider, Wake Forest University, Winston-Salem, NC

2:45 pm - 3:00 pm (page 140)

34. Use of Heparin Coated Polytetrafluoroethylene Grafts Reduces Mortality in Neonates Receiving Systemic-to-Pulmonary Shunts
Adeel Ashfaq1, Amit Iyengar1, Brian Reemtsen2
1David Geffen School of Medicine at UCLA, Los Angeles, CA; 2Mattel Children’s Hospital, Los Angeles, CA
Discussant: Joseph Turek, Carver College of Medicine, Iowa City, IA

3:00 pm - 3:15 pm (page 142)

35. Surgical Strategy Toward Bi-ventricular Repair for Severe Ebstein’s Anomaly in Neonates and Early Infancy
Shu-Chien Huang, Yihsharring Chen
National Taiwan University Hospital, Taipei, Taiwan
Discussant: *Christopher Knott-Craig, Le Bonheur Children’s Hospital, Memphis, TN

3:15 pm - 3:30 pm (page 144)

36. Arch Augmentation via Median Sternotomy for Repair of Coarctation of Aorta With Associated Arch Hypoplasia is a Safe and Durable Procedure
W.H. Gray1,2, Winfield J. Wells1,2, Vaughn A. Starnes1,2, S.R. Kumar1,2
1University of Southern California, Los Angeles, CA; 2Children’s Hospital, Los Angeles, CA
Discussant: *Robert J. Dabal, University of Alabama, Birmingham, AL

3:30 p.m. – 4:00 p.m.
Break – Visit Exhibits
Orchid Ballroom/Foyer
ADULT CARDIAC BREAKOUT Royal Palm Ballroom IV-VIII
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Moderators: D*Faisal G. Bakaeen and ‘Bryan S. Helsel
Resident Moderator: Amanda Eilers

4:00 pm - 4:15 pm (page 146)
37. Similar Outcomes in Diabetic Patients After CABG With Single ITA Plus Radial Artery Grafting & Bilateral ITA Grafting
Sajjad Raza, DEugene Blackstone, Marijan Koprivanac, Penny Houghtaling, Lars G. Svensson, Joseph F. Sabik
Cleveland Clinic, Cleveland, OH
Discussant: *Walter H. Merrill, Vanderbilt University Hospital, Nashville, TN

4:15 pm - 4:30 pm (page 148)
38. Diagnosis and Surgical Management of Pericardial Constriction After Cardiac Surgery
Mayo Clinic, Rochester, MN
Discussant: D*Douglas Johnston, The Cleveland Clinic Foundation, Cleveland, OH

4:30 pm - 4:45 pm (page 150)
39. Incidence, Risk Factors, and Outcomes of Conversion from Off-pump Coronary Artery Bypass Grafting to On-pump Coronary Artery Bypass Grafting: A Report from the STS Adult Cardiac National Database
1Emory University, Atlanta, GA; 2University of Virginia, Charlottesville, VA; 3Duke Clinical Research Institute, Durham, NC; 4University of Pittsburgh, Pittsburgh, PA; 5Johns Hopkins All Children’s Hospital, St. Petersburg, FL
Discussant: D*Faisal G. Bakaeen, Cleveland Clinic, Cleveland, OH

4:45 pm - 5:00 pm (page 152)
40. Surgical Ablation of Atrial Fibrillation in the United States
1West Virginia University, Morgantown, WV; 2Inova Heart and Vascular Institute, Fairfax, VA; 3Duke Clinical Research Institute, Durham, NC; 4Washington University, St. Louis, MO; 5Northwestern University, Chicago, IL; 6Cleveland Clinic, Cleveland, OH; 7Emory University, Atlanta, GA; 8Johns Hopkins University, Baltimore, MD
Discussant: D*Gorav Ailawadi, University of Virginia, Charlottesville, VA

*STSA Member  D Relationship Disclosure
GENERAL THORACIC BREAKOUT  Royal Palm Ballroom II-III
(Presentations are limited to seven minutes, followed by eight minutes of discussion.)

Moderators: *Linda W. Martin and D*Basil Nasir

4:00 pm - 4:15 pm (page 154)
41. Transcervical Extended Mediastinal Lymphadenectomy (TEMLA) – Experience from a North American Cancer Center
*Saikrishna Yendamuri1, Athar Battoo1, Mark Hennon1, Chukwumere Nwogu1, D*Elisabeth Dexter1, Miriam Huang1, *Anthony Picone1, *Todd L. Demmy2
1Roswell Park Cancer Institute, Buffalo, NY; 2Cancer Institute of New Jersey, New Brunswick, NJ

4:15 pm - 4:30 pm (page 156)
42. Transversus Abdominis Plane (TAP) Block Improves Perioperative Outcomes After Esophagectomy Compared to Thoracic Epidural (TE)
Gal Levy1, Mark Cordes2, Ralph W. Aye1, Alexander S. Farivar1, DBrian E. Louie1
1Swedish Medical Center and Cancer Institute, Seattle, WA; 2Swedish Hospital, Seattle, WA

4:30 pm - 4:45 pm (page 158)
43. Office-Based Spirometry: A New Model of Care in Preoperative Assessment for Low-Risk Pulmonary Resections
Washington University School of Medicine, St. Louis, MO

4:45 pm - 5:00 pm (page 160)
44. Video-Thoracoscopic Management of Post-Pneumonectomy Empyema
Domenico Galetta, Alessandro Borri, Roberto Gasparri, Francesco Petrella, Lorenzo Spaggiari
European Institute of Oncology, Milan, Italy

CONGENITAL BREAKOUT  Acacia I-III
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Moderators: *Karla Christian and *Kristine J. Guleserian

4:00 pm - 4:15 pm (page 162)
45. Medium-Term Outcomes After Implantation of Expanded-Polytetrafluoroethylene Valved Conduit (ePTFE VC) for Right Ventricular Outflow Tract
*Yoshio Ootaki (Otaki), Allison Welch, Michael J. Walsh, Michael Quartermain, *Ross M. Ungerleider
Wake Forest Baptist Health, Winston-Salem, NC
Discussant: DJames A. Quintessenza, All Children’s Hospital, St. Petersburg, FL

*STSA Member  D Relationship Disclosure
4:15 pm - 4:30 pm (page 164)

46. Efficacy of an Extracellular Matrix in Systemic Loading Conditions in Congenital Heart Disease Surgical Repair
Adeel Ashfaq¹, Amit Iyengar¹, Oh Jin Kwon¹, Saad Soroya¹, Son Nguyen¹, Ryan Ou¹, Brian Reemtsen¹
¹David Geffen School of Medicine at UCLA, Los Angeles, CA; ²Mattel Children’s Hospital, Los Angeles, CA
Discussant: *Lauren Kane, Texas Children’s Hospital, Baylor College of Medicine, Houston, TX

4:30 pm - 4:45 pm (page 166)

47. Brom (Multisinus) Aortoplasty for Supravalvar Aortic Stenosis
Michael C. Monge¹,², *Carl L. Backer¹,², Osama Eltayeb¹,², Joyce T. Johnson¹,², Andrada R. Popescu¹,², Cynthia K. Rigsby¹,², John M. Costello¹,² ¹Ann & Robert H. Lurie Children’s Hospital, Chicago, IL; ²Northwestern University Feinberg School of Medicine, Chicago, IL
Discussant: *James St. Louis, Children’s Mercy Hospital, Kansas City, MO

4:45 pm - 5:00 pm (page 168)

48. A New Kaolin Impregnated Hemostatic Sponge (QuikClot®) is Effective for Intraoperative Hemostasis in Norwood Operation
Takeshi Shinkawa, Carl Chipman, Jessica Holloway, Xinyu Tang, Jeffrey M. Gossett, Michiaki Imamura
University of Arkansas for Medical Sciences, Little Rock, AR
Discussant: *Charles B. Huddleston, St. Louis University School of Medicine, St. Louis, MO

5:00 p.m. – 6:00 p.m.
STSA ANNUAL BUSINESS MEETING (Members Only)
Royal Palm Ballroom IV-VIII

6:00 pm - 7:00 pm
Resident’s Reception
Acacia IV-VI

7:00 pm – 9:00 pm
President’s Mixer
Sunset Veranda
SATURDAY, NOVEMBER 12, 2016

Cardiothoracic Coding and Reimbursement Update for 2017
Royal Palm Ballroom IV-VIII
7:00 am – 8:00 am

CME Credits Available: 1.0
Moderator: Jeffrey P. Jacobs

Educational Objectives: Upon completion of this program participants will be able to:
• Identify new CPT and ICD-10 diagnosis codes related to cardiothoracic surgery for 2017
• Recognize changes to Medicare related to MIPS and bundled payments starting in 2017.
• Describe the documentation and reporting requirements for G-codes required for all post-operative care starting in 2017

7:00 am - 7:20 am
Cardiothoracic CPT Coding Changes

DJoseph C. Cleveland
University of Colorado, Aurora, CO

*Richard K. Freeman
St. Vincent Hospital and Health System, Indianapolis, IN

7:20 am - 7:30 am
ICD-10 Diagnoses Coding Changes

*Jeffrey P. Jacobs
All Children’s Heart Institute, St. Petersburg, FL

7:30 am - 7:50 am
Overview of MIPS and Bundled Payments

7:50 am – 8:00 am
Q&A
SATURDAY, NOVEMBER 12, 2016

8:00 am - 9:00 am
Simultaneous Cardiac, General Thoracic, Congenital, and Transplant Breakout Sessions

CME Credits Available: 1.0

Attendees select to participate in one of the following four breakout sessions:

ADULT CARDIAC BREAKOUT Royal Palm Ballroom IV-VIII
(Presentations are limited to seven minutes, followed by eight minutes of discussion.)

Moderators: ‘Tom C. Nguyen and D’Ourania Preventza

8:00 am - 8:15 am (page 170)
49. Midterm Results of Hybrid Arch Repair With Zone 0 Stent Graft Deployment
Seyed Hossein Aalaei Andabili1, ‘Charles T. Klodell1, Teng Lee1, Philip Hess2, Tomas Martin2, DAdam Beck2, DRobert Feezor2, Salvatore Scali3, ‘Thomas M. Beaver1
1University of Florida, Gainesville, FL; 2Indiana University, Indianapolis, IN; 3Florida Hospital Orlando, Orlando, FL

8:15 am - 8:30 am (page 172)
50. Transmyocardial Laser Revascularization (TMR) for Class IV Angina: 30-Day Outcomes from a Contemporary, Multi-Center Patient Registry
Centennial Hospital, Nashville, TN

8:30 am - 8:45 am (page 174)
51. Intermediate Outcomes After Conservative Repair of Type A Aortic Dissection
Fernando Fleischman, James M. Tatum, Daniel Logsdon, W.H. Gray, Robbin G. Cohen, Amy Hackmann, Mark J. Cunningham, Vaughn A. Starnes, DMichael E. Bowdish
University of Southern California, Los Angeles, CA

8:45 am - 9:00 am (page 176)
52. Timing of Operation for Tricuspid Regurgitation After Heart Transplant
‘A. Michael Borkon, Kaitlyn Carl, Sanjeev Aggarwal, ‘Keith B. Allen, Alex Pak, John R. Davis, Eric Thompson, Jingyan Wang, Andrew Kao
Mid America Heart Institute of Saint Luke’s Hospital, Kansas City, MO

GENERAL THORACIC BREAKOUT Royal Palm Ballroom II-III
(Presentations are limited to seven minutes, followed by eight minutes of discussion.)

Moderators: D’Traves Crabtree and ‘DuyKhanh Ceppa
Resident Moderator: Christine Jenkins

8:00 am - 8:15 am (page 178)
53. Atrial Resection Without Cardiopulmonary Bypass for Lung Cancer: Experience from a Single Institution
Domenico Galetta1, Alessandro Borri1, Roberto Gasparri1, Francesco Petrella1, Lorenzo Spaggiari1
1European Institute of Oncology, Milan, Italy

‘STSA Member D Relationship Disclosure
8:15 am - 8:30 am (page 180)

54. Comparing Outcomes After Pulmonary Resection for Lung Cancer Between Veterans Administration Medical Center and an Academic Medical Center
Travis Geraci¹, Vanessa Baratta¹, John Young¹, Ann-Marie Duncan¹, Richard Jones¹, Thomas Ng¹
¹Warren Alpert Medical School of Brown University, Providence, RI
²Providence VAMC, Providence, RI
³Warren Alpert Medical School of Brown University, Providence, RI

8:30 am - 8:45 am (page 182)

55. Perioperative Outcomes of Patients Undergoing Pulmonary Lobectomy on Clopidogrel
Scott Atay¹, Arlene Correa¹, Wayne L. Hofstetter¹, Reza J. Mehran¹, David C. Rice¹, Jack A. Roth¹, Boris Sepesi¹, Stephen G. Swisher¹, Ara Vapourian¹, Garrett Walsh¹, Mara Antonoff¹
¹University of Texas, MD Anderson Cancer Center, Houston, TX

8:45 am - 9:00 am (page 184)

Current Surgeon Practices
Siyuan Cao¹, Gail Darling², Stephen C. Yang¹
¹The Johns Hopkins Medical Institution, Baltimore, MD
²General Thoracic Surgery Club Clinical Trials Group/University of Toronto, Toronto, Ontario, Canada

CONGENITAL BREAKOUT Acacia I-III
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Moderators: *Jeffrey P. Jacobs and *Randy Stevens

8:00 am - 8:15 am (page 186)

57. AvalonElite DLC Provides Reliable Total Cavopulmonary Assist in Failing Fontan Sheep Model Using Valved Extracardiac Conduit
Cheng Zhou¹, Dongfang Wang¹, Cherry Ballard-Croft¹, Guangfeng Zhao², Stephen Topaz², Joseph Zwischenberger¹
¹University of Kentucky, Lexington, KY
²W-Z Biotech, LLC, Lexington, KY
Discussant: *Umar Boston, Le Bonheur Children’s Hospital, Memphis, TN

8:15 am - 8:30 am (page 188)

58. Influence of Weight at Time of First Palliation on Survival in Patients With Single Ventricle
TK Susheel Kumar¹, Sushitha Surendran¹, Jeffrey A. Towbin¹, Jerry Allen¹, James B. Tansey¹, Umar Boston¹, David Zurakowski¹, Christopher J. Knott-Craig¹
¹Lebonheur Children’s Hospital, Memphis, TN
²Boston Children’s Hospital, Boston, MA
Discussant: *James Gangemi, UVA Medical Center, Charlottesville, VA

8:30 am - 8:45 am (page 190)

59. Repair of Transposition of the Great Arteries With Intact Ventricular Septum – Results With a Standardized Method of Coronary Transfer
*Kirk R. Kanter
Emory University School of Medicine, Atlanta, GA
Discussant: *Constantine Mavroudis, Florida Hospital for Children, Orlando, FL

8:45 am - 9:00 am (page 192)

60. Neonatal Transfer Does Not Impact Mortality Within a Regionalized Pediatric Cardiac Surgery Network
Michael F. Swartz, George M. Alfieris
University of Rochester, Rochester, NY
Discussant: *Dilip Nath, Children’s National Medical Center, Washington, DC

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D Relationship Disclosure

36 STSA 63rd Annual Meeting
TRANSPLANT BREAKOUT Mangrove I-II
(Presentations are limited to seven minutes, followed by eight minutes of discussion.)

Moderators: *Chadrick R. Denlinger and D*Jay D. Pal
Resident Moderator: Jesse Madden

8:00 am - 8:15 am (page 194)
61. Lung Transplant Outcomes in Patients With Re-Vascularized Coronary Artery Disease
   University of Texas San Antonio, San Antonio, TX

8:15 am - 8:30 am (page 196)
62. Donation After Cardiac Death Donors: A Single Center Experience
   Columbia University Medical Center, New York, NY

8:30 am - 8:45 am (page 198)
63. Minimally Invasive Left Ventricular Assist Device (LVAD) Implantation Reduces Blood Product Utilization After Heart Transplant
   *Denis Gilmore, Shi Huang, Yulia Khalina, Monica Djunaidi, Mary Keebler, Mark Wigger, D*Simon Maltais, Ashish Shah, Matthew Danter
   1Vanderbilt Medical Center, Nashville, TN; 2Vanderbilt Medical Center, Nashville, TN; 3Mayo Clinic, Rochester, MN

8:45 am - 9:00 am (page 200)
64. Is There a Difference in Bleeding After Left Ventricular Assist Device Implant: Centrifugal Versus Axial?
   Ann C. Gaffey, Carol W. Chen, Jennifer J. Chung, Jason Han, Joyce Wald, Michael A. Acker, Pavan Atluri
   1University of Pennsylvania, Philadelphia, PA, Uganda; 2University of Pennsylvania, Philadelphia, PA, United States

9:00 am - 9:30 am
Break
HAROLD URSCHEL HISTORY LECTURESHP

Harold Urschel History Lectureship  Royal Palm Ballroom IV-VIII

CME Credits Available: 0.25
Moderator: John W. Hammon

9:30 am - 9:50 am (page 202)

65. A Surprising Alliance: Two Giants of the 20th Century
   *Robert M. Sade
   Medical University of South Carolina, Charleston, SC
SATURDAY, NOVEMBER 12, 2016

9:50 am - 10: 50 am
Royal Palm Ballroom IV-VIII

CME Credits Available: 1.0
Moderators: *David R. Jones and *S. Adil Husain

9:50 am - 10:05 am (page 204)
66. Individual Assessment of Frailty Parameters in High- And Extreme-Risk Patients Who Underwent Transcatheter Aortic Valve Replacement
Jessica Forcillo1, Jose F Condado Contreras1, Yi-An Ko1, Michael Yuan2, Vasilis Babaliaros3, D* Brad Leshnower1, D Chandan Devireddy1, *Eric L. Sarin1, James P Stewart1, Hanna A Jensen1, Peter C Block1, *Robert Guyton1, D Vinod H. Thourani1
1Emory University, Atlanta, GA; 2Rollins School of Public Health-Emory University, Atlanta, GA

10:05 am - 10:20 am (page 206)
67. Surgeon Leadership in the Operating Room: What Behaviors Best Support Surgical Teamwork?
Juliana Stone3, Francesca Gino2, Emma L. Aveling1, Morgan Shields3, Cameron Wright1, *Thor Sundt1, Sara Singer1,2
1Massachusetts General Hospital, Boston, MA; 2Harvard Business School, Boston, MA; 3Harvard TH Chan School of Public Health, Boston, MA

10:20 am - 10:35 am (page 208)
68. Laparoscopic Synthetic Patch and Hepatic Buttress Repair of an Intrapericardial Diaphragmatic Hernia After Convergent “Hybrid” Maze Procedure
Andrew J. Kaufman1, Eugene Kahn2, Jon Villena2, Justin Steele2, Raja Flores1
1Icahn School of Medicine at Mount Sinai, New York, NY; 2Mount Sinai Beth Israel, New York, NY

10:35 am - 10:50 am (page 210)
69. Left Ventricular Outflow Tract Obstruction After Transcatheter Mitral Valve-in-Ring Implantation: A Word of Caution
Mayo Clinic, Rochester, MN

HOW TO DO IT Royal Palm Ballroom IV-VIII
SATURDAY, NOVEMBER 12, 2016
10:50 am - 11:50 am

CME Credits Available: 2.0
Educational Objectives: Upon completion of this program participants will be able to:
• Demonstrate insight into axillary artery cannulation, purpose and indications, and distinguish it from other cannulation sites
• Describe the role of axillary artery cannulation when providing antegrade cerebral perfusion during surgery on the proximal aorta (ie, the ascending aorta and transverse aortic arch)
• Indicate the related risks of using axillary artery cannulation to provide antegrade cerebral perfusion
• Discuss benefits of harvesting an IMA using skeletonized technique
• Discuss pitfalls to avoid with skeletonized technique
• Identify best patients in whom to utilized this approach

*STSA Member  D Relationship Disclosure
10:50 am – 11:05 am
Hyperthermic Intrathoracic Chemotherapy for Pleural Malignancies
D*Daniel L. Miller
WellStar Health System, Marietta, GA

11:05 am – 11:20 am
Axillary Artery Cannulation: Workhorse and Gold Standard
D*Ourania Preventza
Texas Heart Institute/Baylor College of Medicine, Houston, TX

11:20 am - 11:35 am
3-D Printing
*Shanda Blackmon
Mayo Clinic, Rochester, MN

11:35 am – 11:50 am
How to Harvest a Skeletonized IMA
Dawn S. Hui
St. Louis University Hospital, St. Louis, MO

12:00 pm
PROGRAM ADJOURNS
SCIENTIFIC PAPERS
V. Robotic Repair of Mitral Commissural Endocarditis With a Bridging Patch Technique

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Takashi Murashita, Kevin J. Tveten, D* J. S. Rankin, Lawrence M. Wei, ‘Vinay Badhwar

Author Institution(s): West Virginia University Medical Center, Morgantown, WV

Objectives: Mitral valve reconstruction is now the primary surgical approach in mitral endocarditis, with better early and late outcomes than prosthetic valve replacement. However, certain pathologies can be difficult, and reports of extension to a robotic platform have been limited. This video illustrates robotic repair of mitral commissural endocarditis, using a novel “bridging patch” technique.

Methods: A 20 year-old female college student presented with a febrile illness, heart failure, severe MR (with a posterior leaflet vegetation), and positive blood cultures for Streptococcus Viridans. After 4 days of intravenous penicillin, the patient underwent mitral valve repair, using a 4-port robotic system. The endocarditis had destroyed both anterior and posterior leaflet tissue at the posterior commissure, and was associated with a large vegetation. Involved leaflet tissue was resected, which left a large defect at the posterior commissure. The defect was closed with a patch of fresh autologous pericardium that bridged the gap in the commissure, and a # 28 mitral ring was inserted.

Results: After repair, the valve was completely competent with a mean valve gradient of 4 mmHg. The patient recovered uneventfully, and resumed college with no cardiac symptoms.

Conclusion: In a difficult endocarditis situation affecting both mitral leaflets at the posterior commissure, successful robotic repair was achieved using a bridging patch technique. Normal valve function was restored, suggesting this method could be useful in future cases of mitral commissural endocarditis.

*STSA Member  D Relationship Disclosure

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2V. Extracardiac Valved Conduit for Calcific Mitral Stenosis

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Justin Van Meeteren, *Hartzell Schaff

Author Institution(s): Mayo Clinic, Rochester, MN

Objectives: Calcific mitral valve stenosis with severe mitral annular calcification may present a difficult challenge to the surgeon. Several techniques for mitral valve replacement have been described for these complicated cases including wide debridement of the calcium with reconstruction of the annulus; another reported method is anchoring the prosthetic valve to atrial tissue. We present our technique for bypass of the calcified mitral valve with an extracardiac valved conduit; the method is simple and appears to have low perioperative risk.

Methods: In the video we present a patient with severe aortic stenosis, severe mitral valve disease with both stenosis and regurgitation, and coronary artery disease. Extensive calcification of the mitral valve and annulus complicated the procedure due to calcium extending through the myocardium.

Results: The patient underwent aortic valve replacement, correction of mitral regurgitation, bypass of the mitral valve with an extracardiac conduit, and coronary artery bypass. The video demonstrates details of constructing the conduit for mitral valve bypass, and postoperative images are shown.

Conclusion: Bypass of the mitral valve with a valved conduit is another option for treatment of severe calcific mitral stenosis with annular calcification. The procedure avoids risks of paravalvular leakage and bleeding that may develop with extensive debridement of the mitral annulus.
3V. Management of the Small Aortic Root Using the ‘Floating Valve Technique

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Jonathan M. Hemli, Yuriy Dudiy, Derek R. Brinster

Author Institution(s): Lenox Hill Hospital, New York, NY

Objectives: Dealing with the small aortic root is always a challenging clinical problem, particularly in the reoperative setting, in which scarring and fibrosis of surrounding tissues reduces the flexibility of the left ventricular outflow tract. In this situation, it may not always be possible to implant an adequately sized new valve prosthesis, thus resulting in a degree of patient-prosthesis mismatch, and leading to high trans-valvular gradients postoperatively. We demonstrate our preferred solution for addressing this difficult condition

Methods: Our technique for negotiating the small aortic root is demonstrated in a 31 year-old female patient who underwent aortic and mitral valve replacement in the not-too-distant past, and who now presented with unacceptably high gradients across her old 17 mm mechanical aortic valve.

Results: As illustrated in the video presentation, a 23 mm mechanical aortic valve was able to be secured within a 26 mm Valsalva graft. The valve was sited within the graft in an extra-anatomic position, “floating” within the sinus segment, rather than being positioned at the level of the annulus. This allowed us to implant a significantly larger valve than would otherwise have been possible. Postoperatively, the patient had a peak gradient of only 12 mmHg across the new aortic prosthesis.

Conclusion: Positioning the new aortic valve in a “floating” position within the sinus segment of the aortic graft allows a significantly larger prosthesis to be implanted than would otherwise be possible based on the diameter of the aortic annulus alone. We suggest that surgeons consider this technique when attempting to negotiate the small aortic root.
4V. Combined Pulmonary Artery Sleeve Resection / Left Upper Lobectomy and Extended Resection of the Thoracic Aorta After TEVAR for T4 Lung Cancer

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Raymond Lee, Gopal Singh, John Vandenberge, Jason Glotzbach, Issac George, Joshua R. Sonett

Author Institution(s): NY Presbyterian Hospital / Columbia University, New York, NY

Objectives: The therapeutic approach for advanced stage lung cancer is controversial, specifically in the surgical management of tumors invading the great vessels and mediastinum. We present a case in which we performed a left upper lobectomy and sleeve resection of the left pulmonary artery and extended resection of the thoracic aortic wall after the placement of an endoluminal prosthesis (TEVAR).

Methods: 77 year-old who had CT scan of the chest for routine surveillance due to 30 pack year smoking history. The CT scan revealed a spiculated mass in the medial left upper lobe (3.6 X 2.7), abutting the aortic arch. A PET CT showing the mass was FDG avid (SUV 14.2), clinical Stage, IIIA (T4NoMo). The mass was inseparable from the aortic arch, and Left Main pulmonary artery. Induction chemotherapy was initiated in anticipation of subsequent operative resection. To facilitate a safe resection of the aortic arch we performed preoperative thoracic endograft stenting (TEVAR) one week prior to the planned operative resection.

Results: She underwent mediastinoscopy and left thoracotomy with left upper lobectomy with pulmonary artery sleeve resection. The adventitia of the thoracic aorta was completely dissected free of the invasive tumor, followed by mediastinal and hilar lymphadenectomy. An intercostal muscle flap was positioned between the left pulmonary artery and bronchial staple line. Post-operative course was uneventful.

Conclusion: The use of induction therapy and extended resection of the pulmonary artery and aorta for advanced T4 tumors may be performed safely and may be aided with the use of prophylactic TEVAR. Tumors that invade the great vessels and mediastinum maybe approached after careful preoperative planning and extended resection should be considered for carefully selected patients.

*STSA Member  D Relationship Disclosure
Authors: *Shu-Chien Huang, Ling-Yi Wei

Author Institution(s): National Taiwan University Hospital, Taipei, Taiwan

Objectives: We reported a 27 day-old male baby, who was 3.7 kg and was diagnosed of tetralogy of Fallot with Ebstein’s anomaly. The initial presentations were respiratory distress and hypotension. Cyanosis was also noted after his PDA is closure. We present the surgical technique to repair the rare and severe anomaly.

Methods: Under standard cardiopulmonary bypass, we performed tricuspid valve reconstruction via both right ventricular outflow tract and right atrial approach. The tricuspid valve is downward displacement to the apex and right ventricular outflow tract. The anterior leaflet attached on the free wall of right ventricle and at the lower edge of the ventricular septal defect. The posterior leaflet is the only movable part. We detached and mobilized the tricuspid valve. Reattachment the valve to the normal position of tricuspid annulus was performed. VSD was repaired with Dacron patch after myomectomy, and right ventricular outflow tract was reconstructed with autologous pericardial patch. ASD was closed partially with a small fenestration.

Results: Post-operative echo showed mild tricuspid regurgitation without residual VSD nor RVOT stenosis. Post-operative course was smooth. After extubation on the post-operative day 14, the SpO2 was around 90% - 95% under room air without signs of heart failure.

Conclusion: We performed total correction of Tetralogy of Fallot with anomaly and pulmonary stenosis in a neonate. Post-OP course was quite good. Early repair for this rare and severe anomaly is feasible.
**Authors:** *Ali Dodge-Khatami, Jorge D. Salazar*

**Author Institution(s):** Children’s Heart Center, University of Mississippi Medical Center, Jackson, MS

**Objectives:** When wanting to avoid a median sternotomy, the muscle-sparing right axillary thoracotomy has successfully been used for the transatrial repair of more simple congenital heart defects. With additional surgical experience using this approach, the spectrum of defects amenable to a quality repair has expanded.

**Methods:** Between 2008-2016, 48 patients (26 ASD, 10 ventricular septal defects [VSD] including 3 with double-chambered right ventricle [DCRV], 8 Warden operations for partial anomalous pulmonary venous return [PAPVR], 3 partial atrio-ventricular canals with mitral valve cleft, and 1 cor triatriatum) underwent surgical repair through the right chest, using either induced ventricular fibrillation or aortic cross-clamping with cardioplegic arrest. The attached surgical video shows closure of a ventricular septal defect in a 10 month-old infant girl.

**Results:** Age ranged between 4 months-18 years, and weight from 5.5-82 kg. There was no mortality, no residual defects or peri-operative complications.

**Conclusion:** The muscle-sparing right axillary approach is a safe and reproducible technique to repair congenital heart defects typically accessible through the right atrium. In our experience, compared to other thoracic incisions, the approach is far away from breast tissue which is easily spared with minimal potential for future asymmetrical breast growth, no muscles are sacrificed with rapid functional recovery of the right arm and shoulder, and the cosmetic results highly appreciated by parents and patients alike. With gained expertise and surgeon comfort, the same high standards as through a median sternotomy are maintained without compromising repair quality.
7V. Repair of Aortic Valve, Large Periaortic Abscess and LV-PA Fistula in a 5-Year-Old With Acute Bacterial Endocarditis

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Authors: Matthew Johnston, Yoshio Ootaki, Michael Quartermain, Eduardo Goenaga-Diaz, Allison Welch, Ross M. Ungerleider

Author Institution(s): Wake Forest University, Winston Salem, NC

Objectives: Patient is a 5 year-old who presents with acute right hemispheric stroke, aphasia, fevers and hemodynamic instability. Blood cultures are positive for Strept Viridans. Echocardiography confirms small aneurysm near right and left coronary cusps with shunt from left ventricular outflow tract (LVOT) to pulmonary artery (PA). Initial course on antibiotics with improved hemodynamics and clearing of blood cultures, though continued tachycardia and respiratory difficulty. Repeat echo demonstrates rapidly enlarging aneurysm and increased LVOT to PA shunt.

Methods: Operation performed on cardiopulmonary bypass (CPB) with moderate hypothermia and single dose cardioplegia. LV vent and bilateral branch PA occlusion at inception of CPB. Findings: 1) destruction of part of left coronary leaflet of aortic valve and disintegration of commissure between left and right coronary leaflets; 2) large hole in LVOT communicating to main PA via walled off aneurysm between aorta and PA. Movie shows findings and repair of aortic valve, unroofing of aneurysm and patch closure of holes in LVOT and main PA.

Results: Uneventful postoperative course with extubation on post-operative day (POD) 2, transfer to step down unit on POD 3 and transfer to outpatient rehab (for stroke recovery) on POD 9. Repeat echo with mild residual aortic insufficiency, no residual shunt and elimination of aneurysm, with good ventricular function. Patient recovering right side strength and some speech by time of discharge.

Conclusion: Rapid increase in size of periaortic aneurysm in face of clearing blood cultures is an indication for urgent surgery. Aortic valve repair is possible by preserving remaining valve tissue and conforming annulus to “fit.” Movie also nicely demonstrates how a large disruption in LVOT can be “walled off” by inflammatory tissue. Aortic insufficiency with LVOT-PA communication requires immediate LV venting and branch PA occlusion at inception of CPB.

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8V. Repair of Incarcerated Type IV Hiatal Hernia with Intrathoracic Stomach, Herniated Omentum, Small Bowel and Transverse Colon Can be Safely Achieved via Laparoscopic Approach

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Authors: Farzaneh Banki

Author Institution(s): University of Texas Health Science Center Houston, Memorial Hermann Southeast Esophageal Disease Center, Houston, TX

Objectives: To demonstrate the safety and feasibility of laparoscopic repair of an incarcerated type IV hiatal hernia.

Methods: The laparoscopic approach was selected to treat a patient with a large type IV hiatal hernia with intrathoracic stomach, herniated omentum, small bowel and transverse colon.

Results: Laparoscopic repair was performed without intraoperative complications. Two cm tension free intra-abdominal length was obtained with mediastinal dissection and without the need for Collis gastroplasty. Crural closure was reinforced using A-Cell mesh and a Toupet fundoplication was performed. The patient did well and was discharged on postoperative day 3, tolerating a full liquid diet. She was seen on POD 14 and was doing well.

Conclusion: Large type IV hiatal hernia with intrathoracic stomach, herniated omentum, small bowel and transverse colon can be repaired laparoscopically without perforation or leak. Adequate tension free intra-abdominal esophageal length can be achieved without the need to perform a Collis gastroplasty.
9V. Video-Assisted Thoracoscopic Resection of Right Upper Lobe Lung Cancer with Chest Wall Involvement

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Authors: Erin A. Gillaspie, Shanda H. Blackmon

Author Institution(s): Mayo Clinic, Rochester, MN

Objectives: Lung cancers with chest wall invasion have classically been approached in an open fashion. We describe a minimally invasive approach to a right upper lobe lung cancer involving ribs 2-5.

Methods: Patient was a 53 year-old male smoker who presented with right posterior chest wall pain. Patient was discovered to have a 3.7 cm mass arising from the right upper lobe and extending into right posterior chest wall. Imaging revealed avidity in 2 level 10R lymph nodes, but no distant metastases. Biopsy confirmed a poorly differentiated squamous cell carcinoma. Neoadjuvant treatment was administered and restaging demonstrated a good tumor response.

Results: A thoracoscopic resection was performed through 3 ports: anterior 4th intercostal space (ICS) utility incision, and 8th ICS anterior and posterior ports. The hilum was dissected anteriorly and upper lobe vessels were transected. An energy device scored around the region of chest wall involvement to delineate the margins of resection. The ribs were divided anteriorly and posteriorly with a rongeur and an endoscopic Kerrison. The lobectomy was completed by dividing the bronchus and fissure to expose the posterior chest wall. The posterior dissection was completed, intercostal muscles were divided and specimen was separated from attachments to overlying serratus. The en bloc specimen was removed through the utility port. The defect was measured and a Gore-Tex patch secured into place with a trans-fascial tacking device. Recovery was uneventful and the patient was discharged on day 2.

Conclusion: Final pathology revealed <5% viable cells. Final stage was a ypT3N0Mo (IIB) squamous cell carcinoma. R0 resection. At follow-up the patient was doing well, had no chest wall pain and repeat imaging had no evidence of disease. Thoracoscopic resection of a lung cancer with chest wall involvement can be accomplished safely with accelerated recovery and significant reduction in the pain and morbidity.
1. Early Surgical Intervention in Patients with Mitral Valve Infective Endocarditis and Acute Stroke: Implications for Timing of Surgery

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Authors: Mehrdad Ghoreishi, Nate Foster, Sam Maghami, Chetan Pasrija, Brody Wehman, Murtaza Dawood, Bartely P. Griffith, D*James S. Gammie

Author Institution(s): University of Maryland School of Medicine, Baltimore, MD

Discussant: *Vinay Badhwar, West Virginia University Medical Center, Morgantown, WV

Objectives: According to current guidelines, mitral valve (MV) surgery for infective endocarditis (IE) should be delayed for at least 4 weeks in cases of newly diagnosed stroke. We investigated the outcomes of early surgical intervention (within a week) for MV IE among patients with acute preoperative stroke compared to those without stroke.

Methods: From 2003 to 2015, 314 patients underwent surgery for MV IE. Patients with history of chronic stroke (n=50) were excluded. Patients were categorized into 2 groups: those with preoperative acute stroke: 27% (70/264), and those without preoperative stroke: 73% (194/264). Both preoperative and postoperative strokes were confirmed in all patients with brain computed tomography and/or magnetic resonance imaging and comprehensive examination by a neurologist. Operative mortality and rate of stroke after surgery were compared between the two groups.

Results: The mean age was 50±15 years and 64% (168/264) were male. Mean time from admission to operation was 4±4 days. 29% (76/264) of patients had more than one valve involved and 14% (38/264) had a history of MV surgery (Table). Findings on preoperative brain imaging among patients with preoperative stroke were acute infarct 63% (44/70), infarct with hemorrhage 13% (9/70), hemorrhage 11% (8/70), abscess 4% (3/70), and normal in 9% (6/70). Overall operative mortality was 6% (16/264). Perioperative mortality was 6% (4/70) among patients with preoperative stroke and 6% (12/194) with no stroke (P=0.88). New postoperative strokes occurred in 4% (10/264) and the rate was not significantly different between the 2 groups: 4% (3/70) among patients with preoperative acute stroke and 4% (7/194) among patients with no stroke (P=0.79).

Conclusions: MV surgery for patients with IE and acute stroke can be performed early with a low risk of postoperative neurologic complication. Surgical intervention for MV infective endocarditis complicated by acute embolic stroke should not be delayed.

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<table>
<thead>
<tr>
<th>Variable</th>
<th>Patients (N = 264)</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF (mean, %)</td>
<td>56 ± 12</td>
</tr>
<tr>
<td>Renal failure - dialysis</td>
<td>19% (51 / 264)</td>
</tr>
<tr>
<td>Afb</td>
<td>16% (43 / 264)</td>
</tr>
<tr>
<td>LVDA</td>
<td>27% (71 / 264)</td>
</tr>
<tr>
<td>Endocarditis</td>
<td>100% (264)</td>
</tr>
<tr>
<td>MV</td>
<td>71% (188 / 264)</td>
</tr>
<tr>
<td>MV+AV</td>
<td>24% (64 / 264)</td>
</tr>
<tr>
<td>MV+TV</td>
<td>4% (10 / 264)</td>
</tr>
<tr>
<td>MV+AV+TV</td>
<td>1% (2 / 264)</td>
</tr>
<tr>
<td>Previous cardiac surgery</td>
<td>18% (47 / 264)</td>
</tr>
<tr>
<td>Previous Mitral valve surgery</td>
<td>14% (39 / 264)</td>
</tr>
<tr>
<td>Repair</td>
<td>5% (14 / 264)</td>
</tr>
<tr>
<td>Replacement</td>
<td>9% (25/264)</td>
</tr>
<tr>
<td>MV operation</td>
<td>100% (264)</td>
</tr>
<tr>
<td>Repair</td>
<td>53% (140 / 264)</td>
</tr>
<tr>
<td>Replacement</td>
<td>47% (124 / 264)</td>
</tr>
<tr>
<td>Mechanical</td>
<td>78% (96 / 124)</td>
</tr>
<tr>
<td>Bioprosthesis</td>
<td>22% (28 / 124)</td>
</tr>
<tr>
<td>Concomitant operations</td>
<td>56% (147 / 264)</td>
</tr>
<tr>
<td>CABG</td>
<td>11% (29 / 264)</td>
</tr>
<tr>
<td>AV operation</td>
<td>28% (74 / 264)</td>
</tr>
<tr>
<td>TV surgery</td>
<td>14% (36 / 264)</td>
</tr>
<tr>
<td>Root reconstruction</td>
<td>3% (8 / 264)</td>
</tr>
<tr>
<td>Microbiology</td>
<td>100% (264)</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>37% (98 / 264)</td>
</tr>
<tr>
<td>Streptococcus viridans</td>
<td>18% (48 / 264)</td>
</tr>
<tr>
<td>Culture Negative endocarditis</td>
<td>17% (46 / 264)</td>
</tr>
<tr>
<td>Other Streptococci groups</td>
<td>9% (24 / 264)</td>
</tr>
<tr>
<td>Entroccoccus species</td>
<td>8% (20 / 264)</td>
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<tr>
<td>HACEK</td>
<td>5% (13 / 264)</td>
</tr>
<tr>
<td>Coagulase negative staphylococci</td>
<td>2% (5 / 264)</td>
</tr>
<tr>
<td>Staphylococcus epidermidis</td>
<td>2% (4 / 264)</td>
</tr>
<tr>
<td>Fungal</td>
<td>2% (6 / 264)</td>
</tr>
</tbody>
</table>

**NOTES:**
2. Outcomes of Adult Extracorporeal Membrane Oxygenation with Outside Facility Transfer: A Regional Referral Center Experience

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Authors: David Ranney, Nawar Al-Rawas, Desiree Bonadonna, Babatunde Yerokun, Michael Mulvihill, Michael Weykamp, Rathnayaka Mudiyanseelage K. Gunasingha, Raquel Bartz, John Haney, D*Mani A. Daneshmand

Author Institution(s): Duke University Medical Center, Durham, NC

Discussant: D*Joseph B. Zwischenberger, University of Kentucky, Lexington, KY

Objectives: As the number of hospitals and adult patients utilizing extracorporeal membrane oxygenation (ECMO) increases, there is a proportional increase in referral to high volume centers for ongoing management. The outcomes of these patients are not well characterized and guidelines for referral patterns are lacking. This study describes the experience of a single high-volume adult ECMO center and the outcomes of its patients transferred prior to or after cannulation.

Methods: A single-center, retrospective study was performed that included adult patients (age ≥ 18) undergoing ECMO cannulation between June 2009 and December 2015. Patient characteristics and outcomes were acquired from the medical record. Multiple logistic regression was used to identify predictors of survival to hospital discharge; Kaplan-Meier methods were used to depict overall survival.

Results: Of 133 total patients, 77 (57.9%) underwent veno-arterial (VA) ECMO and 56 (42.1%) veno-venous (VV) ECMO (Table 1). Forty of the 133 (30.1%) were cannulated prior to transport. Patients resided from 53 outside facilities from 11 U.S. states. Median transport distance was 88.8 miles (range 0.2 – 1,434). Cardiogenic shock was the most common indication for ECMO (N=69, 51.9%), 34 (49.3%) of these requiring VA ECMO within 7 days of cardiac surgery. ECMO was indicated in 60 (45.1%) patients due to respiratory failure, 53 (88.3%) of these related to ARDS. Median duration of ECMO was 6 days (range 1-32.5). Age was found to be a negative predictor of survival to hospital discharge (OR 0.965, 95% CI 0.938 – 0.993; p =0.014). Of hospital survivors, overall one-year survival was 82.4% after VA ECMO and 95.5% after VV ECMO (Figure 1).

Conclusions: Outcomes are favorable following transport to a high volume ECMO center. Establishment of infrastructure for short and long distance ECMO transport is imperative for the efficient and successful ongoing management of these patients.

NOTES:
### Patient and Transport Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total (N=133)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>54.4 (19.8-83.5)</td>
</tr>
<tr>
<td>Male gender</td>
<td>83 (62.4%)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>79 (59.4%)</td>
</tr>
<tr>
<td>Black</td>
<td>31 (23.3%)</td>
</tr>
<tr>
<td>Other</td>
<td>23 (17.3%)</td>
</tr>
<tr>
<td>BMI</td>
<td>29.1 (14.6-78.2)</td>
</tr>
<tr>
<td>Mode of ECMO</td>
<td></td>
</tr>
<tr>
<td>VV</td>
<td>56 (42.1%)</td>
</tr>
<tr>
<td>VA</td>
<td>77 (57.9%)</td>
</tr>
<tr>
<td>Cardiogenic Shock</td>
<td>69 (51.9%)</td>
</tr>
<tr>
<td>Post-cardiotomy</td>
<td>34 (25.6%)</td>
</tr>
<tr>
<td>Cardiac arrest</td>
<td>28 (21.1%)</td>
</tr>
<tr>
<td>Acute MI</td>
<td>15 (11.3%)</td>
</tr>
<tr>
<td>Pre-ECMO MCS</td>
<td>47 (35.3%)</td>
</tr>
<tr>
<td>Respiratory Failure</td>
<td>60 (45.1%)</td>
</tr>
<tr>
<td>ARDS (influenza)</td>
<td>15 (11.3%)</td>
</tr>
<tr>
<td>ARDS (lung infection, non-influenza)</td>
<td>14 (10.5%)</td>
</tr>
<tr>
<td>ARDS (non-infectious)</td>
<td>24 (18.0%)</td>
</tr>
<tr>
<td>Mixed Shock</td>
<td>6 (4.5%)</td>
</tr>
<tr>
<td>Sepsis</td>
<td>2 (1.5%)</td>
</tr>
<tr>
<td>Distance from OSH, median (miles)</td>
<td>88.8 (0.2-1,434)</td>
</tr>
<tr>
<td>Cannulation at OSH</td>
<td>40 (30.1%)</td>
</tr>
<tr>
<td>Cannulation conversion after transport</td>
<td>14 (10.5%)</td>
</tr>
<tr>
<td>ECMO circuit malfunction</td>
<td>12 (9.0%)</td>
</tr>
<tr>
<td>Duration of ECMO, median (days)</td>
<td>6 (1-32.5)</td>
</tr>
<tr>
<td>Hospital LOS, median (days)</td>
<td>28 (1-702)</td>
</tr>
<tr>
<td>Survival to decannulation</td>
<td>94 (70.7%)</td>
</tr>
<tr>
<td>Survival to hospital discharge</td>
<td>76 (57.1%)</td>
</tr>
</tbody>
</table>

![Cumulative Survival](chart.png)

**One-Year Survival of Survivors to Hospital Discharge**
3. Aortic Root Replacement for Children With Loeys-Dietz Syndrome

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Author Institution(s): Johns Hopkins Medical Institutions, Baltimore, MD

Discussant: *Jorge D. Salazar, Boston Children’s Hospital, Boston, MA

Objectives: Loeys-Dietz syndrome (LDS) is an aggressive aortopathy with proclivity for aortic aneurysm rupture/dissection at smaller diameters than other connective tissue disorders. We reviewed our experience in children with LDS to validate our guidelines for root replacement (ARR).

Methods: We reviewed all children (<18 years) with a diagnosis of LDS who had ARR at our institution. Endpoints included mortality, complications, and need for further interventions.

Results: Thirty-four children with LDS underwent ARR. Mean age was 10 years and 15 (44%) were female. Mean preoperative root diameter was 4 cm (z score 7.8). Three (9%) had composite ARR with a mechanical prosthesis and 31 (91%) had a valve-sparing ARR. Concomitant procedures included arch replacement in 2 (6%), aortic valve repair in 1 (3%), atrial septal defect closure in 7 (21%), and patent foramen ovale closure in 16 (47%) children. There was no operative mortality. Two (6%) children required late replacement of the ascending aorta, 5 (15%) required arch replacement, 1 (3%) required mitral valve replacement, and 2 (6%) developed coronary button aneurysms/pseudoaneurysms requiring repair. Two children developed progressive aortic insufficiency following a Florida Sleeve procedure requiring redo valve-sparing ARR, and 2 developed progressive aortic insufficiency requiring aortic valve replacement following a valve-sparing procedure. No children suffered thromboembolism or endocarditis. There were 2 (6%) late deaths.

Conclusions: These data confirm the aggressive aortopathy of LDS and the concern for aortic catastrophe, even in children with smaller root dimensions. Valve-sparing ARR should be performed when feasible to avoid the risks of prostheses. Serial imaging of the arterial tree is critical given the propensity for dissection/aneurysm and rate of re-intervention. Concomitant arch replacement should be considered in selected children, but more data are required to make definitive recommendations.
4. Neonatal Aortic Arch Reconstruction With Splanchnic and Cerebral Perfusion Avoids Deep Hypothermia and Supports Recovery of Extracardiac Organs

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Authors: *David Bichell, Clinton D. Morgan, Venessa L. Pinto, Ashly Westrick, Chevis N. Shannon, *Karla Christian, *Bret A. Mettler

Author Institution(s): Vanderbilt University, Nashville, TN

Discussant: *E. Dean McKenzie, Texas Children’s Hospital, Houston, TX

Objectives: Neonatal aortic arch reconstruction, typically performed with deep hypothermia (DH) and selective cerebral perfusion (SCP), leaves splanchnic organ protection dependent on deep hypothermia alone. A novel method of direct in-field descending aortic perfusion during neonatal arch reconstruction permits the avoidance of deep hypothermia. We hypothesize that direct splanchnic perfusion at mild hypothermia will contribute to improved postoperative extracardiac organ recovery.

Methods: Eighty-eight consecutive biventricular patients <90 days old, undergoing aortic arch reconstruction with cardiopulmonary bypass (CPB) were included. Patients were grouped according to perfusion method A (SCP with DH at 18-20°C), or method B (cerebral and splanchnic perfusion at moderate hypothermia at 30-32°C). Patient characteristics, perioperative clinical and serologic data were analyzed. Univariate analyses were used to describe patient characteristics. Analysis of Variance (ANOVA) was applied to serologic data. Significance was assigned for p <0.05.

Results: Of 85 hospital survivors (96.6% survival), 25 underwent method A and 60 underwent method B. The average age at surgery was 17.1 ± 20.9 days, and average weight 3.2 ± 0.6 Kg, with no significant variation between groups. Method B patients had shorter CPB time (130 ± 38.4 vs 163.0 ± 55.8, p=0.01), shorter descending aortic cross clamp times (22.9 ± 8.32 min vs 60.8 ± 27.48 min), less frequent delayed sternal closures (10% vs 48%, p=0.0002), significantly lower peak postoperative serum lactate (p=0.02), lower postoperative serum creatinine (p=0.02). There were no significant differences seen in ascending aortic cross-clamp time, ventilator time, or LOS.

Conclusions: A simplified method of direct splanchnic perfusion during neonatal aortic arch reconstruction avoids the use of deep hypothermia and provides renal protection at least as effective as deep hypothermia.

NOTES:
5. The Changing Spectrum of Tracheostomy Related and Post Intubation Tracheal Stenosis: Implications for Surgical Treatment

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Authors: Samuel Kim, Charles Hsu, Alex G. Little

Author Institution(s): University of Arizona, Tucson, AZ; University of Arizona, Tucson, AZ

Discussant: D*Daniel L. Miller, WellStar Health System, Marietta, GA

Objectives: Identify the changing characteristic patterns and location of stenosis after tracheostomy or intubation and to assess the risk factors associated with peri-operative complication and restenosis following primary resection and reconstruction.

Methods: Retrospective review was performed (1/2012-3/2015) on patients with symptomatic tracheal stenosis treated at University of Arizona Medical Center due to prolonged intubation and tracheostomy. Demographics, surgical approach and outcome were obtained. Analysis was performed using chi square test, Kaplan-Meier estimate of survival, Cox proportional hazards survival analysis, and univariate and multivariate logistic regression.

Results: 48 patients were referred for surgical resection and 36 patients underwent primary resection and reconstruction. 72% of patients had prior endobronchial treatments for stenosis such dilation. 14 patients had tracheal stenosis related to prior intubation and 22 had tracheostomy related stenosis (16 percutaneous, 6 open tracheostomy). 52.8% of all patients had a stenosis proximal to or involving the cricoid. 72.7% of those with tracheostomy related stenosis had the stenosis at or proximal to cricoid while only 21.4% of the patients with intubation related stenosis had a stenosis at similar location. 19 patients underwent laryngo-tracheal resection, and 17 patients had tracheal resection. Mean length of resection was 3.6 cm. Body mass index >35 was associated with increased peri-operative complications (p<0.012). In multivariate analysis, patients age <30 at surgery had an increased relative risk of recurrence.

Conclusions: Recent advancement of percutaneous tracheostomy has increased the numbers of patients presenting with more proximal tracheal stenosis, necessitating more complex subglottic resection and reconstruction. The anastomotic and overall complication rate remains low despite more complex operation.

NOTES:

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### Comparison Between Tracheostomy Related Stenosis vs. Intubation Related Stenosis

<table>
<thead>
<tr>
<th>N (%)</th>
<th>Intubation Related Stenosis (N=14)</th>
<th>Tracheostomy Related Stenosis (N=22)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI &lt;35 kg/m²</td>
<td>13 (92.9)</td>
<td>17 (77.3)</td>
<td>0.221</td>
</tr>
<tr>
<td>BMI &lt;35 kg/m²</td>
<td>1 (7.1)</td>
<td>5 (22.7)</td>
<td></td>
</tr>
<tr>
<td>Co-Morbidity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>6 (42.9)</td>
<td>18 (81.8)</td>
<td>0.016</td>
</tr>
<tr>
<td>Any</td>
<td>8 (57.1)</td>
<td>4 (18.2)</td>
<td>0.236</td>
</tr>
<tr>
<td>DM</td>
<td>5 (35.7)</td>
<td>4 (18.2)</td>
<td>0.068</td>
</tr>
<tr>
<td>ESRD</td>
<td>2 (14.3)</td>
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</tr>
<tr>
<td>CRF</td>
<td>2 (14.3)</td>
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<td>COPD</td>
<td>5 (35.7)</td>
<td>0 (0.0)</td>
<td>0.956</td>
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<tr>
<td>CAD</td>
<td>2 (14.3)</td>
<td>3 (13.6)</td>
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<tr>
<td>Location Stenosis</td>
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<td>0.003</td>
</tr>
<tr>
<td>Cricoid/Proximal 1st-3rd tracheal ring</td>
<td>3 (21.4)</td>
<td>16 (72.7)</td>
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</tr>
<tr>
<td>Type of Surgery</td>
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<tr>
<td>Laryngotraceal</td>
<td>5 (35.7)</td>
<td>14 (63.6)</td>
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<tr>
<td>Tracheal resection</td>
<td>9 (64.3)</td>
<td>8 (36.4)</td>
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<tr>
<td>Length of Resection</td>
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<tr>
<td>Mean, (SD) cm</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>≤5.5 cm</td>
<td>3.9 (0.8)</td>
<td>3.4 (0.8)</td>
<td>0.062</td>
</tr>
<tr>
<td>&gt;5.5 cm</td>
<td>6 (42.9)</td>
<td>16 (72.7)</td>
<td>0.073</td>
</tr>
<tr>
<td>12 patients excluded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 3 CHF</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 2 Quadriplegia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 1 Oxygen dependent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 3 laryngeal stenosis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- 3 responded to dilation</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Flow Diagram of Patients Who Underwent Tracheal Resection and Reconstruction**

- **48 patients referred for tracheal stenosis**
- **36 patients qualified for surgery**
  - 22 tracheostomy related
  - 14 Intubation Related
- **19 Resection Cricoid/ trachea**
  - 16 trachea-thyroid anastomosis
  - 3 trachea-thyroid anastomosis with posterior mucosal flap
- **17 Resection Trachea**
  - 9 Trachea-cricoid anastomosis
  - 8 trachea-trachea anastomosis
6. Contemporary Practice Patterns and Outcomes of Surgery for Acute Type A Aortic Dissection: An Analysis of a Multi-Institutional Regional STS Database

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Authors: *Robert B. Hawkins*, Emily A. Downs¹, ’J H. Mehaffey’, Lily Johnston¹, ’Damien LaPar’, Clifford Fonner², Leora Yarboro¹, D Gorav Ailawadi, Ravi Ghanta¹

Author Institution(s): ¹University of Virginia, Charlottesville, VA; ²Virginia Cardiac Surgery Quality Initiative, Falls Church, VA

Discussant: D Ourania Preventza, Texas Heart Institute, Houston, TX; Baylor College of Medicine, Houston, TX

Objectives: The surgical management of acute Type A aortic dissection is evolving and many aortic centers of excellence are reporting improved outcomes. We hypothesize that similar trends exist in a statewide consortium of hospitals, with more extensive aortic operations being performed and overall outcomes improving.

Methods: Records for 914 patients who underwent aortic operations (2003 to 2012) for acute Type A aortic dissection were extracted from a regional Society of Thoracic Surgeons (STS) database. Patients were stratified by tertiles based on operative year. Differences in operative characteristics and outcomes were analyzed by univariate analysis while risk factors for mortality were determined by logistic regression.

Results: Surgery for Type A aortic dissection is increasing in extent and complexity (Table 1). The frequency of aortic root repair has increased from 16% in the early era to 67% currently (p<0.0001). Similarly, aortic arch operations increased from 27% to 37% (p<0.0001). Consequently, bypass and cross-clamp times have increased (Table 1). Cerebral perfusion is utilized in 86% of circulatory arrest cases, most frequently antegrade (57%). While operative mortality remained unchanged (16-19%), composite major morbidity decreased from 65% to 54% (p<0.0001) with notable decreases in permanent stroke and renal failure (Table 1). Logistic regression modeling indicates predictors of operative mortality are age (OR=1.03; p<0.0001) and renal failure requiring dialysis (OR=2.89; p<0.0001). Importantly, extent of aortic operation did not increase risk of mortality.

Conclusions: Extent of aortic surgery and use of cerebral perfusion has increased for acute Type A aortic dissection surgery in contemporary “real-world” practice. Operative mortality remains significant, but improved compared to historical outcomes. Major morbidity has decreased, most notably permanent stroke and renal failure.
CPB = cardiopulmonary bypass; IQR = interquartile range †Not captured in STS database during this era ‡ Major morbidity includes: permanent stroke, cardiac arrest, renal failure requiring dialysis, deep sternal wound infection, prolonged ventilation, reoperation for any reason

### CPB time (min; median, IQR)
- Overall: 178.5 (139-233)
- Middle (2009-2012): 176 (134-229)
- p value: 0.001

### Cross clamp time (min; median, IQR)
- Overall: 105 (76-150)
- Early (2003-2008): 97 (73-134.5)
- Middle (2009-2012): 106 (76-158)
- p value: 0.0138

### Circulatory arrest
- Overall: 541 (79.9%) (57 (79.2%)
- Early (2003-2008): 256 (80.0%)
- Middle (2009-2012): 228 (80.0%)
- Current (2013-2015): 0.9862

### Circulatory arrest with cerebral perfusion
- Overall: 242 (82.9%)
- Early (2003-2008): 48 (73.9%)
- Middle (2009-2012): 194 (85.5%)
- Current (2013-2015): 0.0284

### Cerebral perfusion type
- Antegrade: 133 (55.4%)
- Retrograde: 91 (37.9%)
- Both antegrade and retrograde: 16 (6.7%)

### Cerebral perfusion time (min; median, IQR)
- Overall: 28.5 (20-40)
- Middle (2009-2012): 29.5 (20-40)
- Current (2013-2015): 0.0839

### Lowest temperature (Celsius; median, IQR)
- Overall: 20.4 (18-25)
- Middle (2009-2012): 20.6 (18-24.7)

### Extent of Aortic Surgery
- Aortic root repair: 365 (39.9%)
- Aortic arch repair: 272 (29.8%)

### Outcomes
- Operative Mortality: 158 (17.3%)
- Major morbidity‡: 561 (61.4%)
- Permanent stroke: 77 (8.6%)
- Renal failure requiring dialysis: 117 (14.5%)

### p values
- Overall: 0.001
- Early: 0.001
- Middle: 0.001
- Current: 0.001

### NOTES:
- STSA 63rd Annual Meeting 73
7. Determinants of Hospital Variation in Pneumonia Rates After Coronary Artery Bypass Grafting: An Analysis of 324,085 Consecutive CABG Patients

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Authors: *Alexander A. Brescia*¹, D J. S. Rankin², Derek Cyr¹, *Jeffrey P. Jacobs*³, *Richard L. Prager*¹, Min Zhang³, Roland Matsouaka³, Steven D. Harrington⁵, Rachel S. Dokholyan¹, *Steven Bolling*¹, Astrid Fishstrom¹, David M. Shahian⁶, Donald S. Likosky⁶

Author Institution(s): ¹University of Michigan, Ann Arbor, MI; ²Cardiothoracic Surgery Associates, Nashville, TN; ³Duke Clinical Research Institute, Durham, NC; ⁴Johns Hopkins University School of Medicine, Baltimore, MD; ⁵Henry Ford Macomb Hospitals, Clinton Township, MI; ⁶Harvard Medical School, Boston, MA

Discussant: D Jay D. Pal, University of Washington, Seattle, WA

Objectives: Adults with congenital heart disease (ACHD) may present with end-stage heart failure necessitating orthotopic heart transplant (OHT). We sought to review the UNOS experience with this unique cohort with emphasis on surgical outcomes and survival.

Methods: From the UNOS registry, 737 ACHD recipients out of 26993 OHT patients (2.7%) who underwent OHT were queried to analyze early and late outcomes and compare to non-congenital recipients (NCR) over a fifteen-year period (2000-2014).

Results: More ACHD patients underwent OHT in the most recent era (3%; 2010-2014) as compared to the earlier period (2.5%; 2000-2004; p<0.03). ACHD recipients were more likely female (40% vs 24%; p<0.01), younger (mean age 35 vs 53 years; p<0.01), less likely with left ventricular assist device support (2% vs 14%; p<0.01) and spent more time on wait-list (mean 305 vs 216 days; p<0.01) when compared to NCR. When compared to the NCR in same time period, the ACHD cohort had longer post-operative length of stay (mean 28 vs 19 days; p<0.01), higher perioperative hemorrhage (3% vs 0.6%; p<0.01), higher operative mortality (11.5% vs 4.5%; p<0.001), higher incidence of liver failure (2.6% vs 0.8%; p<0.01) and higher need for dialysis (20% vs 9%; p<0.01). Re-transplantation rate was 2.3% during the follow up period (median 4 years) with overall estimated survival of 80%, 67% and 56% at 1,5 and 10 years respectively. Survival was significantly better in the most recent era (p<0.001).

Conclusions: Although the survival for OHT in ACHD has progressively improved over the past fifteen years, it is still associated with increased morbidity and operative mortality when compared to NCR.
Model estimates explaining factors of hospital variation in pneumonia rates

- Model 1: Patient demographics and admission status
- Model 2: Model 1 + patient risk factors
- Model 3: Model 2 + measure of pulmonary function
- Model 4: Model 3 + cardiac anatomy and function and medications
- Model 5: Model 4 + measures of intra- and post-operative care

Proportion of variation explained by each model:

- Unexplained Factors: 1.05%
- Traditional Patient Factors: 4.24%
- Measure of pulmonary function: 3.49%
- Cardiac anatomy and function and medications: 2.85%
- Intra- and post-operative care: 2.09%
8. Improved Lymph Node Staging in Early Stage Non-Small Cell Lung Cancer in the National Cancer Database

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Authors: Seth B. Krantz1,2, Waseem Lutfi1, Kristine Kuchta1, Chi-Hsiung Wang1, Ki Wan Kim1,2, *John Howington3

Author Institution(s): 1NorthShore University Health System, Evanston, IL; 2University of Chicago Pritzker School of Medicine, Chicago, IL; 3Saint Thomas Healthcare, Nashville, TN

Discussant: D*Robert J. Cerfolio, University of Alabama At Birmingham, Birmingham, AL

Objectives: Mediastinal lymph node assessment for non-small cell lung cancer (NSCLC) varies widely among centers. Our aim was to assess the quality of lymph node assessment in Stage I NSCLC, and determine what factors are associated with improved lymph node harvest.

Methods: We queried the NCDB to identify all patients with clinical Stage I NSCLC who underwent segmentectomy or lobectomy between 2004-2013. Patients were stratified into three groups based on the number of lymph nodes assessed (0-5, 6-15, >15).

Results: There were 51,545 patients who met inclusion criteria. From 2004 to 2013, mean lymph node counts increased from 8.1 to 10.0 (p<0.001). There was a significant decrease in the percent of patients with 0-5 nodes assessed (41.1% vs 31.1%, p<0.001) and a significant increase in those with >15 nodes assessed (10.1% vs. 17.0%, p<0.001). Compared to community centers, patients at academic centers were less likely to have 0-5 nodes assessed (27.2% vs. 43.5%, p<0.001). Independent predictors of >15 nodes assessed were increasing year, age >65, male sex, non African-American race, academic or high volume centers, lobectomy, and clinical T2 (all p<0.001).

Patients with >15 nodes assessed showed significantly more nodal upstaging than patients with 6-15 or 0-5 nodes (18.2% vs. 13.2% vs. 7.4%, respectively, p<0.001). Multivariable logistic regression analysis demonstrated significantly higher odds of nodal upstaging for each additional node assessed, up to fourteen nodes (all p<0.001). Assessing >14 nodes did not consistently increase the odds of upstaging. Having only 0-5 nodes assessed was associated with a worse overall survival.

Conclusions: The number of mediastinal lymph nodes assessed has increased significantly over the past decade but still varies widely by facility type. The optimum number of nodes to remove remains controversial, however, this data shows that there is a staging benefit up to 14 nodes assessed.
9. Causes and Patterns of Unplanned Readmissions After Anatomic Lung Resection: Comparison of Thoracoscopic vs. Open Approaches

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Authors: Rohun Bhagat1,5, Austin N. Ward2, Elizabeth Juarez-Colunga3,4, Michael R. Bronsert4, Natalia O. Glebova1, William G. Henderson3,4, David A. Fullerton1, Michael J. Weyant1, John D. Mitchell1, Jeremiah Martin2, Robert Meguid1

Author Institution(s): 1University of Colorado School of Medicine, Aurora, CO; 2University of Kentucky, Lexington, KY; 3University of Colorado School of Public Health, Aurora, CO; 4University of Colorado School of Medicine, Aurora, CO; 5University of Rochester, Rochester, NY

Discussant: *Richard K. Freeman, St Vincent’s Health and Hospital System/Indiana Heart Institute. Indianapolis, IN

Objectives: Hospital readmissions are increasingly viewed as a marker of inferior healthcare quality and penalized with decreased reimbursement. The timing of, and the reasons for unplanned postoperative readmissions after anatomic lung resections (ALR) are not well understood. We examine unplanned readmission following thoracoscopic (VATS) vs. open ALR to identify opportunities to improve patient care.

Methods: We analyzed the ACS NSQIP dataset (2012-14) to characterize 30-day unplanned postoperative readmissions after VATS vs. open ALR identified by CPT codes. Reasons for and timing of readmission are presented.

Results: Of 9075 patients who underwent ALR, 51% (4626) were VATS (86% lobectomies, 14% segmentectomies, <1% pneumonectomies), and 49% (4,449) were open (84% lobectomies, 8% segmentectomies, 8% pneumonectomies). Mean length of stay (LOS) after VATS was 4.9 days (standard deviation (SD) 4.3) vs. 6.9 days (SD 6.0) after open, p<0.001. 12% (538) of VATS experienced ≥1 complication, vs. 21% (954) of open, p<0.001. 7% (316) of VATS experienced unplanned readmissions, vs. 8% (367) of open, p=0.01. Causes of readmission are reported in the Table. 57% (96/169) of infectious complications for VATS occurred after discharge, vs. 44% (88/200) for open, p=0.6. Timing of unplanned readmission was similar for VATS and open (Figure).

Conclusions: Open ALR had nearly twice the complication rate but only a slightly higher readmission rate than VATS. More complications in VATS patients occurred after discharge than in open patients. Most infections in VATS patients occurred after discharge. Increased post-discharge complications in VATS patients may be due to decreased LOS. The majority of readmissions after ALR occurred within 2 weeks. Follow-up within the first few days after discharge may help identify patients at risk of unplanned readmission and facilitate intervention.
### Reasons for unplanned related postoperative readmissions.

<table>
<thead>
<tr>
<th>Reason for Unplanned Readmission</th>
<th>Total n (%)</th>
<th>VATS n (%)</th>
<th>Open n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases</td>
<td>527</td>
<td>288 (55%)</td>
<td>239 (45%)</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>228 (55%)</td>
<td>144 (50%)</td>
<td>144 (60%)</td>
</tr>
<tr>
<td>Infectious</td>
<td>90 (17%)</td>
<td>60 (21%)</td>
<td>30 (13%)</td>
</tr>
<tr>
<td>Cardiac/Transfusion</td>
<td>40 (8%)</td>
<td>22 (8%)</td>
<td>18 (8%)</td>
</tr>
<tr>
<td>Venous Thromboembolic</td>
<td>24 (5%)</td>
<td>15 (5%)</td>
<td>9 (4%)</td>
</tr>
<tr>
<td>Other</td>
<td>25 (5%)</td>
<td>13 (5%)</td>
<td>12 (5%)</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>20 (4%)</td>
<td>12 (4%)</td>
<td>8 (3%)</td>
</tr>
<tr>
<td>Pain</td>
<td>18 (3%)</td>
<td>10 (3%)</td>
<td>8 (3%)</td>
</tr>
<tr>
<td>Metabolic Derangement</td>
<td>11 (2%)</td>
<td>7 (2%)</td>
<td>4 (2%)</td>
</tr>
<tr>
<td>Renal</td>
<td>6 (1%)</td>
<td>3 (1%)</td>
<td>3 (1%)</td>
</tr>
<tr>
<td>Dehydration</td>
<td>5 (1%)</td>
<td>2 (1%)</td>
<td>3 (1%)</td>
</tr>
</tbody>
</table>

*Reasons for readmission of 28 of VATS and 128 of open anatomic lung resection patients not available.

---

**CHART:**

- **Title:** Percentage of Patients
- **X-axis:** Days after Discharge
- **Y-axis:** Percentage of Patients
- **Legend:**
  - VATS
  - Open

**Graph Description:**

- The graph illustrates the percentage of patients who had unplanned readmissions over time following anatomic lung resections via VATS vs. open approach.
- The vertical line at day 21 indicates a significant difference in readmission rates between VATS and open approaches.
- Log rank test p-value is 0.39.

**NOTES:**

Time from discharge to unplanned readmission following anatomic lung resections via VATS vs. open approach, in days. Log rank test p=0.39.
10. Bilateral Internal Mammary Artery Use Can Be Safely Taught Without Increasing Morbidity or Mortality

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Authors: Chetan Pasrija, Mehrdad Ghoreishi, Aakash Shah, Michael Rouse, Zachary Kon, Bradley S. Taylor

Author Institution(s): University of Maryland, Division of Cardiac Surgery, Baltimore, MD

Discussant: John S. Ikonomidis, Medical University of South Carolina, Charleston, SC

Objectives: Evidence shows a clear survival benefit with the use of bilateral internal mammary arteries (BIMA) compared to a single internal mammary artery (SIMA). BIMA is often not used or taught because of a perceived increase in operative time and complexity. We aimed to evaluate the effect of resident performance in BIMA cases on operative time, morbidity, and mortality.

Methods: From 10/2012 to 4/2015, all patients undergoing isolated coronary artery bypass grafting (CABG) were reviewed. Cases were stratified based on the use of SIMA vs. BIMA, and resident teaching vs. non-resident teaching case. Mammary artery harvest time was approximated by incision to heparin administration time. Primary outcomes were deep sternal wound infection (DSWI), renal failure (RF), stroke, readmission rates for pleural effusion, and mortality. Secondary outcomes included mammary harvest, cardiopulmonary bypass (CPB), and operative time.

Results: 416 cases were identified. BIMA compared to SIMA use in resident cases was associated with a longer operative and CPB time but didn’t impact morbidity or mortality. BIMA use in non-resident cases had no significant difference in total operative or CPB time. In fact, within the non-resident group, a subset analysis of 2 or 3 vessel CABG actually showed a significantly shorter CPB time in the BIMA group (83±25 vs 69±14 min, p<0.01). Outcomes, mammary harvest time, and operative time are detailed in Table 1. Overall, 30 day and 1-year mortality was similar in the two groups (SIMA: 1.53%, 1.89%, BIMA: 0%, 0%, p=NS). The rate of DSWI was minimal in both cohorts (0.9% vs. 0%, p=NS). Readmission for pleural effusions was significantly lower in the SIMA group compared to the BIMA group (0.6% vs 3.7%, p=0.05).

Conclusions: BIMA use can be effectively performed without an increase in operative or CPB time. In resident teaching cases, BIMA use may increase operative time, but can be safely taught without impacting morbidity or mortality.
<table>
<thead>
<tr>
<th></th>
<th>Non-Resident Teaching Case</th>
<th>Resident Teaching Case</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SI MA</td>
<td>BI MA</td>
</tr>
<tr>
<td>N</td>
<td>192</td>
<td>40</td>
</tr>
<tr>
<td>Average Vessels Grafted</td>
<td>3.2±0.8</td>
<td>3.3±0.9</td>
</tr>
<tr>
<td>Mammary Harvest Time (min)</td>
<td>23±19</td>
<td>46±20</td>
</tr>
<tr>
<td>CPB Time (min)</td>
<td>84±24</td>
<td>81±21</td>
</tr>
<tr>
<td>Operative Time (min)</td>
<td>209±43</td>
<td>214±39</td>
</tr>
<tr>
<td>Renal Failure (N)</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Stroke or TIA (N)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>DSW1(N)</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Readmission w Pleural Effusion (N)</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>30 day Mortality</td>
<td>1.6%</td>
<td>0%</td>
</tr>
<tr>
<td>1-year Mortality</td>
<td>2.0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

NOTES:
1B. Serum-Based Biomarker Panel May Predict Recurrence in Resected T1-2N0 Non-Small Cell Lung Cancer

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Authors: Christopher W. Seder, Andrew Arndt, Lia Jordano, Sanjib Basu, Cristina Fhied, Selina Sayidine, Gary Chmielewski, William H. Warren, Michael Liptay, Jeffrey Borgia

Author Institution(s): Rush University Medical Center, Chicago, IL

Discussant: Virginia R. Little, Boston Medical Center, Boston, MA

Objectives: A significant proportion of patients who undergo anatomic resection for T1-2N0 non-small cell lung cancer (NSCLC) will die of disease recurrence within 5 years. The ability to risk-stratify patients for recurrence may help individualize treatment and surveillance regimens. We hypothesized that a serum-based biomarker panel would be capable of identifying T1-2N0 NSCLC patients at greatest risk for recurrence.

Methods: An institutional biorepository of over 1,500 cases was used to identify patients with resected T1-2N0 NSCLC. Clinical and radiographic data were collected from patient charts and imaging studies. Pre-treatment serum specimens were evaluated in a blinded manner for 42 biomarkers that sampled biological processes associated with metastatic progression, including angiogenesis, energy metabolism, apoptosis, and inflammation. Receiver-operating characteristics curves and log-rank tests were used to evaluate individual biomarkers with respect to recurrence, followed by a random forest analysis to generate and cross-validate a multi-analyte panel to risk-stratify patients for recurrence.

Results: 150 patients with resected T1-2N0 NSCLC were identified for analysis with a median follow-up of 50.6 months. This included 69 males and 81 females with a median age of 69.5 years and a median smoking history of 30 pack-years. There were 47 cases of recurrence with a median time to recurrence of 16.1 months. A 7-analyte panel consisting of HE4, IGFBP-1, -HCG, follistatin, prolactin, angiopoietin-2, and HGF optimally identified patients with disease recurrence with an accuracy of 71% (AUC=0.631), sensitivity 29.8%, specificity 89.3%, PPV 56%, and NPV 73.6%.

Conclusions: Serum-based biomarkers may be useful for identifying T1-2N0 NSCLC patients at greatest risk for recurrence after lung resection.
2B. Ex Vivo Lung Perfusion Rehabilitates Sepsis-Induced Lung Injury

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Author Institution(s): UVA, Charlottesville, VA

Discussant: D’Joshua R. Sonett, Columbia University, New York, NY

Objectives: Sepsis is the number one cause of lung injury in adults. Ex vivo lung perfusion (EVLP) is gaining clinical acceptance for donor lung evaluation and rehabilitation, and may expand the use of marginal organs for transplantation. We hypothesized that four hours of normothermic EVLP would improve compliance and oxygenation in a porcine model of sepsis-induced lung injury.

Methods: We utilized a porcine lung injury model using intravenous lipopolysaccharide (LPS) to induce a systemic inflammatory response. Two groups (n=4 animals/group) received a 2-hour infusion of LPS via the external jugular vein. Serial blood gases were performed every 30 min until the PaO2/FiO2 ratio dropped below 150 on two consecutive readings. Lungs were then randomized to treatment with 4 hours of normothermic EVLP with Steen solution or 4 additional hours of in vivo perfusion (control). Airway pressures and blood gases were recorded for calculation of dynamic lung compliance and PaO2/FiO2 ratios. EVLP was performed according to the NOVEL trial protocol with hourly recruitment maneuvers and oxygen challenge.

Results: All animals reached a PaO2/FiO2 ratio <150 mmHg within 3 hours after start of LPS infusion. Animals in the control group had continued decline of oxygenation and compliance during the 4-hour in vivo perfusion period with three of the four animals dying within 4 hours due to severe hypoxia. As shown in Figure 1, the EVLP group demonstrated significant improvements in oxygenation and dynamic compliance from hour 1 to hour 4.

Conclusions: EVLP can successfully rehabilitate LPS-induced lung injury in this preclinical porcine model. Thus EVLP may provide a reliable means to rehabilitate many types of acute lung injury through other mechanisms including targeted drug therapy.
3B. A Novel Murine Model of Marfan Syndrome Accelerates Aortopathy and Cardiomyopathy by short-term Unloading by Left Ventricular Assist Device After Acute Myocardial Infarction Attenuates Left Ventricular Remodeling and Dysfunction Through Inhibition of MMP-2-mediated Apoptosis

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Authors: Nicholas Cavanaugh, Lan Qian, William J. Kutschke, Ella J. Born, Joseph W. Turek

Author Institution(s): 1University of Iowa Carver College of Medicine, Iowa City, IA

Discussant: Luca A. Vricella, Johns Hopkins University, Baltimore, MD

Objectives: Marfan syndrome (MFS) represents a genetic disorder with variable phenotypic expression. The main cardiovascular sequelae of MFS include aortic aneurysm/dissection and cardiomyopathy. While significant advances in the understanding of TGF-β signaling have led to promising therapeutic targets for the treatment of the most devastating effects resulting from aortic pathology, clinical studies have tempered this optimism. In particular, these studies suggest the existence of additional signaling pathways that play a significant role in disease progression. To date, studies aimed at elucidating molecular mechanisms involved in MFS-induced disease progression have been hampered by the lack of an accelerated disease model.

Methods: C57BL/6J (Wild-type) and Fbn1C1039G/+ (MFS) mice underwent subcutaneous, cervical osmotic mini-pump installation with either sodium chloride (in Wild-type mice, n=20; in MFS mice, n=7) or angiotensin II (4.5 mg/kg/day) (in MFS mice; n=15) for up to 28 days. Interval measurements of mouse hemodynamics were obtained throughout the experiment. Aortas and hearts were analyzed by transthoracic echocardiography and histopathology.

Results: This accelerated murine MFS model replicates increased mortality from MFS-related maladies (63% mortality at 28 days versus 0% for non-accelerated MFS mice). Aortic diameters in accelerated MFS mice were significantly enlarged at 10 days after mini-pump implantation (Figure 1) and correlated with a higher degree of elastin fragmentation. Accelerated MFS mice also demonstrated dilated cardiomyopathy at 14 days (Table 1), even in the absence of aortic insufficiency, suggesting an intrinsic etiology.

Conclusions: A novel in vivo model consisting of subcutaneously delivered angiotensin II in MFS mice reproducibly causes accelerated aortic aneurysm formation and cardiomyopathy within 14 days of implantation. This model allows for better investigation of the sequelae of MFS via rapid experimental processes.

<table>
<thead>
<tr>
<th>Wild Type + Vehicle</th>
<th>MFS + Vehicle</th>
<th>MFS + Angiotensin II</th>
</tr>
</thead>
<tbody>
<tr>
<td>End Diastolic Volume (ul)</td>
<td>35.32 ± 2.28</td>
<td>34.05 ± 2.45</td>
</tr>
<tr>
<td>Ejection Fraction (%)</td>
<td>80.16 ± 1.74</td>
<td>85.55 ± 1.22</td>
</tr>
<tr>
<td>Heart Mass (mg): Body Weight (g)</td>
<td>0.05066 ± 0.0015</td>
<td>0.05518 ± 0.0030</td>
</tr>
</tbody>
</table>

*STSA Member  D Relationship Disclosure
NOTES:
**4B. Erythropoietin Attenuation of Spinal Cord Ischemia Injury is cR-Receptor Dependent**

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**Authors:** Lisa S. Foley, Joshua Mares, DJoseph C. Cleveland, Michael J. Weyant, *David A. Fullerton, T. B. Reece

**Author Institution(s):** University of Colorado, Aurora, CO

**Discussant:** D*Scott A. LeMaire, Baylor College of Medicine, the Texas Heart Institute, and Baylor St. Luke’s Medical Center, Houston, TX

**Objectives:** Paraplegia from spinal cord ischemia reperfusion (IR) remains an elusive and devastating complication of complex aortic operations. Erythropoietin (EPO) attenuates this injury in models of spinal cord ischemia. Upregulation of the cR subunit of the EPO receptor is associated with neuron survival following ischemic injury. The purpose of this study was to examine whether EPO-mediated neuroprotection was dependent on cR expression. We hypothesized that isolated spinal cord neurons subjected to oxygen glucose deprivation (OGD) would mimic IR injury in aortic surgery and that EPO treatment attenuates this injury in a cR-dependent fashion.

**Methods:** Lentiviral vectors with cR knockdown sequences were created and tested on neuron cell lines and the virus with greatest cR knockdown was selected. Spinal cords from perinatal C57/BL6 mice were harvested and neurons cultured for 5 days. Neurons were treated with knockdown or nonsense virus and transfected cells selected with puromycin. Three groups (cR knockdown, lentiviral nonsense control, no virus control, n=8 of each) were subjected to one hour of OGD in a humidified hypoxic chamber. Viability was assessed with MTT assay. cR receptor expression was quantified by Western blot.

**Results:** EPO significantly preserved neuronal viability following OGD treatment (mean 0.82 ± 0.04 vs. 0.61 ± 0.01, p<0.01). Additionally, EPO-mediated neuronal preservation was similar in the nonsense virus and cells not treated with virus (mean 0.82 ± 0.04 vs. 0.80 ± 0.05, p=0.77). EPO attenuation of neuronal injury was lost in cR knockdown cells compared to nonsense controls (mean 0.46 ± 0.03 vs. 0.80 ± 0.05, p<0.01).

**Conclusions:** EPO attenuates neuronal loss following OGD in a cR-dependent fashion. This receptor holds immense clinical promise as a target for future pharmacotherapies treating spinal cord IR injury.
Figure 1: EPO preserved neuronal viability following OGD treatment (mean 0.82 ± 0.04 vs. 0.61 ± 0.01, p<0.01). This attenuation of injury was lost in BcR knockdown compared to nonsense controls (mean 0.46 ± 0.03 vs. 0.80 ± 0.05, p<0.01).

NOTES:
5B. Selective Localization of a Novel Dendrimer Nanoparticle in an Ischemia-reperfusion Model of Myocardial Infarction

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Authors: J. Trent Magrude1, Todd C. Crawford, Yi-An Lin2, Fan Zhang, Joshua C. Grimm, Rangaramanujam Kannan, Sujatha Kannan, *Christopher M. Sciortino

Author Institution(s): Johns Hopkins University School of Medicine, Baltimore, MD

Discussant: John W. Hamman, Wake Forest Baptist Medical Center, Winston-Salem, NC

Objectives: Dendrimer nanoparticle therapies represent promising new approaches to drug delivery, particularly in diseases associated with inflammatory injury. However, their application has not been fully explored in models of acute myocardial infarction and reperfusion injury.

Methods: White male New Zealand rabbits underwent left thoracotomy with 30-minute temporary LAD occlusion and infarction confirmed by EKG and histology (“MI” rabbits, n=9), or left thoracotomy and pericardial opening for 30 minutes but no LAD occlusion (control or “C”, n=9) rabbits. Following the 30-minute period, dendrimer (“G6-Cy5”, 6.7 nm diameter) was administered and the chest closed in layers. Animals were sacrificed at 3h (n=3 MI, 3 C), 24h (3 MI, 3 C), or 48h post-surgery (3 MI, 3 C). Of note, one 3h MI rabbit expired from cardiogenic shock prior to 3 hours and was excluded from analysis.

Results: As compared to controls, MI rabbits had twofold G6-Cy5 uptake in the myocardial anterior wall as compared to the same region in non-infarcted control rabbits at 24 hours post-surgery (p<0.05; Table 1). This trend was also present at 3h and 48h (p<some nonsignificant value here), and was qualitatively evident on confocal microscopy (Figure 1). Renal, hepatic, and splenic G6Cy5 accumulation was noted in both groups. The observed G6-Cy5 half-life in serum was approximately 12 hours, with 22% of the injected G6-Cy5 dose remaining at 48 hours; no inter-group differences were seen.

Conclusions: This is the first known study to demonstrate selective localization of a dendrimer-drug delivery system in infarcted as compared to normal myocardium. Subsequent studies will assess the efficacy of a dendrimer-drug conjugate in ameliorating reperfusion injury following myocardial ischemia and infarction.

Table 1. G6-Cy5 dendrimer tissue concentrations.

<table>
<thead>
<tr>
<th>Concentrations shown in ug per g tissue</th>
<th>24h sacrifice</th>
<th>48h sacrifice</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MI</td>
<td>Control</td>
</tr>
<tr>
<td>Heart - normal</td>
<td>4.44</td>
<td>2.61</td>
</tr>
<tr>
<td>Heart - anterior wall</td>
<td>6.00*</td>
<td>2.85</td>
</tr>
<tr>
<td>Lung</td>
<td>2.27</td>
<td>2.35</td>
</tr>
<tr>
<td>Liver</td>
<td>2.55</td>
<td>1.61</td>
</tr>
<tr>
<td>Spleen</td>
<td>8.27</td>
<td>5.43</td>
</tr>
<tr>
<td>Kidney</td>
<td>16.07</td>
<td>11.45</td>
</tr>
<tr>
<td>Brain</td>
<td>0.73</td>
<td>0.65</td>
</tr>
</tbody>
</table>

Table 1 – G6-Cy5 dendrimer concentrations in ug/g tissue for MI and control rabbits at 24 and 48 hours post-surgery. * denotes significant difference from control rabbits (p<0.05).
Figure 1 – Confocal microscopy showing G6-Cy5 dendrimer accumulation (red fluorescence) in ischemic anterior wall region (A) as compared to normal myocardium (B). Blue stain is DAPI (stains DNA).

NOTES:
6B. C-kit+ Cardiac Stem Cells Enhance Neonatal Right Ventricular Performance After Pulmonary Artery Banding

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Authors: Brody Wehman, Nicholas Pietris1, Osama T. Siddiqui1, Tieluo Li, Rachana Mishra1, Sudhish Sharma, *Sunjay Kaushal

Author Institution(s): University of Maryland School of Medicine, Baltimore, MD

Discussant: John Mayer, Boston Children’s Hospital, Boston, MA

Objectives: Right ventricular dysfunction is a major contributor to morbidity and mortality in patients with complex congenital heart disease (CHD), with limited treatment options. C-kit+ cardiac stem cells (CSCs) are shown to be safe and effective in large animal models and an early phase clinical trial for adult patients with ischemic heart disease, yet have not been evaluated in a preclinical model of RV dysfunction which is a salient feature of many forms of CHD.

Methods: Human c-kit+ CSCs were generated from right atrial appendage biopsies obtained during routine congenital cardiac surgeries. Immunosuppressed Yorkshire swine (6-9kg) underwent pulmonary artery banding to induce RV dysfunction. Thirty minutes after banding, pigs received intramyocardial injection into the RV free wall with c-kit+CSCs (1 million cells, n=5) or control (phosphate-buffered saline, n=5). RV function was monitored with serial transthoracic echocardiography and myocardial strain analysis. Pigs were euthanized at 30 days post-banding.

Results: Banding was calibrated to a consistent rise in RV: systemic pressure ratio across both groups (post-banding: CSCs=0.76±0.06, control=0.75±0.03). At 30 days post-banding the CSCs group demonstrated less RV dilatation and a significantly greater RV ejection fraction than the control group (p=0.002, Figure). Additionally, measures of RV myocardial strain including global longitudinal strain and strain rate were significantly greater in the CSCs group at four weeks relative to control (p=0.004 and p=0.01, respectively). The RV free wall in the CSCs group had a significantly greater percentage of viable myocardium as compared to the control group (97.9±0.81% vs. 91.2±2.5%, p=0.02).

Conclusions: Intramyocardial injection of c-kit+ CSCs results in enhanced RV performance relative to control at 30 days post-banding in neonatal pigs. This model is important for further evaluation of c-kit+ CSCs, including long-term efficacy.
Echocardiographic findings following right ventricular (RV) injection of human c-kit+ cardiac stem cells (CSCs) or control (saline) in the setting of pulmonary artery banding (PAB). A) RV ejection fraction was preserved in the CSCs group at 30 days post-banding compared to immediately post-banding, and was significantly greater than the control group ($**p<0.01$), which experienced a significant decline in function over the study period ($†p<0.01$). B) RV global longitudinal strain improved significantly in the CSCs group from baseline post-banding values ($†p<0.05$) and was significantly greater at 30 days relative to control values ($**p<0.01$).

NOTES:
11. Variability in Integrated Cardiothoracic Surgery Training Program Curriculum

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Authors: Elizabeth H. Stephens1, Dustin Walters1, Asad Shah3, Walter DeNino4, Amanda Eilers5, Vakhtang Tchantchaleishvili6, Andrew Goldstone7, Ryan Shelstad8, Tarek Malas9, Erin A. Gillaspie10, Marisa Cevasco11, Amy Fiedler12, Scott Halbreiner13, Kevin Koomalsingh14, Damien LaPar15

Author Institution(s): 1Columbia, New York, NY; 2Duke, Durham, NC; 3University of Washington, Seattle, WA; 4MUSC, Charleston, SD; 5University of Texas San Antonio, San Antonio, TX; 6University of Rochester, Rochester, NY; 7University of Pennsylvania, Philadelphia, PA; 8University of Colorado, Denver, CO; 9Ottawa Heart Institute, Ottawa, Ontario, Canada; 10Mayo Clinic, Rochester, MN; 11Brigham and Women’s Hospital, Boston, MA; 12Massachusetts General Hospital, Boston, MA; 13Cleveland Clinic, Cleveland, OH; 14Cedars Sinai, Los Angeles, CA; 15University of Virginia, Charlottesville, VA

Discussant: D*Richard Lee, Saint Louis University, St. Louis, MO

Objectives: The development of curricula that appropriately progresses a resident from medical school graduate to fully-trained cardiothoracic surgeon is a key challenge for integrated cardiothoracic training programs. This study examined variability and perceived challenges in integrated curricula.

Methods: Responses to the 2016 TSDA/TSRA survey that accompanies the in-training exam (ITE) taken by current cardiothoracic surgery residents were analyzed. Descriptive statistics were utilized to examine trends in participant responses.

Results: General surgery experience decreased during training, while cardiac operative experience increased (Fig. 1a). Rotations in a wide variety of adjunct fields were common (Fig. 1b). The vast majority (87%) of residents had dedicated cardiothoracic intensive care unit (ICU) rotations, while surgical ICU and cardiac care unit rotations were less common (68% and 42%, respectively). An array of surgical sub-specialty rotations were reported, most commonly vascular (94%) and acute care surgery (88%, Fig. 1c), with a wide range of duration (i.e., 0-44 weeks for vascular). Importantly, 52% felt competition with general surgery residents for experience and 22.5% of general surgery rotations were at hospitals without general surgery residents. Perceived challenges included optimization of rotations (78%), faculty allowing residents to perform case components (60%), faculty teaching in the operating room (29%), and surgical experience on general surgery rotations (19%).

Conclusions: Significant variation exists in integrated curricula. Optimization of rotations, access to surgical experience and integration with general surgery training programs appear the most significant perceived challenges among trainees. These data suggest that optimization of early clinical and surgical experience within institutions should improve trainee preparedness for senior cardiothoracic surgery training.

*STSA Member  D Relationship Disclosure
Fig. 1a
Operative Experience

Fig. 1b
Experience in Adjunct Fields

PGY=post-graduate year, OR=operating room, error bars indicate standard deviation.

NOTES:
Cath=catheterization, ED=emergency department.

Fig. 1c
Surgical Sub-Specialties

HPS=hepatobiliary.

NOTES:
12. Concomitant Atrial Fibrillation Ablation Remains Underutilized Despite No Additive Risk

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Authors: Lily E. Johnston1, Emily A. Downs1, Damien LaPar1, Irving L. Kron1, Jeffrey B. Rich2, *Alan Speir3, Mohammed Quader4, *Jonathan Philpott4, Gorav Ailawadi4

Author Institution(s): 1University of Virginia, Charlottesville, VA; 2Sentara Heart Hospital, Norfolk, VA; 3INOVA Heart and Vascular Institute, Fairfax, VA; 4Virginia Commonwealth University, Richmond, VA

Discussant: *Theresa D. Luu, Emory University, Atlanta, GA

Objectives: Historically, only 40% of patients with atrial fibrillation (AF) undergo ablation at the time of concomitant cardiac surgery. The objective of this study was to examine if utilization of concomitant surgical ablation has increased, and to determine its additive risks and costs.

Methods: Patients with preoperative AF undergoing cardiac surgery from a multi-institution STS database (2008-2015) were stratified based on whether they received a concomitant AF procedure. Propensity matching (1:1) based on comorbidities, procedures, and institution was performed. Mortality and composite major morbidity were evaluated.

Results: Of 7,091 patients with a pre-existing AF, 3,101 (43.7%) underwent a concomitant AF ablation procedure. Over time, there was no change in utilization of AF ablation procedures (p=0.1). Patients receiving concomitant AF treatment were, in general, healthier, younger (68 vs 72 years, p<0.001), and had less comorbidities (p<0.001). Propensity matching yielded two well-balanced groups of 1,402 patients each (median STS PROM: 2.46% vs 2.60%, p=0.2). The risk of mortality (OR 0.56, 95% CI 0.41-0.80, p=0.001) and major morbidity (OR 0.72, 95% CI 0.61-0.85, p<0.001) were lower in the AF-treated group. Post-operative stroke and prolonged ventilation were also lower in the treated group. While pacemaker implantation, re-admission, and post-operative length of stay were similar between groups (see table). Median total hospital costs were higher in patients receiving an AF corrective procedure, likely due to the costs of ablation devices.

Conclusions: Intraoperative treatment of AF remains under-utilized. AF ablation can be performed with negligible additional risk, albeit with increased costs. Recent randomized evidence demonstrating effectiveness of ablation in restoring sinus rhythm may increase its utilization in the future.

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Postoperative Outcomes of Concomitant AF Procedures in Unmatched and Matched Cohorts

<table>
<thead>
<tr>
<th>Outcome, N (%)</th>
<th>All (N=3,990)</th>
<th>AF Procedure (N=3,101)</th>
<th>p-value</th>
<th>Propensity-Matched (N=1,402)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-day mortality</td>
<td>276 (6.9)</td>
<td>102 (3.3)</td>
<td>&lt;0.001</td>
<td>101 (7.2)</td>
<td>60 (4.3)</td>
</tr>
<tr>
<td>Major Morbidity</td>
<td>1,203 (30)</td>
<td>615 (20)</td>
<td>&lt;0.001</td>
<td>430 (31)</td>
<td>340 (24)</td>
</tr>
<tr>
<td>Stroke</td>
<td>100 (2.5)</td>
<td>45 (1.5)</td>
<td>0.002</td>
<td>44 (3.1)</td>
<td>24 (1.7)</td>
</tr>
<tr>
<td>Prolonged Ventilation</td>
<td>931 (23)</td>
<td>433 (14)</td>
<td>0.001</td>
<td>325 (23)</td>
<td>248 (18)</td>
</tr>
<tr>
<td>Need for Pacemaker</td>
<td>138 (3.5)</td>
<td>129 (4.2)</td>
<td>0.1</td>
<td>59 (4.2)</td>
<td>70 (5.0)</td>
</tr>
<tr>
<td>30-day Readmission</td>
<td>502 (14)</td>
<td>378 (13)</td>
<td>0.2</td>
<td>174 (14)</td>
<td>163 (12)</td>
</tr>
<tr>
<td>Length of Stay, median (IQR)</td>
<td>8 (5-13)</td>
<td>7 (5-10)</td>
<td>&lt;0.001</td>
<td>8 (5-13)</td>
<td>8 (6-12)</td>
</tr>
<tr>
<td>Total Costs, median (IQR)</td>
<td>$46,753 ($32,202-$74,863)</td>
<td>$44,222 ($33,859-$61,659)</td>
<td>&lt;0.001</td>
<td>$46,652 ($31,608-$77,829)</td>
<td>$50,550 ($38,236-$72,484)</td>
</tr>
</tbody>
</table>

NOTES:
Impact of DiGeorge Syndrome on Early and Late Outcomes of Surgical Repair of Conotruncal Cardiac Anomalies

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Authors: *Bahaaldin Alsoufi, Courtney McCracken, *Kirk R. Kanter, Subhadra Shashidharan, *Brian Kogon

Author Institution(s): Emory University School of Medicine, Atlanta, GA

Discussant: *Andrew J. Lodge, Duke University Medical Center, Durham, NC

Objectives: We aim to describe the impact of 22q11.2 deletion (DiGeorge) syndrome on clinical characteristics, postoperative course, early and late outcomes of neonates undergoing surgery for conotruncal anomalies.

Methods: Retrospective review of 224 neonates who underwent surgery for interrupted aortic arch (n=67), truncus arteriosus (n=85) or ductal-dependent pulmonary atresia / ventricular septal defect (n=72) was performed (2002-12). Patients were divided into 3 groups: NG (n=119, no genetic syndromes), DG (n=64, DiGeorge), NDG (n=41, non-DiGeorge genetic syndromes). Outcomes between groups were compared.

Results: In comparison with NG group, DG group had longer durations of mechanical ventilation (148 vs. 102 h, p<0.001), ICU stay (268 vs. 159 h, p<0.001) and hospital stay (19.3 vs. 11.5 d, p<0.001). On adjusted analysis, there was a nonsignificant trend for increased unplanned reoperation (OR 2.8 (0.8-10.3), p=0.117) but no increased ECMO use (OR 1.5 (0.3-6.5), p=0.610), hospital mortality (OR 0.8 (0.1-4.2), p=0.743) or decreased late survival (HR 0.9 (0.4-2.1), p=0.822). In comparison to NG group, NDG group had longer durations of mechanical ventilation (190 vs. 102 h, p<0.001), ICU stay (236 vs. 159 h, p<0.001) and hospital stay (21.5 vs. 11.5 d, p<0.001); and increased unplanned reoperation (OR 3.7 (1.1-12.5), p=0.032), ECMO use (OR 4.4 (1.1-17.6), p=0.038), hospital mortality (OR 4.2 (1.2-14.5), p=0.021) and diminished late survival (HR 4.0 (2.1-8.1), p<0.001).

Conclusions: DiGeorge syndrome in neonates with conotruncal anomalies is associated with prolonged recovery and increased resource utilization. However, despite a trend for increased unplanned reoperation, there is no significant impact on early or late survival. In comparison, other genetic syndromes are associated with increased unplanned reoperation, ECMO use, hospital mortality and diminished late survival. These findings are important for family counseling and risk stratification.
Comparison of patients' characteristics and postoperative details between NG, DG and NDG groups.

<table>
<thead>
<tr>
<th></th>
<th>Overall N = 224</th>
<th>No Genetic Syndrome N = 119</th>
<th>Non-DiGeorge Genetic Syndrome N=41</th>
<th>DiGeorge Syndrome N=69</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Days), Median (25th - 75th)</td>
<td>6 (4 - 11)</td>
<td>6 (4 - 9)</td>
<td>8 (5 - 19)</td>
<td>6 (4 - 10)</td>
<td>0.074</td>
</tr>
<tr>
<td>Male Gender, N (%)</td>
<td>130 (58%)</td>
<td>71 (60%)</td>
<td>24 (59%)</td>
<td>35 (55%)</td>
<td>0.807</td>
</tr>
<tr>
<td>Weight (kg), Median (25th - 75th)</td>
<td>2.9 (2.5 - 3.1)</td>
<td>2.9 (2.5 - 3.3)</td>
<td>2.7 (2.3 - 3.0)</td>
<td>3.1 (2.7 - 3.4)</td>
<td>0.099</td>
</tr>
<tr>
<td>Weight ≤ 2.5 kg, N (%)</td>
<td>57 (25.5%)</td>
<td>30 (25.2%)</td>
<td>14 (34.2%)</td>
<td>13 (20.3%)</td>
<td>0.283</td>
</tr>
<tr>
<td>Premature, N (%) [n = 217]</td>
<td>53 (24%)</td>
<td>27 (24%)</td>
<td>16 (41%)</td>
<td>10 (16%)</td>
<td>0.015</td>
</tr>
<tr>
<td>ECMO Requirement</td>
<td>15 (6.7%)</td>
<td>6 (5.0%)</td>
<td>5 (12.2%)</td>
<td>4 (6.3%)</td>
<td>0.283</td>
</tr>
<tr>
<td>Unplanned Reoperation</td>
<td>22 (9.8%)</td>
<td>8 (6.7%)</td>
<td>8 (19.5%)</td>
<td>6 (9.4%)</td>
<td>0.059</td>
</tr>
<tr>
<td>Hospital Mortality</td>
<td>17 (7.6%)</td>
<td>8 (6.7%)</td>
<td>7 (17.1%)</td>
<td>2 (3.1%)</td>
<td>0.027</td>
</tr>
<tr>
<td>Duration of Mechanical Ventilation, hours Median (25th - 75th)</td>
<td>117 (69 - 198)</td>
<td>97 (53 - 161)</td>
<td>167 (80 - 382)</td>
<td>126 (77 - 260)</td>
<td>0.004</td>
</tr>
<tr>
<td>ICU Length of Stay, hours Median (25th - 75th)</td>
<td>167 (116 - 311)</td>
<td>145 (97 - 216)</td>
<td>179 (104 - 509)</td>
<td>243 (141 - 440)</td>
<td>0.001</td>
</tr>
<tr>
<td>Post-operative Length of Stay, days Median (25th - 75th)</td>
<td>13 (9 - 23)</td>
<td>10 (8 - 16)</td>
<td>19 (9 - 46)</td>
<td>18 (12 - 32)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

![Graph showing patient survival over time](image)

Notes:

- **p < 0.001**

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14. Pulmonary Artery Aneurysms: Presentation and Operative Outcomes

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Author Institution(s): Mayo clinic, Rochester, MN

Discussant: *Brian Kogon, Emory University School of Medicine, Atlanta, GA

Objectives: Pulmonary artery (PA) aneurysms are rare. To better understand presentation and results of surgical treatment, we reviewed our experience with surgical management of PA aneurysms.

Methods: We reviewed all patients with pulmonary artery aneurysms undergoing cardiac surgery between 1995 and 2015.

Results: There were 38 patients (24 females, 63%) whose mean age was 46 ± 15 years. Symptoms included dyspnea in 18 (47%), fatigue in 2 (5%), palpitations in 2 (5%), and syncope in 2 (5%). Indication for surgery was the aneurysm in 14 patients (37%), pulmonary valve regurgitation in 17 (45%) and PV stenosis in 4 (11%). Aneurysms were located in the main pulmonary artery in 35 (92%) with branch involvement in 5. Mean aneurysm diameter was 5.8 ± 1.8 cm. Congenital heart disease was present in 36 patients (95%), namely pulmonary stenosis and/or regurgitation (23, 64%) and tetralogy of Fallot (8, 21%). A dysplastic pulmonary valve was identified in 25 patients (66%). The average right ventricular systolic pressure (RVSP) was 45.8 ± 21.2 mmHg, and 31 patients had aneurysms with high pulmonary artery pressure (RVSP >30 mmHg). Operative strategies included reduction arterioplasty in 30 patients and graft interposition in 8. Length of stay was 6.0 ± 2.2 days. Morbidity included atrial fibrillation/flutter in 7 patients, pericardial effusion in 1 patient and pulmonary embolism in 1 patient. Late mortality occurred in 3 patients, all non-cardiac. Late reoperations occurred in 8%, due to endocarditis of the prosthetic pulmonary valve in 1 patient, recurrent pulmonary regurgitation in 1 patient requiring percutaneous valve implantation, and severe mitral stenosis in another.

Conclusions: The majority of surgical PA aneurysms occur in the setting of congenital heart disease and high pulmonary artery pressure. Repair can be done with low morbidity and mortality and is advised for symptomatic patients and for select asymptomatic patients with high-pressure aneurysms.
12 cm high pressure main pulmonary artery aneurysm

NOTES:
15. Surgical Outcomes in Clinical Stage IIIA – N2 Positive, Older Lung Cancer Patients in The Society of Thoracic Surgeons Database

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Author Institution(s): 1Yale University School of Medicine, New Haven, CT; 2Emory University, Atlanta, GA; 3Duke Clinical Research Institute, Durham, NC; 4Johns Hopkins, St Petersburg, FL; 5Massachusetts General Hospital, Boston, MA; 6Baptist Medical Center, Jacksonville, FL; 7Starr-Wood Cardiac Group, Portland, OR

Discussant: *David R. Jones, Memorial Sloan-Kettering Cancer Center, New York, NY

Objectives: The role of surgery in older patients with clinical stage, IIIA – N2 positive (c, IIIA-N2) lung cancer is controversial, in part because of variability in short and long-term outcomes. The objective of this study was to characterize the management of c, IIIA-N2 lung cancer in the Society of Thoracic Surgeons (STS) General Thoracic Surgery Database (GTSD).

Methods: The STS-GTSD was linked to Medicare data and queried for patients >65 years of age that underwent surgery for c, IIIA-N2 lung cancer between 2002 and 2012.

Results: 1,011 surgically-managed, older, IIIA-N2 patients were identified including 628 (62%) treated with initial surgery, 116 (11%), with induction chemotherapy, and 259 (26%) with induction chemoradiation (Table). In 2012 invasive mediastinal staging was performed in 74% (48/65) of induction patients, but only 34% (30/87) of initial surgery patients. Overall 42% of initial surgery c, IIIA-N2 patients were clinically over-staged in the mediastinum (final pStage I or, II). In the induction group 45% were ypStage I or, II, representing either response to induction therapy, or clinical over-staging. VATS was less common in the induction group (18% vs. 34% p < .001) and only 8% had a pneumonectomy. Overall 90-day mortality was similar for both initial surgery and induction therapy: wedge (6.5% vs. 9.1%), lobectomy (7.2% vs. 6.3%), pneumonectomy (15.9% vs. 8.8%). Kaplan Meier estimates of 5-year survival were similar between initial surgery (35%) and induction therapy (33%).

Conclusions: STS surgeons achieve excellent short and long-term results treating predominantly lobectomy-amenable c, IIIA-N2 lung cancer. However, prevalent over-staging and abstention from induction therapy suggest either “over-coding” of false positives on imaging, or variable compliance to current guidelines for c, IIIA-N2 lung cancer. Efforts are needed to improve clinical stage determination and guideline compliance in the GTSD for this cohort.

NOTES:

*STSA Member  D Relationship Disclosure

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<table>
<thead>
<tr>
<th>Variable</th>
<th>Overall N = 1011</th>
<th>Initial Surgery N = 628</th>
<th>Induction Therapy N = 383</th>
<th>P value</th>
</tr>
</thead>
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<tr>
<td>Age (Median Years)</td>
<td>72</td>
<td>73</td>
<td>70</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Male (%)</td>
<td>54</td>
<td>56</td>
<td>51</td>
<td>.1586</td>
</tr>
<tr>
<td>White/Caucasian (%)</td>
<td>94</td>
<td>95</td>
<td>92</td>
<td>.1060</td>
</tr>
<tr>
<td>Year of Surgery (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>2002-2004</td>
<td>96 (10)</td>
<td>58 (9)</td>
<td>38 (10)</td>
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<td>2005-2006</td>
<td>277 (27)</td>
<td>155 (25)</td>
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<td>2009-2012</td>
<td>638 (65)</td>
<td>415 (66)</td>
<td>223 (58)</td>
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<td>DLCO (median % predicted)</td>
<td>68</td>
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<td>FEV1 (median % predicted)</td>
<td>81</td>
<td>79</td>
<td>83</td>
<td>.0242</td>
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<tr>
<td>Induction therapy (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>0</td>
<td>116 (30)</td>
<td>259 (68)</td>
<td></td>
</tr>
<tr>
<td>Chemotherapy (&lt; 6 months)</td>
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<td></td>
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<td>Chemotherapy and radiation (&lt;6 months)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Radiation only</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pathologic Stage (7th edition AJCC) (%)*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>286 (29)</td>
<td>168 (27)</td>
<td>118 (32)</td>
<td>.4427</td>
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<tr>
<td>II</td>
<td>147 (15)</td>
<td>91 (14)</td>
<td>56 (15)</td>
<td></td>
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<tr>
<td>III</td>
<td>533 (54)</td>
<td>344 (56)</td>
<td>189 (51)</td>
<td></td>
</tr>
<tr>
<td>IV</td>
<td>24 (2)</td>
<td>15 (2)</td>
<td>9 (2)</td>
<td></td>
</tr>
<tr>
<td>Incomplete stage information</td>
<td>21</td>
<td>10</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>EBUS or Mediastinoscopy done (%)**</td>
<td></td>
<td></td>
<td></td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>None</td>
<td>74 (49)</td>
<td>57 (65)</td>
<td>17 (26)</td>
<td></td>
</tr>
<tr>
<td>EBUS only</td>
<td>21 (14)</td>
<td>10 (12)</td>
<td>11 (17)</td>
<td></td>
</tr>
<tr>
<td>Mediastinoscopy/Chamberlain only</td>
<td>49 (32)</td>
<td>16 (18)</td>
<td>33 (51)</td>
<td></td>
</tr>
<tr>
<td>Both EBUS and Mediastinoscopy</td>
<td>8 (5)</td>
<td>4 (5)</td>
<td>4 (6)</td>
<td></td>
</tr>
<tr>
<td>VATS Used for Primary Procedure (%)</td>
<td>281 (28)</td>
<td>213 (34)</td>
<td>68 (18)</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Primary mortality</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 day</td>
<td>38 (3.8)</td>
<td>23 (3.7)</td>
<td>15 (3.9)</td>
<td>.8369</td>
</tr>
<tr>
<td>90 day</td>
<td>78 (7.7)</td>
<td>49 (7.8)</td>
<td>29 (7.6)</td>
<td>.8939</td>
</tr>
</tbody>
</table>

* % of patients with complete staging information ** invasive mediastinal staging information only available for 2012 subgroup (N = 152)
16. Pilot Study to Incorporate Patient Reported Outcomes Associated With Lung Cancer Surgery into the STS Database

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Author Institution(s): 1Emory University School of Medicine, Atlanta, GA; 2Rollins School of Public Health, Emory University, Atlanta, GA; 3Georgia Tech, Atlanta, GA

Discussant: *Elizabeth A. David, David Grant Medical Center, Travis AFB, CA

Objectives: Currently, cancer outcomes are routinely evaluated by morbidity and mortality. A critical gap in the STS Database is the absence of patient reported outcomes (PRO), which are important for comparison of treatments and guideline development. Our aim was to demonstrate the feasibility of integrating PRO into our institutional STS data for patients undergoing lung cancer surgery.

Methods: The NIH Patient Reported Outcome Measurement Information System (PROMIS) includes reliable, precise measures of PRO. We developed a survey for patients undergoing lung cancer resection from validated question banks within PROMIS. PRO data were prospectively collected electronically on tablet devices, stored in the PROMIS Assessment Center website, and merged with our institutional data. The survey was administered preoperatively, at the first post-operative visit, and at 6 months.

Results: 131 patients were enrolled over 16 months. 39 were excluded (31 non-lung cancer, 7 withdrew, 1 mortality). Of the 92 patients remaining, 47 had reached 6 month follow up. Procedures included 16 wedges, 10 segmentectomies, 62 lobectomies, and 4 pneumonectomies. Mean age was 65.9, 39% of patients were men, and 64% were white. At the time of the first postoperative visit, there was a significant increase over baseline in pain, fatigue, and sleep impairment, and a decrease in physical function (Table). By 6 months these improved towards baseline (Figure). Anxiety and depression, however, significantly improved after surgery and at 6 months.

Conclusions: It is feasible to collect PRO data from lung cancer surgery patients and integrate the results into a clinical database. This pilot serves as a model for widespread incorporation of PRO data into the STS Database. Future integration of such data would continue to position the STS National Database as the gold standard for clinical registries. This will be necessary for assessing overall patient recovery from different cancer therapies.
Patient reported outcomes - Preoperative baseline and Postoperative data

<table>
<thead>
<tr>
<th>PROMIS Instrument</th>
<th>Baseline Measurement (N=92) Mean ± SD</th>
<th>Initial Postoperative Follow-Up (N=92) Mean ± SD</th>
<th>6 Month Follow-Up (N=47) Mean ± SD</th>
<th>p value</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain Intensity</td>
<td>40.5 ± 10.7</td>
<td>48.1 ± 8.1</td>
<td>42.3 ± 9.8</td>
<td>&lt;0.001</td>
<td>0.03</td>
</tr>
<tr>
<td>Pain Interference</td>
<td>50.0 ± 10.8</td>
<td>58.5 ± 8.4</td>
<td>51.2 ± 10.5</td>
<td>&lt;0.001</td>
<td>0.23</td>
</tr>
<tr>
<td>Physical Function</td>
<td>46.7 ± 9.3</td>
<td>38.9 ± 9.0</td>
<td>42.8 ± 8.5</td>
<td>&lt;0.001</td>
<td>0.001</td>
</tr>
<tr>
<td>Anxiety/Fear</td>
<td>56.2 ± 9.1</td>
<td>51.6 ± 9.1</td>
<td>48.0 ± 9.7</td>
<td>&lt;0.001</td>
<td></td>
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<tr>
<td>Depression</td>
<td>49.3 ± 7.6</td>
<td>48.2 ± 7.5</td>
<td>46.6 ± 7.7</td>
<td>0.13</td>
<td>0.02</td>
</tr>
<tr>
<td>Fatigue</td>
<td>48.8 ± 10.2</td>
<td>52.4 ± 8.6</td>
<td>49.8 ± 10.0</td>
<td>&lt;0.001</td>
<td>0.26</td>
</tr>
<tr>
<td>Sleep Related Impairment</td>
<td>48.1 ± 9.9</td>
<td>52.5 ± 8.9</td>
<td>46.2 ± 9.4</td>
<td>&lt;0.001</td>
<td>0.12</td>
</tr>
<tr>
<td>Ability to Participate in Social Roles</td>
<td>54.8 ± 8.9</td>
<td>48.5 ± 8.9</td>
<td>&lt;0.001</td>
<td>52.5 ± 9.7</td>
<td>0.05</td>
</tr>
<tr>
<td>Emotional Support</td>
<td>55.8 ± 7.2</td>
<td>56.2 ± 7.2</td>
<td>56.4 ± 7.2</td>
<td>0.56</td>
<td>0.76</td>
</tr>
<tr>
<td>Informational Support</td>
<td>57.4 ± 7.9</td>
<td>57.8 ± 7.4</td>
<td>58.0 ± 8.5</td>
<td>0.53</td>
<td>0.98</td>
</tr>
</tbody>
</table>

*For PROMIS instruments, the population mean for each outcome dimension has been normalized to be 50 on a 0-100 interval scale. When estimating the means and standard errors at each visit for each of the outcomes, a mixed-effects model was constructed to account for the within-subject covariance structure.

Figure: Patient reported outcomes at baseline (1), initial postoperative visit (2), and 6 months (3)

NOTES:

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Authors: Julius I. Ejiofor, Anthony V. Norman, Siobhan McGurk, James Rawn, Hari R. Mallidi, Sary F. Aranki, Prem Shekar, DTsuyoshi Kaneko

Author Institution(s): Brigham and Women’s Hospital, Harvard Medical School, Boston, MA

Discussant: Vinay Badhwar, WVU Heart & Vascular Institute, West Virginia University, Morgantown, WV

Objectives: With the emergence of transcatheter valve-in-valve/ring replacement for failed MV bioprostheses, comparative clinical benchmarks for surgical repeat MVR (re-MVR) are needed. However, there is a paucity of outcome data on patients undergoing re-MVR after previous repair (pMVP) or replacement (pMVR) procedures. We present in-hospital and survival outcomes of a twenty-year experience with re-MVR.

Methods: From 01/1992-06/2015, 520 adult patients underwent re-MVR; 273 had pMVP and 247 pMVR. Primary outcomes were operative mortality and long-term survival. Total follow-up time was 3777 patient-years.

Results: The mean age was 64±12yrs for pMVP and 63±15yrs for pMVR patients (p=0.281). The rate of endocarditis was higher for pMVR than for pMVP patients (27.1% vs 8.8%, p<0.001). PMVP were more likely to have concomitant CABG and valvular procedures (50.2% vs 46.2%, p<0.014), with longer median perfusion (180 vs 160mins, p<0.001) and cross-clamp times (118 v 100mins, p<0.005). Overall operative mortality was 37/520, 7%; 14/273, 5% for pMVP vs 23/247, 9% for pMVR (p=0.087). The groups had comparable rates of postoperative stroke (pMVP = 5.1% vs pMVR = 5.3%, p=1.0) and new pacemaker implantation (8.1% vs 8.5% respectively, p=0.88). PMVP patients had shorter hospitalizations (median 9d vs 11d, p≤0.001). Median unadjusted survival was 13.7yrs for pMVP and 8.3yrs for pMVR (p=0.001). A Cox proportional hazard analysis (Figure 1) showed that, pMVR (HR 1.395 95% CI = 1.073 – 1.813), renal failure (HR 1.531, 95% CI - 1.101 – 2.127) and endocarditis (HR 2.605, 95% CI=1.869 – 3.630) were associated with shortened survival after re-MVR.

Conclusions: Reoperative MVR is a high risk operation with pMVP patients having better long-term survival compared to pMVR. Our identified factors should be taken into taken into account for patients requiring re-MVR with a consideration for transcatheter valve-in-valve.
Figure 1: Cox proportional hazard model of longitudinal survival, stratified by previous procedure. Overall model performance -2 Log likelihood = 2653.949, Chi sq = 100.991, df = 4, p<0.0001

NOTES:
18. Contemporary Outcomes for Low-risk Surgical Aortic Valve Replacement: A Benchmark for Evaluating Transcatheter Aortic Valve Technology

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Authors: Lily E. Johnston¹, Emily A. Downs¹, Robert B. Hawkins¹, Mohammed Quader², D*Alan Speir³, *Jeffrey B. Rich⁴, Ravi Ghanta¹, Leora Yarboro¹, D*Gorav Ailawadi⁴

Author Institutions: ¹University of Virginia, Charlottesville, VA; ²Virginia Commonwealth University, Richmond, VA; ³INOVA Heart and Vascular Institute, Fairfax, VA; ⁴Sentara Heart Hospital, Norfolk, VA

Discussant: *Chad N. Stasik, University of Texas Health Science Center at San Antonio, San Antonio, TX

Objectives: Two large, randomized trials are underway evaluating transcatheter aortic valve replacement (TAVR) against conventional surgical aortic valve replacement (AVR). We analyzed contemporary, real-world outcomes of surgical aortic valve replacement in low-risk patients to provide a practical benchmark of outcomes and cost for evaluating current and future TAVR technology.

Methods: From 2010 to 2015, 2,505 isolated AVR operations were performed for isolated severe aortic stenosis (AS) at 18 statewide cardiac institutions. Of these, 1,434 patients had a STS predicted risk of mortality (PROM) less than 4%, and met other clinical and hemodynamic criteria as outlined in the PARTNER 3 protocol, including 963 patients who were ≥65 years of age. Patients with endocarditis, end stage renal disease, EF<45%, and previous valve replacements were excluded. Outcomes of interest included operative mortality and perioperative adverse events.

Results: The STS PROM for the patients over age 65 was 1.63%, with a median age of 74 (IQR 69-79). The prevalence of preoperative risk factors and incidence of complications is shown in Table I. Operative mortality was 1.0%, permanent stroke was 1.3%, and pacemaker requirement was 4.6%. The most common adverse events were transfusion of 2 or more units of red blood cells (20%) and atrial fibrillation (32%). The median length of stay was 6 days (IQR 5-8). Median total hospital cost was $38,018 (IQR $30,632-$46,235). Examination of complications by age<65 vs. ≥65 demonstrated significantly lower need for transfusion (10.4%, p<0.001), atrial fibrillation (18.3%, p<0.001), and reoperation (2.5% vs 5.5%, p=0.012).

Conclusions: In the current era, low risk patients undergoing surgical AVR have excellent results. The most common complications were atrial fibrillation and bleeding. These real-world results should provide additional context for upcoming transcatheter clinical trial data.
### Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>N=963</th>
</tr>
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<tbody>
<tr>
<td><strong>Preoperative Factors</strong></td>
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<td>Patient Age, median (IQR)</td>
<td>74 (69, 79)</td>
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<tr>
<td>STS PROM, median (IQR)</td>
<td>.0163 (.0113, .0231)</td>
</tr>
<tr>
<td><strong>Postoperative Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>Operative Mortality</td>
<td>10 (1.0%)</td>
</tr>
<tr>
<td>2+ PRBC Units</td>
<td>193 (20.0%)</td>
</tr>
<tr>
<td>Any Reoperation</td>
<td>53 (5.5%)</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>304 (31.6%)</td>
</tr>
<tr>
<td>Pacemaker</td>
<td>44 (4.6%)</td>
</tr>
<tr>
<td>All Renal adverse events</td>
<td>15 (1.6%)</td>
</tr>
<tr>
<td>Permanent stroke</td>
<td>13 (1.3%)</td>
</tr>
<tr>
<td>Major morbidity (Composite)</td>
<td>124 (12.9%)</td>
</tr>
<tr>
<td>Total cost ($), median (IQR)</td>
<td>38017.51 (30631.94, 46234.76)</td>
</tr>
<tr>
<td>Length of stay, median (IQR)</td>
<td>6 (5, 8)</td>
</tr>
</tbody>
</table>

NOTES:
19. Risk Factors for Late Aortic Valve Dysfunction Following the David V Valve Sparing Root Replacement

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Authors: Jiro Esaki1, D*Brad Leshnower2, Jose Binongo2, Yi Lasanajak2, LaRonica McPherson2, *Robert Guyton2, *Edward P. Chen2

Author Institution(s): 1Otsu Red Cross Hospital, Otsu, Japan; 2Emory University, Atlanta, GA

Discussant: *John S. Ikonomidis, Medical University of South Carolina, Charleston, SC

Objectives: Valve sparing root replacement (VSRR) is an established therapy for aortic root pathology. However, late aortic valve dysfunction requiring reoperation remains a primary concern of this procedure. This study examines risk factors for aortic insufficiency (AI) and aortic stenosis (AS) following the David V VSRR.

Methods: A retrospective review from 2005-2015 identified 282 patients who underwent VSRR. Cox proportional hazards model was used to determine risk factors of late AI and AS.

Results: The mean age of the series was 46.4 yrs. Sixty-four patients (22.7%) had bicuspid valves and 41 patients (14.5%) had Marfan syndrome. The incidence of reoperations was 9.6% (27 pts) and 42 cases (14.9%) were performed in the setting of acute type A dissection. Concomitant procedures were CABG in 31 patients (11.0%), and arch replacement in 154 patients (54.6%). Operative mortality was 2.8% (8 pts). 7-year survival and freedom from reoperation were 90.9% and 96.7%, respectively, 7-year freedom from >2+ AI and >1+ AI was 97.1% and 84.6%, respectively. 7-year freedom from greater than moderate AS and greater than mild AS was 98.8% and 79.8%, respectively. Univariate analysis showed early VSRR experience (2005-2006) & aortic root size >55 mm were associated with late AI while bicuspid valves, cusp repair & preoperative mild AS were associated with late AS. Multivariable analysis showed early VSRR experience (2005-2006) & aortic root size >55 mm were associated with late AI while bicuspid valves, cusp repair & preoperative mild AS were associated with late AS. Multivariable analysis showed aortic root size >55 mm were associated with late AI while bicuspid valves, cusp repair & preoperative mild AS were associated with late AS.

Conclusions: VSRR can be performed with low operative risk and good overall long-term patient survival even in complex clinical settings. Durable valve function can be expected, however, aortic root size >55 cm and bicuspid valve anatomy represent independent risk factors for late aortic valve dysfunction following these procedures.
20. Whole Body Perfusion Strategy for Aortic Arch Repair Under Moderate Hypothermia: Simultaneous Antegrade Cerebral Perfusion and Lower Body Perfusion

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Authors: Christopher L. Tarola, Katie L. Losenno, Jill J. Gelinas, Philip M. Jonesz, Phil Fernandes, Stephanie A. Fox, DBob Kiaii, DMichael Chu

Author Institution(s): Western University, London, Ontario, Canada

Discussant: D*Joseph S. Coselli, Texas Heart Institute, Houston, TX; Baylor College of Medicine, Houston, TX

Objectives: Aortic arch reconstruction under moderate hypothermia is commonly performed with antegrade cerebral perfusion (ACP) for brain protection; however, hypothermia alone is often solely relied upon for visceral and lower body protection. We investigate whether adding simultaneous lower body perfusion to ACP (whole body perfusion - WBP) may ameliorate the metabolic derangements of moderate hypothermic circulatory arrest (MHCA).

Methods: Between 2008 and 2014, 106 consecutive patients underwent elective or emergent aortic arch surgery with MHCA and either ACP only (44 patients, 66±12 years, 30% (13) female) or WBP (62 patients, 61±15 years, 31% (19) female).

Results: Patient demographics are described in Table 1. Cardiopulmonary bypass (CPB) time, cross-clamp time, and ACP time were significantly longer in the WBP group (all p <0.0001). More patients in the WBP group underwent total arch replacement (p = 0.007). There were no significant differences between groups in 30-day mortality (ACP: 3 (6.8%), WBP: 2 (3.2%); p = 0.65), stroke (ACP: 1 (2.3%), WBP: 1 (1.6%); p = 1.0), or renal failure (ACP: 2 (4.5%), WBP: 1 (1.5%); p = 0.57). In the WBP group, there was a significant reduction in lactate at ICU admission (ACP 5.5 vs. WBP 3.5 mmol/L; p = 0.002), time to lactate normalization (p = 0.014), and median ICU length-of-stay (ACP 3 vs. WBP 1 days; p = 0.049; Figure 1). There was no difference in postoperative creatinine (ACP: 104, WBP: 107 μmol/L; p = 0.66). After multivariable regression adjustment, perfusion strategy still trended towards an independent predictor of ICU discharge time (p = 0.09), however CPB time (p = 0.02), age (p = 0.012), and emergent surgery (p = 0.02) were.

Conclusions: A WBP strategy during aortic arch reconstruction with MHCA may be associated with more rapid normalization of metabolic parameters and reduced ICU length of stay compared to using ACP alone. Further evaluation with a randomized trial is warranted.

NOTES:
### Table 1: Patient demographics

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Total (n=106)</th>
<th>ACP only (n=44)</th>
<th>WBP (n=62)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>63 (13)</td>
<td>66 (12)</td>
<td>61 (15)</td>
<td>0.039</td>
</tr>
<tr>
<td>Female</td>
<td>32 (30%)</td>
<td>13 (30%)</td>
<td>19 (31%)</td>
<td>1.0</td>
</tr>
<tr>
<td>NYHA III/IV</td>
<td>27 (25%)</td>
<td>15 (34%)</td>
<td>12 (19%)</td>
<td>0.11</td>
</tr>
<tr>
<td>LV Grade III/IV</td>
<td>11 (10%)</td>
<td>8 (18%)</td>
<td>3 (4.8%)</td>
<td>0.048</td>
</tr>
<tr>
<td>BMI</td>
<td>28 (5)</td>
<td>28 (4.4)</td>
<td>29 (5.3)</td>
<td>0.35</td>
</tr>
<tr>
<td>Max. aortic diameter (mm)</td>
<td>55 (8)</td>
<td>56 (10)</td>
<td>55 (7)</td>
<td>0.40</td>
</tr>
<tr>
<td>Tricuspid Aortic Valve</td>
<td>57 (54%)</td>
<td>29 (66%)</td>
<td>28 (45%)</td>
<td>0.115</td>
</tr>
<tr>
<td>Bicuspid Aortic Valve</td>
<td>42 (40%)</td>
<td>13 (30%)</td>
<td>29 (47%)</td>
<td>0.115</td>
</tr>
<tr>
<td>Unicuspid Aortic Valve</td>
<td>7 (7%)</td>
<td>2 (5%)</td>
<td>5 (8%)</td>
<td></td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stroke</td>
<td>9 (8%)</td>
<td>4 (9%)</td>
<td>5 (8%)</td>
<td>1.0</td>
</tr>
<tr>
<td>TIA</td>
<td>11 (10%)</td>
<td>4 (9%)</td>
<td>7 (11%)</td>
<td></td>
</tr>
<tr>
<td>Connective Tissue Disorder</td>
<td>8 (8%)</td>
<td>2 (4.5%)</td>
<td>6 (10%)</td>
<td>0.68</td>
</tr>
<tr>
<td>Coronary Artery Disease</td>
<td>23 (22%)</td>
<td>10 (23%)</td>
<td>13 (21%)</td>
<td>1.0</td>
</tr>
<tr>
<td>COPD</td>
<td>21 (20%)</td>
<td>11 (25%)</td>
<td>10 (16%)</td>
<td>0.33</td>
</tr>
<tr>
<td>Type II Diabetes Mellitus</td>
<td>10 (9%)</td>
<td>3 (7%)</td>
<td>7 (11%)</td>
<td>0.52</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>43 (41%)</td>
<td>14 (32%)</td>
<td>29 (47%)</td>
<td>0.16</td>
</tr>
<tr>
<td>History of Tobacco Use</td>
<td>51 (48%)</td>
<td>23 (52%)</td>
<td>28 (45%)</td>
<td>0.56</td>
</tr>
<tr>
<td>Hypertension</td>
<td>74 (70%)</td>
<td>33 (75%)</td>
<td>41 (66%)</td>
<td>0.39</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>18 (17%)</td>
<td>7 (16%)</td>
<td>11 (18%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Peripheral Vascular Disease</td>
<td>15 (14%)</td>
<td>9 (20%)</td>
<td>6 (10%)</td>
<td>0.16</td>
</tr>
<tr>
<td>Redo Sternotomy</td>
<td>12 (11%)</td>
<td>2 (5%)</td>
<td>10 (16%)</td>
<td>0.12</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>5 (5%)</td>
<td>2 (5%)</td>
<td>3 (5%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Congestive Heart Failure</td>
<td>7 (7%)</td>
<td>3 (7%)</td>
<td>4 (6%)</td>
<td>1.0</td>
</tr>
<tr>
<td>Indication for Surgery</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aneurysm</td>
<td>77 (73%)</td>
<td>27 (62%)</td>
<td>50 (81%)</td>
<td>0.004</td>
</tr>
<tr>
<td>Acute Aortic Dissection</td>
<td>17 (16%)</td>
<td>10 (23%)</td>
<td>10 (11%)</td>
<td>0.364</td>
</tr>
<tr>
<td>Chronic Aortic Dissection</td>
<td>4 (4%)</td>
<td>1 (2%)</td>
<td>3 (5%)</td>
<td></td>
</tr>
<tr>
<td>Rupture*</td>
<td>8 (7%)</td>
<td>6 (13%)</td>
<td>2 (3%)</td>
<td>0.064</td>
</tr>
</tbody>
</table>

NYHA, New York Heart Association; TIA, transient ischemic attack; COPD, chronic obstructive pulmonary disease *Refers to rupture of ascending aortic aneurysm or acute type A aortic dissection, evidenced by extravasation of contrast from the aortic lumen or the presence of a pseudoaneurysm on CT scan.

![Figure 1: Kaplan-Meier curve identifying time to discharge from the ICU.](image-url)
21. Moderate Hypothermia and Unilateral Selective Antegrade Cerebral Perfusion is a Safe Perfusion Strategy for Extended Arch Replacement in Patients With Acute Aortic Dissection

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Authors: *William B. Keeling, D*Brad Leshnower, Jose Binongo, *Eric L. Sarin, ‘Ed Chen

Author Institution(s): Emory University, Atlanta, GA

Discussant: D’Anthony L. Estrera, University of Texas Houston Medical School, Memorial Hermann Hospital, Houston, TX

Objectives: Unilateral selective antegrade cerebral perfusion (uSACP) with moderate hypothermic circulatory arrest (MHCA) has been shown to be a safe and effective method of cerebral protection during surgery for acute Type A dissection (Type A). This study evaluates the safety of this strategy on outcomes following more extensive aortic arch reconstruction in patients with Type A.

Methods: A retrospective review from 2004–2014 of patients undergoing surgery for acute type A dissections using MHCA and SACP was performed. Cohorts were established based on extent of aortic resection: hemi-arch (HEMI) and transverse arch (TOTAL) groups were created. A propensity score-matched analysis of outcomes for TOTAL patients and HEMI patients was then conducted.

Results: 298 patients met inclusion criteria and were included for analysis (263 HEMI, 35 TOTAL). Preoperative comorbidities including age, stroke, diabetes, and renal failure were similar between groups (p>0.50). In-hospital mortality was 11.4% for the entire cohort (11.8% (31 pts) HEMI, 8.6% (3 pts) TOTAL; p=0.70), and the permanent stroke rate was 8.1% (8.0% (21 pts) HEMI, 8.6% (3 pts) TOTAL; p=0.75). Median circulatory arrest time was 38.3±19.5 minutes (34.1±12.1 HEMI, 68.5±32.3 TOTAL; p<0.001). Lowest median circulatory arrest temperature was 25.8±3.1 degrees and not different between groups (25.8±3.2 HEMI, 26.1±2.6 TOTAL; p=0.57). No increase in operative mortality, temporary neurologic dysfunction, stroke, or renal failure was observed in the TOTAL group when compared to HEMI. Table 1 contains the results of 136 patients in the propensity score-matched analysis.

Conclusions: uSACP with MHCA remains a safe strategy for cerebral protection during emergent surgical repair of acute Type A and provides equivalent outcomes for both limited and more extensive aortic arch reconstruction. Based on this data, uSACP and MHCA may represent an optimal strategy for cerebral protection in this acute setting.

<table>
<thead>
<tr>
<th>Table 1 - Propensity Score-Matched Postoperative Outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Death</strong></td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Stroke</strong></td>
</tr>
<tr>
<td><strong>Temporary Neurologic Deficit</strong></td>
</tr>
<tr>
<td><strong>Septicemia</strong></td>
</tr>
<tr>
<td><strong>Renal Failure</strong></td>
</tr>
<tr>
<td><strong>New Onset Dialysis</strong></td>
</tr>
<tr>
<td><strong>Prolonged Ventilation</strong></td>
</tr>
<tr>
<td><strong>Re-Exploration for Hemorrhage</strong></td>
</tr>
</tbody>
</table>

*STSA Member D Relationship Disclosure

114 STSA 63rd Annual Meeting
22. Frozen Elephant Trunk is Not the “Bad Boy” Compared With the Traditional Elephant Trunk: Current Trends and Lessons Learned Using the Simplified US Version of the FET

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Authors: D*Ourania Preventza1,2, Jessica Mayor1,2, Katherine Simpson1,2, Julius Carillo1,2, Matt D. Price1,2, Kim I. de la Cruz1,2, Lorraine D. Cornwell2, Shuaib Omer1,2, Arin C. Jobe1,2, D*Scott A. LeMaire1,2, D*Joseph S. Coselli1,2

Author Institution(s): 1Texas Heart Institute, Houston, TX; 2Baylor College of Medicine, Houston, TX

Discussant: DTomas, Martin, Florida Hospital Orlando, Orlando, FL

Objectives: It has been suggested that the frozen elephant trunk (FET) procedure incurs a greater risk of spinal cord ischemia than the traditional elephant trunk (t-ET) technique. We analyzed trends assessed, outcomes and lessons learned, and investigated whether using the simplified US version of the FET technique to treat complex arch pathology poses additional risk.

Methods: From 2010 to present we performed 129 consecutive elephant trunk procedures (t-ET, n=92, 71.3%; FET, n=37, 28.7%) for chronic dissecting (n=62, 48.1%) and atherosclerotic aneurysms (n=67, 51.9%). A stepwise logistic regression model using preoperative and intraoperative variables was created to analyze the outcomes.

Results: Operative mortality was 14.7% (t-ET, n=11, 12.0%; FET, n=8, 21.6%; P=0.16). Permanent stroke was 6.2% (t-ET, n=5, 5.4%; FET, n=3, 8.1%; P=0.69). Permanent spinal cord deficit was 4.7% (t-ET, n=3, 3.3%; FET, n=3, 8.1%; P=0.35). In the multivariate analyses for the entire period, the addition of FET was not an independent predictor of mortality, permanent stroke, or spinal cord deficit.

Conclusions: With the advent of endovascular technology, there is a clinical shift toward increased use of FET to eliminate or facilitate the second surgical stage in treating patients with extensive aortic pathology. The addition of FET to the surgical armamentarium does not pose additional risk but judicious use is advised nonetheless. The need for a single-piece endoprosthesis of FET instead of a customized FET may be considered.
23. Transcatheter Aortic Valve Implantation for Patients With Bicuspid Aortic Valves: Still A Contraindication?

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Authors: Mirko Doss, D Won Kim, Thomas Walther

Author Institution(s): Kerckhoff Heart Center, Bad Nauheim, Germany

Discussant: D*Vinod Thourani, Emory University, Atlanta, GA

Objectives: The aim of this study was to evaluate the safety of transcatheter aortic valve implantation (TAVR) in patients with bicuspid aortic valves (BAV).

REGULATORY DISCLOSURE: This presentation describes the use of Acurate aortic bioprosthesis valves by Symetis, which has an FDA status of investigational.

Methods: 82 consecutive patients with stenotic BAV were treated with self-expanding (Core Valve, Symetis Acurate) and balloon expandable (Sapien 3, XT) transcatheter aortic valve prostheses, at our institution, from 2011 to 2014. Clinical outcomes were compared to a cohort of patients with tricuspid aortic stenosis (n=891) that received TAVI within the same time frame. Clinical endpoints were procedural complications, device success (VARC, II) and 30 day all-cause mortality.

Results: The groups were comparable with regards to pre-operative data: mean age (81.8±6.2 years), logistic Euroscore (24.2±12.6%), STS score (6.4±4.2%), mean aortic gradient (44±16.8 mmHg) and effective orifice area (0.7±0.2). 30 day mortality was lower in the BAV group (2% vs 8.4%, p=0.12). Device success rate was lower in patients with BAV (73.1% vs 87.1%, p=0.004). Procedural complications were higher in the BAV group with regards to: residual aortic regurgitation > grade, II (21.2% vs 7.8%, p=0.001), non-perpendicular deployment (30.2% vs 16.3%, p=0.002), malposition of the prosthesis (10.4% vs 3.5%, p=0.02) and the need for secondary valve in valve procedure (7.7% vs52.9%, p=0.05). The incidence of annular rupture (1.9% vs 0.5%) and conversion to open surgery (3.9% vs 2.5%) was comparable between the groups.

Conclusions: Treatment of BAV with TAVR bears significant procedural challenges. Although, 30 day mortality and valve function were similar to that of tricuspid aortic valves, BAV had significantly higher rates of procedural complications.
24. Statewide Impact of Transcatheter Aortic Valve Replacement on Surgical Aortic Valve Replacement

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Author Institution(s): 1Virginia Cardiac Surgery Quality Initiative, Falls Church, VA; 2Virginia Commonwealth University, Richmond, VA; 3University of Virginia, Charlottesville, VA; 4INOVA Heart and Vascular Institute, Falls Church, VA

Discussant: *Richard Prager, University of Michigan, Ann Arbor, MI

Objectives: Transcatheter aortic valve replacement (TAVR) represents a disruptive technology approved for high risk and inoperable patients. Internationally, some countries now perform more TAVR than surgical aortic valve replacement (SAVR). The purpose of this study was to determine if TAVR has negatively influenced SAVR volumes and altered the SAVR patient profile to those with fewer comorbidities.

Methods: A total of 11,547 SAVR patients were evaluated (2002-2015) from a statewide cohort. Patients were stratified by surgical era: pre-TAVR era (2002-2008, n=5,317), early-TAVR era (2009-2011, n=2,809), and commercial-TAVR era (2012-2015, n=3,421). Patient characteristics and outcomes were analyzed by univariate analysis.

Results: Throughout the study period, SAVR volumes increased with median volumes of 791 cases/year (pre-TAVR), 919 cases/year (early-TAVR) and 980 cases/year (commercial-TAVR, \(p = 0.016\)). TAVR implementation was associated with declining STS predicted risk of mortality among SAVR patients over time (Table 1). This was driven by fewer reoperative cases, higher ejection fraction, and more frequent elective cases in later eras. This decreasing risk profile occurred despite increasing frequency of diabetes, cerebrovascular disease, chronic lung disease, and heart failure (all \(p < 0.0001\)). Importantly, with increasing TAVR implementation, SAVR mortality remained excellent, while composite major morbidity improved (Table 1). These overall improvements come at the price of significantly longer ICU time and greater hospitalization costs (Table 1).

Conclusions: In a statewide database, SAVR volumes have not yet been negatively impacted by TAVR implementation. While the overall risk profile for SAVR patients decreased with TAVR implementation, SAVR patients now present with a higher prevalence of comorbid disease. Surgical morbidity and mortality outcomes for SAVR are excellent and continue to improve.
### Table 1

<table>
<thead>
<tr>
<th>STS PROM (median, IQR)</th>
<th>Overall (n = 11,547)</th>
<th>Pre-TAVR (n = 5,317)</th>
<th>Early-TAVR (n = 2,809)</th>
<th>Commercial-TAVR (n = 3,421)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>STS PROMM (median, IQR)</td>
<td>18.3% (12.6-26.6%)</td>
<td>18.4% (12.6-27.8%)</td>
<td>18.7% (12.7-27.2%)</td>
<td>17.9% (12.6-25.9%)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>LVEF (median, IQR)</td>
<td>58 (50-63)</td>
<td>55 (45-60)</td>
<td>60 (50-63)</td>
<td>60 (53-63)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Elective</td>
<td>73.9% (8521)</td>
<td>72.6% (3954)</td>
<td>73.0% (2050)</td>
<td>76.5% (2617)</td>
<td>0.0001</td>
</tr>
<tr>
<td>Reoperative SAVR</td>
<td>12.8% (1299)</td>
<td>13.5% (534)</td>
<td>13.3% (372)</td>
<td>11.5% (393)</td>
<td>0.0208</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>% (n)</th>
<th>% (n)</th>
<th>% (n)</th>
<th>% (n)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative mortality</td>
<td>3.9% (450)</td>
<td>4.0% (213)</td>
<td>4.3% (121)</td>
<td>3.4% (116)</td>
</tr>
<tr>
<td>Major morbidity‡</td>
<td>43.1% (4974)</td>
<td>44.3% (2349)</td>
<td>43.9% (1230)</td>
<td>40.8% (1395)</td>
</tr>
<tr>
<td>Total cost (median)</td>
<td>$33,339.37</td>
<td>$25,847.56</td>
<td>$35,596.04</td>
<td>$43,175.59</td>
</tr>
<tr>
<td>ICU stay (hrs; median, IQR)</td>
<td>48.2 (26.3-95)</td>
<td>48 (25.5-95)</td>
<td>48 (26-94)</td>
<td>49.7 (27.5-96)</td>
</tr>
<tr>
<td>Length of stay (days; median, IQR)</td>
<td>6 (5-9)</td>
<td>6 (5-9)</td>
<td>6 (5-9)</td>
<td>6 (5-9)</td>
</tr>
<tr>
<td>Operative mortality O/E</td>
<td>0.88</td>
<td>0.77</td>
<td>1.11</td>
<td>0.95</td>
</tr>
</tbody>
</table>

STSA PROM = society of thoracic surgeons predicted risk of mortality; PROMM = predicted risk of morbidity or mortality; LVEF = left ventricular ejection fraction; ICU = intensive care unit. ‡ Major morbidity includes: permanent stroke, cardiac arrest, renal failure requiring dialysis, deep sternal wound infection, prolonged ventilation, reoperation for any reason

**NOTES:**
25. Multi-institutional Validation of a Modified Thoracic Revised Cardiac Risk Index (m-ThRCRI) for Predicting Cardiac Complications Following Lung Resection

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Authors: Daniel C. Thomas, Brian N. Arnold, Joshua E. Rosen, Michelle C. Salazar, DFrank C. Detterbeck, Justin D. Blasberg, Daniel J. Boffa, Anthony W. Kim

Author Institution(s): Duke University, Durham, NC

Objectives: The Thoracic Revised Cardiac Index (ThRCRI) has emerged as a tool that differentiates patients who may proceed to lung resection without further cardiac assessment (classes A/B) from those who should receive additional cardiac evaluation (classes C/D). This study aims to demonstrate that a modified ThRCRI (m-ThRCRI) can be employed for cardiac risk stratification using a large national multi-institutional dataset.

Methods: Patients undergoing lobectomy or pneumonectomy were identified in the American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) dataset from 2005-2012. Patients were grouped into 4 risk classes based on a summary score of preoperative risk factors: ischemic heart disease (IHD), cerebrovascular disease (CVD), renal comorbidity, pneumonectomy. The primary outcome was the incidence of postoperative major cardiac complication in each of the four risk classes.

Results: Of the 4,625 patients identified, the majority underwent surgery for malignant disease (78%) and had an open procedure (70%). Among the m-ThRCRI risk factors, 9% had IHD, 7% had CVD, 2% had renal comorbidity, and 6% underwent pneumonectomy. The incidence of cardiac complication in all patients was 2%. The incidence of cardiac complication within risk classes A, B, C, D were 1%, 3%, 9%, and 4%, respectively (p<0.01). When combined, higher risk patients (classes C and D) were three times as likely to have a cardiac complication compared to class A. Multivariable analysis identified class C as having an increased risk for cardiac complication compared with class A (OR 4.9, 95% CI 1.1-22.1).

Conclusions: Using a large multi-institutional dataset, the m-ThRCRI can differentiate patients at higher risk for cardiac complication following lung resection (classes C and D) and can be a useful and straightforward preoperative instrument. The m-ThRCRI may allow for identification of patients who would benefit from additional cardiac evaluation.
Rate of major cardiac complications, by m-ThRCRI risk classes.

NOTES:
26. Is Repeat Pulmonary Metastasectomy Indicated for Soft Tissue Sarcoma?

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Author Institution(s): Memorial Sloan Kettering Cancer Center, New York, NY

Objectives: Recurrence following pulmonary metastasectomy (PM) for soft tissue sarcoma (STS) is high despite complete (R0) resection. Systemic therapies are limited and repeat PM is often considered. Our objective is to define the subset of patients with pulmonary recurrence selected for repeat PM and identify prognostic factors for survival.

Methods: We reviewed a prospectively maintained database of 539 patients undergoing PM for STS. Clinicopathologic variables of the primary tumor, metastatic disease, treatment and recurrence were examined. Cox proportional hazards models were constructed to identify factors associated with the likelihood of operative selection following lung recurrence, and prognostic factors for survival in the repeat PM group. Survival was modeled using the Kaplan-Meier method.

Results: Following complete initial PM, 63% of patients (N=341) experienced pulmonary recurrence. One hundred forty-one (41%) underwent repeat resection (Table 1). For the entire cohort (N=341), patients with synovial sarcoma primary histology (p=0.001), longer disease-free interval (DFI) between first PM and recurrence (p<0.001), and the lungs as the only site of recurrence (p<0.001) were more likely to undergo subsequent PM. Increased age (p=0.004) and open resection at the first PM (p=0.013) were associated with a decreased odds of undergoing repeat resection. Median overall survival (OS) from first PM was 49 mos in the repeat PM group compared to 20 mos in those not resected (p<0.001, Fig. 1). In repeat PM patients, increasing number of pulmonary metastases (p=0.011), and shorter DFI from initial PM (p=0.005) were associated with increased risk of death.

Conclusions: While subject to operative selection, repeat PM for STS is associated with prolonged OS in the management of recurrent pulmonary metastases. Factors associated with survival in patients undergoing repeat resection include number of pulmonary metastases and DFI.

NOTES:
Table 1: Clinicopathologic Characteristics of Patients with Pulmonary Recurrence Following Initial Pulmonary Metastasectomy

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>NO REPEAT PM (N=200)</th>
<th>REPEAT PM (N=141)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HISTOLOGY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PS/MFH</td>
<td>59 (29.5%)</td>
<td>21 (14.9%)</td>
</tr>
<tr>
<td>Synovial</td>
<td>21 (10.5%)</td>
<td>32 (22.7%)</td>
</tr>
<tr>
<td>Leiomyosarcoma</td>
<td>71 (35.5%)</td>
<td>42 (29.8%)</td>
</tr>
<tr>
<td>Liposarcoma</td>
<td>10 (5.0%)</td>
<td>9 (6.4%)</td>
</tr>
<tr>
<td>Fibrosarcoma</td>
<td>8 (4.0%)</td>
<td>14 (10.0%)</td>
</tr>
<tr>
<td>MPNST</td>
<td>5 (2.5%)</td>
<td>4 (2.8%)</td>
</tr>
<tr>
<td>Other</td>
<td>26 (13.0%)</td>
<td>19 (13.4%)</td>
</tr>
<tr>
<td><strong>SIZE OF PRIMARY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 10 cm</td>
<td>97 (48.5%)</td>
<td>75 (53.2%)</td>
</tr>
<tr>
<td>&gt; 10 cm</td>
<td>90 (45.0%)</td>
<td>50 (35.5%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>13 (6.5%)</td>
<td>16 (11.3%)</td>
</tr>
<tr>
<td><strong>GRADE OF PRIMARY</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>16 (8.0%)</td>
<td>18 (12.8%)</td>
</tr>
<tr>
<td>High</td>
<td>180 (90.0%)</td>
<td>122 (86.5%)</td>
</tr>
<tr>
<td>Unknown</td>
<td>4 (2.0%)</td>
<td>1 (0.7%)</td>
</tr>
<tr>
<td><strong>TYPE OF SURGERY AT INITIAL PM</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Open</td>
<td>155 (77.5%)</td>
<td>87 (61.7%)</td>
</tr>
<tr>
<td>Minimally-Invasive</td>
<td>45 (22.5%)</td>
<td>54 (38.3%)</td>
</tr>
<tr>
<td><strong>DISEASE-FREE INTERVAL</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt; 12 mos</td>
<td>175 (87.5%)</td>
<td>98 (69.5%)</td>
</tr>
<tr>
<td>≥ 12 mos</td>
<td>25 (12.5%)</td>
<td>43 (30.5%)</td>
</tr>
<tr>
<td><strong>SYNCHRONOUS EXTRAPULMONARY DISEASE AT RECURRENCE</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>74 (37.0%)</td>
<td>110 (78.0%)</td>
</tr>
<tr>
<td>Yes</td>
<td>126 (63.0%)</td>
<td>31 (22.0%)</td>
</tr>
</tbody>
</table>

PS/MFH, Pleomorphic sarcoma/malignant fibrous histiocytoma; MPNST, Malignant peripheral nerve sheath tumor; PM, Pulmonary metastasectomy; *From first pulmonary metastasectomy to recurrence at any site.

Figure 1: Overall Survival in Patients with Recurrent Pulmonary Soft Tissue Sarcoma Based on Treatment

STSA 63rd Annual Meeting 125
27. Pilot Study Percutaneous Cryotherapy for Stage IA Lung Cancer

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Authors: Frank A. Baciewicz¹, Lance K. Heilbrun¹, Deborah Hackstock¹, Fulvio Lonardo¹, Peter Littrup²

Author Institution(s): ¹Wayne State University, Detroit, MI; ²Brown Medical Center, Providence, RI

Objectives: Lobectomy for Stage IA lung cancer has a 60-85% 5-year survival but has morbidity, mortality risks. Not all patients (pts) with clinical Stage IA cancer are surgical candidates and some pts refuse surgical intervention. Our pilot study’s purpose was to determine how much residual tumor would remain in the lung after single visit outpatient percutaneous cryotherapy (PCT) of a stage IA lung cancer

Methods: Pts with a 3.0 cm diameter peripheral (outer 1/3 lung) primary lung cancer would undergo standard clinical staging including body PET scan, MRI brain and/or mediastinal node evaluation. Those in Stage IA would undergo 3 PCT freeze/thaw/freeze cycles to -20C for 15/10/15 minutes. The PCT (Endocare, Irvine, Cal) treatment goal was to create a 4.5 cm iceball (necrosis) engulfing the cancer. CT scans documented the iceball. Thoracotomy/lobectomy was to be performed within 60 days of PCT. The lobectomy specimen and lymph node dissection underwent histologic review.

Results: 9 pts (7 male, 2 female), median age 65.9 yrs (range 52-78), mean tumor diameter 1.9 cm received PCT for 4 R upper lobe lesions, 4 L upper lobe lesions and 1 R lower lobe lesion. They had thoracotomy a median of 48 days after PCT. Adverse events after PCT were 4 pneumothoraces, 3 hemoptysis and 3 dyspnea. All patients were discharged after resection. One patient expired 2.5 months later of aspergillus lung infection. 8 pts had no residual tumor in the ablated lung. The one patient with residual disease had pathologic stage, IIIA and died 3.5 months postop from recurrent disease. Image demonstrates lung which has received PCT and then been resected.

Conclusions: 1. Single visit, outpatient PCT treatment for Stage IA lung cancer can be performed with acceptable morbidity. 2. In clinical Stage IA lung cancer pts treated with PCT, no residual tumor was seen in the resected lobe. 3. PCT may offer another treatment option to pts with clinical Stage IA lung cancer.
Representative histologic section of lung which has received PCT and then been resected.

NOTES:
28. Evaluation of Esophageal Anastomotic Integrity With Serial Pleural Amylase Levels

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Authors: D*Daniel L. Miller, *Gerald A. Helms, *William R. Mayfield

Author Institution(s): WellStar Health System, Marietta, GA

Objectives: An anastomotic leak is the most devastating and potentially fatal complication after esophagectomy. Current detection methods can be inaccurate and place patients at risk of other complications. Analysis of pleural fluid for amylase may be more accurate and less of a risk for evaluating the integrity of an esophageal anastomosis.

Methods: We retrospectively reviewed prospective data of 30 consecutive patients who underwent an Ivor Lewis esophagectomy over a nine month period in 2015 and evaluated their anastomotic integrity with serial pleural amylase levels.

Results: There were 27 men (90%) with a median age of 60 years (range, 35-77). Indication for esophagectomy was cancer in 23 patients (77%); 16 (70%) underwent neoadjuvant chemoradiation. A barium swallow was performed in the first 25 patients at a median of POD 5 (range, 5 - 10); the swallow was negative in 28 patients (93%). Serial pleural amylase levels were performed starting on POD 3 and ending one POD after the swallow test. Amylase levels in the no leak patients were highest on POD 3 (<50 IU/L) and decreased (<20 IU/L) to the lowest levels one POD after the swallow. The two patients with a leak had amylase levels of 630 and 227 IU/L each a day before their scheduled swallow. There was one postoperative death (3%) secondary aspiration pneumonia. Complications occurred in 11 patients (37%); most common was respiratory. The last 5 patients underwent pleural amylase levels only without a swallow or CT scan; no leaks or respiratory issues occurred in these patients.

Conclusions: Serial pleural amylase levels for the detection of esophageal anastomotic leaks proved to be accurate and safe. Elimination of barium swallows and CT scans for evaluation of anastomotic integrity would decrease aspiration risks as well as possible respiratory failure in the postoperative period. Serial pleural amylase levels may be the preferred method of detection for an anastomotic leak after esophagectomy.
29. Management of Anastomotic Leaks After Esophagectomy

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Authors: Joshua L. Manghelli, David Blitzer, Adam Hicks, Karen Rieger, *DuyKhanh Ceppa, Thomas J. Birdas

Author Institution(s): Indiana University School of Medicine, Indianapolis, IN

Objectives: Anastomotic leaks are a feared complication after esophagectomy. Their management has evolved over time. We describe our experience with management of esophageal leaks over an 11-year period.

Methods: All patients undergoing esophagectomy with gastric reconstruction at a single institution between 2004-2014 were identified. Perioperative factors were reviewed. Failure of initial leak treatment was defined as need for reintervention for leak management. Length-of-stay (LOS) and mortality were the primary outcomes.

Results: Of 692 eligible patients, 61 (8.8%) were diagnosed with an anastomotic leak, more frequently after a cervical anastomosis (16.9% vs 6%). Thirty-day mortality was 12.7% and median LOS was 19 days (no-leak population: 3.2% and 11 days, respectively). Forty-six patients (75.4%) were initially observed and 11 (23.9%) failed (8 stents – 3 surgery); an occult leak (diagnosed in a routine esophagram) was the only factor predicting success of observation (p= .04). Successful observation patients had shorter LOS (p= .001) – similar to patients without leak. Stents were employed in 19 patients; 42.1% of stents required revision. Stenting did not lower LOS. Lower preoperative serum albumin was the only factor predicting mortality after leak (p= .01). Intrathoracic and cervical leaks had similar outcomes.

Conclusions: Non-occult anastomotic leaks were more likely to fail observation. Occult leaks successfully observed did not worsen postoperative outcomes. Preoperative nutritional status affected mortality, but anastomotic location did not influence outcomes. Stents required frequent revisions and did not shorten LOS. Further study is warranted on interventions in patients likely to fail conservative management.

*STSA Member D Relationship Disclosure
Hospitalization Costs Following Surgery in High-Risk Patients With Early Stage Lung Cancer

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Authors: *Manu S. Sancheti, Ray Chihara, Sebastian Perez, Felix Fernandez, Allan Pickens, Seth Force

Author Institution(s): Emory University, Atlanta, GA

Objectives: We previously reported that early stage lung cancer patients who are considered high-risk for surgery can undergo resection with favorable perioperative results and long-term mortality. To further elucidate the role of surgical resection in this patient cohort, this study evaluated the length of stay and total hospitalization cost among patients classified as standard or high risk with early stage lung cancer who underwent pulmonary resection.

Methods: 490 patients from our institutional STS data from 2009-2013 underwent resection for clinical stage I lung cancer. High-risk patients were identified by ACOSOG z4032/z4099 criteria. Demographics, length of stay, and hospitalization cost between high and standard risk patients undergoing lobectomy and sublobar resection were compared. Univariate analysis was performed using the chi-square test/Fisher’s exact test. Multivariate analysis was performed using a linear regressions model.

Results: 180 (37%) of patients were classified as high-risk. These patients were older (70y vs. 65y, p<0.0001), had worse FEV1 (57% vs. 85%, p <0.0001), and DLCO (47% vs. 77%, p<0.0001). The baseline cost and length of stay was represented by a thoracoscopic wedge resection in a standard risk patient. A larger extent of resection, thoracotomy, or high-risk classification increased the cost and length of stay, as depicted in Table 1.

Conclusions: Our previous study showed that good clinical outcomes following surgery for early stage lung cancer can be achieved in patients classified as high-risk. In this study, while surgery in high-risk patients led to slightly increased costs, these costs seemed negligible when viewed along with the patients’ excellent short and long-term results. This study suggests that surgical resection on high-risk patients with early stage lung is associated with acceptable hospital lengths of stay and overall cost when compared to standard risk patients.
### Table 1: Hospitalization Costs and Length of Stay

<table>
<thead>
<tr>
<th>Classification</th>
<th>Mean Cost</th>
<th>95% CI</th>
<th>p-value</th>
<th>Mean Length of stay</th>
<th>95% CI</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Risk, Thoracoscopic Wedge Resection</td>
<td>$14,994.00</td>
<td>$11,931.48-$17,956.52</td>
<td></td>
<td>3.63</td>
<td>2.47-4.80</td>
<td></td>
</tr>
<tr>
<td>+ Segmentectomy</td>
<td>$2,622.00</td>
<td>$2,442.64-$7,686.64</td>
<td>0.31</td>
<td>0.97</td>
<td>0.98-2.93</td>
<td>0.32</td>
</tr>
<tr>
<td>+ Lobectomy</td>
<td>$3,633.00</td>
<td>$567.56-$6,698.44</td>
<td>0.02</td>
<td>0.91</td>
<td>0.28-2.09</td>
<td>0.14</td>
</tr>
<tr>
<td>+ Thoracotomy</td>
<td>$8,337.00</td>
<td>$5,257.84-$11,416.16</td>
<td>&lt;0.001</td>
<td>3.13</td>
<td>1.94-4.31</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>+ High Risk</td>
<td>$3,377.00</td>
<td>$1,013.24-$5,740.76</td>
<td>0.005</td>
<td>1.58</td>
<td>0.67-2.49</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**NOTES:**
31. Need for Pulmonary Arterioplasty at the Time of Bidirectional Cavopulmonary Anastomosis is an Independent Predictor of Poor Surgical Outcome

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Authors: John D. Cleveland¹ ², Susana Tran¹, Cheryl Takao¹, Winfield J. Wells¹, Vaughn A. Starnes¹ ², S R. Kumar¹ ²

Author Institution(s): ¹Children’s Hospital, Los Angeles, Los Angeles, CA; ²University of Southern California, Los Angeles, CA

Discussant: ⁴Carl L. Backer, Ann & Robert H Lurie Children’s Hospital, Chicago, IL; Northwestern University Feinberg School of Medicine, Chicago, IL

Objectives: Whereas routine bidirectional cavopulmonary anastomosis (BDCA) can be accomplished with low morbidity and mortality, the impact of concomitant pulmonary arterioplasty (PAplasty) is not known. Currently, PAplasty does not alter the STAT mortality category of BDCA. We hypothesized that the need for and extent of PAplasty adversely affect BDCA outcomes.

Methods: Patients who underwent BDCA at our institution between 2008 and 2015 were included in the analysis. Major morbidity was defined as need for extracorporeal support, BDCA takedown or percutaneous intervention during same admission, hospital length of stay 1 standard deviation or more from mean, or need for supplemental oxygen at discharge. Data were analyzed using SAS 9.2 and are presented as median (interquartile ranges).

Results: 250 patients (136 males, 54%) underwent BDCA for single ventricle physiology at 7 months (5.5-8.8) of age and 6.5 kg (5.7-7.6) weight. 62 (25%) required PAplasty - 29 unilateral and 33 bilateral. Of those that required bilateral PAplasty, 6 underwent ascending aortic extension to augment the aortopulmonary window. There was no difference in the demographic variables, PA pressure or resistance between patients who did and did not require PAplasty. Both major morbidity (35% vs. 15%, p=0.01) and mortality (9.7% vs. 1.6%, p=0.04) were higher in patients who required PAplasty vs. those who did not. Amongst the operative variables evaluated, need for deep hypothermic circulatory arrest (HR = 2.51, p=0.03) and extent of PAplasty (HR = 1.9, p=0.02) independently predicted hospital mortality. Duration of cardiopulmonary bypass (HR = 1.2, p=0.03) and need for any PAplasty (HR = 2.6, p=0.01) were independent predictors of major morbidity.

Conclusions: The need for PAplasty at BDCA is an independent predictor of increased morbidity and mortality. It is important to consider this variable when developing outcome metrics for BDCA.
Major Aortopulmonary Collateral Arteries in Patients With Anatomy Other Than Pulmonary Atresia With Ventricular Septal Defect

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Authors: William L. Patrick, Richard D. Mainwaring, Olaf Reinhartz, Rajesh Punn, Theresa Tacy, Frank L. Hanley

Author Institution(s): Stanford University School of Medicine, Stanford, CA

Discussant: Jeffrey P. Jacobs, Johns Hopkins All Children's Hospital, St. Petersburg, FL

Objectives: Major aortopulmonary collateral arteries (MAPCAs) are most frequently found in association with Pulmonary Atresia with Ventricular Septal Defect (PA/VSD). However, between 5 and 10% of patients with MAPCAs do not have PA/VSD but instead have a variety of other “atypical” anatomic diagnoses. This study was performed to evaluate the surgical results in these patients.

Methods: This was a retrospective review of patients with MAPCAs and atypical anatomy who underwent surgical treatment from 1997 to 2015. The 42 patients with MAPCAs could be subdivided into two groups: 1) Two-ventricle anatomy (n=12) and 2) Single-ventricle anatomy (n=30).

Results: The 12 patients with MAPCAs and two ventricles included 4 with complete atrioventricular canal (CAVC), 3 with double outlet right ventricle, 3 with corrected transposition, 1 with complex D-transposition, and 1 with scimitar syndrome. The initial cardiac operation included single stage complete repair in 4 and unifocalization / shunt in 8. Six patients have currently achieved complete repair status. The 30 patients with MAPCAs and single ventricle included 9 with unbalanced CAVC and total anomalous pulmonary venous connection (TAPVC), 6 with unbalanced CAVC, 5 with pulmonary atresia-intact ventricular septum, 3 with tricuspid atresia, and 7 with other forms of single ventricle. The initial cardiac operation included unifocalization / shunt with TAPVC repair in 9, unifocalization / shunt in 12, creation of an aortopulmonary window in 5, and shunt in 4. To date, 13 patients have had a bi-directional Glenn and 5 have had a Fontan. The flow diagram for these two groups is shown in the Figure.

Conclusions: The data demonstrate the wide diversity of anatomy that can be seen in patients with MAPCAs when evaluating diagnoses other than PA/VSD/MAPCAs. More than two-third of the patients with atypical anatomy had single ventricle, and single ventricle anatomy was associated with a relatively high mortality.
Flow diagram for the 42 MAPCA patients. The combined early and late mortality for the two-ventricle cohort was 17%, and the combined mortality for the single-ventricle group was 43%.

NOTES:
33. Current Results of Multistage Single Ventricle Palliation of Patients With Double Inlet Left Ventricle

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Authors: *Bahaaldin Alsoufi, Kirk R. Kanter, Subhadra Shashidharan, Brian Kogon

Author Institution(s): Emory University School of Medicine, Atlanta, GA

Discussant: *Ross M. Ungerleider, Wake Forest University, Winston Salem, NC

Objectives: Double inlet left ventricle (DILV) is a heterogeneous single ventricle anomaly in which initial presentation and, consequently, timing and mode of palliation vary based on morphology and degree of pulmonary or systemic outflow obstruction. Very few reports, mostly old, focused on palliation outcomes of patients with DILV. We report current era results and examine whether morphologic and, subsequently, surgical factors influence survival.

Methods: From 2002 to 2015, 56 infants with DILV underwent palliation. Initial echocardiographic examination showed pulmonary outflow tract obstruction (n=28, 50%, severe in 15), systemic outflow tract obstruction (n=17, 30%, severe in 14), and arch obstruction (n=16, 19%). Long term outcomes and risk factors associated with hospital / inter-stage death and late survival were examined.

Results: Forty-three patients (77%) required neonatal first-stage palliation: modified Blalock-Taussig shunt (n=15, 27%), Norwood (n=14, 25%), pulmonary artery band (n=14, 25%); whereas 13 patients (23%) received primary Glenn. There was one hospital death (2%) and 2 additional inter-stage mortalities prior to Glenn, in addition to 1 late death that was not cardiac related. Overall 10-year survival was 94% and was comparable for different initial palliation surgeries (93%, 87%, 100% and 100% following shunt, Norwood, band and Glenn, respectively, p=0.28). Two patients underwent heart transplantation for ventricular non-compaction (n=1), pacemaker-induced cardiomyopathy (n=1). On multi-variable analysis, none of the tested demographic, morphologic or surgical variables was associated with the risk of death or transplantation.

Conclusions: Current outcomes of multistage palliation of DILV are relatively good compared to published outcomes of other single ventricle anomalies. Survival is not greatly affected by morphology or type of initial palliation surgery. This information is helpful for decision making and family discussion.
34. Use of Heparin Coated Polytetrafluoroethylene Grafts Reduces Mortality in Neonates Receiving Systemic-to-Pulmonary Shunts

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Authors: Adeel Ashfaq¹, Amit Iyengar¹, Brian Reemtsen²

Author Institution(s): ¹David Geffen School of Medicine at UCLA, Los Angeles, CA; ²Mattel Children’s Hospital, Los Angeles, CA

Discussant: *Joseph W. Turek, University of Iowa Carver College of Medicine, Iowa City, IA

REGULATORY DISCLOSURE: This presentation describes the use of Propaten vascular grafts by W.L. Gore, which is FDA approved.

Objectives: We aimed to evaluate outcomes of systemic-to-pulmonary (SP) shunt procedures utilizing heparin-coated (HC) polytetrafluoroethylene vascular grafts compared to uncoated (non-HC) grafts, in order to observe any benefits in neonates.

Methods: Our institution switched from using non-HC grafts to HC grafts in March 2011. We conducted a retrospective review of consecutive neonates receiving SP shunts from May 2008 to December 2015. Perioperative variables including baseline characteristics, morbidity, mortality, and blood-product utilization were evaluated between the HC and non-HC groups.

Results: A total of 142 neonates received SP shunts during the study period: 69 patients received HC shunts and 73 patients received non-HC shunts. There were no significant differences between groups in age, weight, gender and perioperative variables including bypass necessity, bypass time, and cross clamp time. Perioperative transfusion and blood product utilization was significantly lower in the HC group (p=0.025). There was no significant difference in the incidence of unplanned reoperation for desaturation or arrest (p=0.746) [HC group 6/69 (8.2%); non-HC group 7/73 (5.8%); p=0.746]. Of the 6 patients requiring unplanned reoperation in the HC group, 5 shunts remained patent and did not require revision. There was a significantly lower incidence of shunt revision in the HC group (1.4%) compared to the non-HC group (8%), p=0.007). Thirty day mortality was significantly lower in the HC group (4%) versus the non-HC group (15%), p=0.047.

Conclusions: In this study, neonates receiving HC polytetrafluoroethylene grafts in SP shunts demonstrated significantly lower mortality, shunt revisions, and transfusions of blood and blood products. Though no significant difference was noted for unplanned reoperations, the majority of HC grafts remained patent. These findings suggest that HC grafts used in SP shunt procedures may benefit neonates in terms of efficacy and outcomes.

*STSA Member  D Relationship Disclosure
35. Surgical Strategy Toward Bi-ventricular Repair for Severe Ebstein’s Anomaly in Neonates and Early Infancy

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Authors: Shu-Chien Huang, Yihsharng Chen

Author Institution(s): National Taiwan University Hospital, Taipei, Taiwan

Discussant: Christopher J. Knott-Craig, Lebonheur Children’s hospital, Memphis, TN

Objectives: The neonates with severe form of Ebstein’s anomaly is a surgical challenge, and the Starnes’s operation as single ventricle palliation is highly advocated. The cone reconstruction of tricuspid valve plasty (TVP) had become a widely accepted technique, but the experience of TVP in neonates is few. Here we describe the surgical strategy of neonatal Ebstein’s anomaly, aiming for bi-ventricular repair.

Methods: Since 2007, seven neonate/early infancy with severe Ebstein’s anomalies received TVP in our institute. The principle of cone reconstruction was applied with mobilization of all three leaflets and reattach to normal tricuspid annulus. The atrialized right ventricle (RV) was not plicated. In patients with anatomical pulmonary stenosis (PS), the inter-atrial communication was not totally closed and a systemic-to-pulmonary shunt was added if needed.

Results: All of them presented as intractable heart failure and/or severe cyanosis with mechanical ventilation. One patient with hydrops required ECMO before operation for 6 days. All of them had marked adherence of the anterior leaflet to the RV free wall. Intracardiac anomalies including VSD (n=2) and tetralogy of Fallot (n=1), were repaired simultaneously. One patient died after operation. The other six patients (86%) survived. There were no late mortality or re-do TVP for a median follow-up of 3.7 years (range:0.2-9.3). In the two patients with VSD and no PS, complete bi-ventricular circulation was achieved. For the other four patients with PS, fenestration on ASD (n=4) and shunt (n=2) were performed, and shunt closure was done in one.

Conclusions: Reconstruction of tricuspid valve is an acceptable surgical strategy in severe neonatal Ebstein’s anomaly. Fенестрированный ASD and systemic-pulmonary shunt could help to overcome the anatomical PS and high pulmonary resistance in the neonatal period. This surgical strategy had good survival outcome and preserve the possibility for complete biventricular repair.
Patient characteristics, associated lesions and outcome

<table>
<thead>
<tr>
<th>Case</th>
<th>Age (days)</th>
<th>Body weight (kg)</th>
<th>Associated lesions</th>
<th>Operation</th>
<th>Outcomes</th>
<th>Follow-up duration (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>23</td>
<td>3.1</td>
<td>VSD</td>
<td>TVP, VSD repair, ASD closure</td>
<td>survive</td>
<td>9.3</td>
</tr>
<tr>
<td>2</td>
<td>102</td>
<td>3.4</td>
<td>VSD, prematurity</td>
<td>TVP, VSD repair, ASD closure</td>
<td>survive</td>
<td>5.9</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>2.7</td>
<td>valvular PS</td>
<td>TVP, fenestrated ASD</td>
<td>survive</td>
<td>4.2</td>
</tr>
<tr>
<td>4</td>
<td>36</td>
<td>3.4</td>
<td>functional pulmonary atresia</td>
<td>TVP, fenestrated ASD, shunt</td>
<td>survive shunt closed</td>
<td>3.7</td>
</tr>
<tr>
<td>5</td>
<td>6</td>
<td>2.0</td>
<td>hydrops, on ECMO, severe PS</td>
<td>TVP, RVOT patch fenestrated ASD, shunt</td>
<td>survive shunt partially occluded</td>
<td>1.9</td>
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<tr>
<td>6</td>
<td>11</td>
<td>2.1</td>
<td>critical PS</td>
<td>TVP, RVOT patch fenestrated ASD, shunt</td>
<td>mortality (TVP stitches tear)</td>
<td>X</td>
</tr>
<tr>
<td>7</td>
<td>27</td>
<td>3.7</td>
<td>Tetralogy of Fallot mild RV hypoplasia</td>
<td>TVP, Fallot repair ASD fenestration</td>
<td>survive</td>
<td>0.2</td>
</tr>
</tbody>
</table>


Case 7, A neonate with Ebstein’s anomaly with Fallot’s tetralogy. The tricuspid valve before (A) and after (B) anatomical repair

NOTES:
36. Arch Augmentation via Median Sternotomy for Repair of Coarctation of Aorta With Associated Arch Hypoplasia is a Safe and Durable Procedure

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Authors: W H . Gray1,2, Winfield J . Wells1,2, Vaughn A . Starnes1,2, S R . Kumar1,2

Author Institution(s): 1University of Southern California, Los Angeles, CA; 2Children’s Hospital, Los Angeles, Los Angeles, CA

Discussant: *Robert J . Dabal, University of Alabama Birmingham, Birmingham, AL

Objectives: It has been proposed that coarctation of aorta with proximal arch hypoplasia can be approached via thoracotomy/extended end-to-end anastomosis with the expectation that the proximal arch grows. We hypothesized that complete arch augmentation via midline sternotomy is a safe and more effective repair.

Methods: We reviewed records of patients with biventricular anatomy and coarctation of aorta/proximal arch hypoplasia, without any other cardiac lesion mandating midline sternotomy. Data are presented as median (interquartile range).

Results: 64 patients underwent repair between 2005-15 at 11 (5-21) days of life. 15 (23%) of them presented in shock. The proximal transverse arch was 41% (34-47) the size of the ascending aorta. Following median sternotomy and placement on cardiopulmonary bypass (41, 37-47min), the arch was reconstructed with or without coarctectomy either primarily (6%) or via homograft patch plasty (94%). In 62 patients, repair was undertaken with circulatory arrest (27, 22-31min). Patients were discharged home in 12 (8-19) days. There was no mortality and 9 morbidity events (recurrent nerve injury-4, chylothorax-2, phrenic nerve injury, seizure and superficial wound infection-1 each). All patients are alive at 30-(11-59) month follow-up. 7 (11%) have required re-intervention (5 catheter-based and 2 surgical) for recurrent coarctation. Re-intervention free survival at 1, 3 and 5 years is 86%. Only one child is on anti-hypertensive therapy. At last echocardiogram, the transverse arch is 95% (86-102) of ascending aortic diameter, ejection fraction 67% (59-78) and one patient has left ventricular hypertrophy.

Conclusions: Arch augmentation via median sternotomy is a safe and effective procedure associated with low morbidity and mortality. The reconstructed arch retains excellent profile at intermediate follow-up. Our results should serve as contemporary benchmark when evaluating other modes of intervention in this patient population.

*STSA Member  D Relationship Disclosure
37. Similar Outcomes in Diabetic Patients After CABG With Single ITA Plus Radial Artery Grafting & Bilateral ITA Grafting

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Authors: Sajjad Raza, DEugene Blackstone, Marijan Koprivanac, Penny Houghtaling, Lars G. Svensson, DJoseph F. Sabik

Author Institution(s): Cleveland Clinic, Cleveland, OH

Discussant: *Walter H. Merrill, Vanderbilt University, Nashville, TN

Objectives: To determine in diabetic patients whether single internal thoracic artery (SITA) plus radial artery (RA) grafting yields similar outcomes to those of bilateral internal thoracic artery grafting (BITA).

Methods: From January 1994 to January 2011, 1,325 diabetic patients underwent primary isolated coronary artery bypass grafting (CABG) with either (i) SITA+RA+saphenous vein grafts (SVG; n=965) or (ii) BITA+SVG (n=360); internal thoracic artery was used in all patients to graft the left anterior descending coronary artery. Endpoints were in-hospital outcomes and long-term mortality. Median follow-up was 7.4 years, with a total follow-up of 9,162 patient-years. Propensity-score matching was performed to identify 282 well-matched pairs for adjusted comparison of outcomes.

Results: Unadjusted hospital mortality (0.52% vs. 0.28%; P=.6) and occurrence of deep sternal wound infections (DSWI; 3.2% vs. 1.7%; P=.13) were similar between the SITA+RA+SVG and BITA+SVG groups. Unadjusted survival was better in the BITA+SVG group at 1, 5, 10, and 14 years, 97%, 88%, 68%, and 51% for the SITA+RA+SVG group vs. 97%, 95%, 80%, and 66% for the BITA+SVG group, respectively (early P=.4, late P=.002). However, in propensity-matched patients, hospital mortality (0.35% vs. 0.35%) and occurrence of DSWI (1.4% vs. 1.4%) were similar (P>.9) between the two groups, as was survival at 1, 5, 10, and 14 years: 97%, 90%, 70%, and 58% for the SITA+RA+SVG group and 97%, 93%, 79%, and 64% for the BITA+SVG group, respectively (early P=.8, late P=.2).

Conclusions: In patients with diabetes, SITA+RA grafting and BITA grafting yield similar in-hospital outcomes and long-term survival after CABG. Therefore, both SITA+RA grafting and BITA grafting should be considered in diabetic patients undergoing CABG.

*STSA Member D Relationship Disclosure
Diagnosis and Surgical Management of Pericardial Constriction After Cardiac Surgery

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Authors: Justin Van Meeteren, *Hartzell Schaff, *Joseph Dearani, Kevin Greason, D*Richard Daly

Author Institution(s): Mayo Clinic, Rochester, MN

Discussant: DDouglas R. Johnston, The Cleveland Clinic Foundation, Cleveland, OH

Objectives: The incidence of pericardial constriction after cardiac surgery is unknown, and the diagnosis may be difficult to establish because of underlying cardiac disease. To better understand modes of presentation and results of operation, we reviewed our experience with pericardiectomy for constrictive pericarditis in patients who have undergone previous cardiac surgery.

Methods: Two hundred fifty-three patients underwent pericardiectomy for postoperative constriction from January 1, 1994 through October 1, 2013. The median interval between prior operation and pericardiectomy was 2.2 (9.7) years and 72 (28.5%) patients presented within two years of initial operation. Baseline characteristics include mean age 61.6 (13.7), male sex 211 (83.4%), NYHA, III/IV 217 (85.7%) and mean ejection fraction 57.4% (9). Previous operations included CABG 103 (40.7%), valve surgery 69 (27.3%), combined CABG and valve surgery 25 (9.9%), and other procedures in 56 (22.1%). Cardiac catheterization was performed in 193 (76%) patients; mean right ventricular systolic and diastolic pressures were 44.8 (14.5) mmHg and 24.4 (5.8) mmHg.

Results: Cardiopulmonary bypass was used to support the heart during dissection in 183 (72%) patients for an average of 50.2 (37.7) minutes. Mean length of stay was 8 (range 0-102) days and there were 14 (5.5%) early deaths. Median follow-up time was 6.2 years, and survival at 5 and 10 years postoperatively was 56% and 37%. On multivariate analysis, older age (P < .0001), NYHA, III/IV (P= .0089), right heart failure symptoms (P= .0255), time from previous surgery <2 years (P= .0303) and non-elective operation (P= .0305) were associated with decreased long-term survival.

Conclusions: Increased awareness for symptoms of right heart failure in post cardiac surgery patients should alert physicians to the possibility of pericardial constriction, and early diagnosis may improve early and late outcomes of pericardiectomy in this challenging group of patients.
39. Incidence, Risk Factors, and Outcomes of Conversion from Off-pump Coronary Artery Bypass Grafting to On-pump Coronary Artery Bypass Grafting: A Report from the STS Adult Cardiac National Database

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Author Institutions: 1Emory University, Atlanta, GA; 2University of Virginia, Charlottesville, VA; 3Duke Clinical Research Institute, Durham, NC; 4University of Pittsburgh, Pittsburgh, PA; 5Johns Hopkins All Children's Hospital, St. Petersburg, FL

Discussant: D*Faisal Bakaeen, Cleveland Clinic, Cleveland, OH

Objectives: Off pump coronary artery bypass grafting (OPCAB) has been shown to be an effective strategy to achieve coronary revascularization. The purpose of this study was to define the incidence of intraoperative conversion from OPCAB to ONCAB and to report outcomes based on the reason for conversion.

Methods: Starting in 7/2007, the STS database captured patients that were planned OPCAB but then were converted to OPCAB. 196,576 patients undergoing planned OPCAB within the STS National Database from 7/07 to 6/14 were evaluated. Patients were grouped according to their intraoperative conversion to cardiopulmonary bypass (CPB): 1) planned conversion (PLAN), 2) unplanned conversion for visualization (VIS), 3) unplanned conversion for hemodynamic instability (HEMO), and 4) no conversion (OPCAB). Logistic regression analysis was used to determine risk factors for conversion.

Results: The overall rate of conversion from OPCAB to ONCAB was 5.5%, with 49.6% of the conversions being planned. When compared to those not undergoing conversion (OPCAB, 30-day mortality O:E 0.8), those undergoing conversion to ONCAB experienced greater 30-day mortality regardless of etiology of conversion (PLAN O/E 1.4, VIS 1.6, and HEMO 2.7) (Table 1). Similar O:E ratios were observed for renal failure and prolonged ventilation following conversion. Logistic regression analysis showed advanced age, ejection fraction less than 35%, preoperative intra-aortic balloon pump placement, increasing number of diseased coronary arteries, preoperative heart failure within two weeks, and urgent procedural status were all independent predictors for conversion to ONCAB (p<0.01).

Conclusions: Intraoperative conversion from OPCAB to ONCAB remains a morbid event with a risk of mortality much higher than expected. Surgeons should consider elective ONCAB in those with a high risk for conversion during OPCAB.
Table 1 – Postoperative Outcomes

<table>
<thead>
<tr>
<th></th>
<th>PLAN N=5,385</th>
<th>VIS N=1,429</th>
<th>HEMO N=4,034</th>
<th>OPCAB N=185,728</th>
<th>Overall</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Sternal Wound Infection</td>
<td>15 (0.3%)</td>
<td>8 (0.6%)</td>
<td>24 (0.6%)</td>
<td>468 (0.3%)</td>
<td>515 (0.3%)</td>
</tr>
<tr>
<td>Permanent Stroke</td>
<td>76 (1.4%)</td>
<td>29 (2.0%)</td>
<td>116 (2.9%)</td>
<td>1,535 (0.8%)</td>
<td>1,756 (0.9%)</td>
</tr>
<tr>
<td>Prolonged Ventilation</td>
<td>671 (12.5%)</td>
<td>209 (14.6%)</td>
<td>933 (23.1%)</td>
<td>13,137 (7.1%)</td>
<td>14,950 (7.6%)</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>222 (4.1%)</td>
<td>61 (4.3%)</td>
<td>272 (6.7%)</td>
<td>4,683 (2.5%)</td>
<td>5,238 (2.7%)</td>
</tr>
<tr>
<td>30 Day Mortality</td>
<td>163 (3.0%)</td>
<td>48 (3.4%)</td>
<td>294 (7.3%)</td>
<td>2,786 (1.5%)</td>
<td>3,291 (1.7%)</td>
</tr>
</tbody>
</table>

NOTES:
Surgical Ablation of Atrial Fibrillation in the United States

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Author Institution(s): 1West Virginia University, Morgantown, WV; 2Inova Heart and Vascular Institute, Fairfax, VA; 3Duke Clinical Research Institute, Durham, NC; 4Washington University, St. Louis, MO; 5Northwestern University, Chicago, IL; 6Cleveland Clinic, Cleveland, OH; 7Emory University, Atlanta, GA; 8Johns Hopkins University, Baltimore, MD

Discussant: D*Gorav Aliwadi, University of Virginia, Charlottesville, VA

Objectives: Surgical ablation (SA) for atrial fibrillation (AF) is effective at restoring sinus rhythm. Incompletely defined operative risk has previously limited the concomitant performance of SA during cardiac operations. The goal of this study was to define performance trends and risk-adjusted outcomes of contemporary surgical ablation.

Methods: From January 1 2011 to June 30 2014, 86,941 patients with AF and without endocarditis underwent primary non-emergent cardiac operations in the Society of Thoracic Surgeons Adult Cardiac Surgery Database (STS ACSD). Performance trends of SA were examined for 6 operative categories: MVRR±CABG, AVR±CABG, CABG, AVR+MVR, Stand-alone SA, other concomitant operations. The risk of performing concomitant SA was analyzed by propensity matching 28,739 patients with and without SA by the primary operation type, AF type, and STS ACSD co-morbid risk variables using Greedy 1:1 matching algorithms.

Results: Among all patients with AF in the unmatched cohort, 48.3% (42,066/86,941) underwent SA. Mitral operations had the highest rate of SA [MVRR±CABG 68.4% (14,693/21,496), AVR+MVR 59.1% (1,626/2,750)]. AVR±CABG and isolated CABG rates were 39.3% (6,816/17,349) and 32.8% (9,156/27,924), respectively. Nearly half of other concomitant operations underwent SA, 47.6% (6,939/14,586). Performance frequency increased throughout the study period (Figure). Relative risks (RR) in the matched cohort revealed SA was associated with 30-day reduction in mortality [RR 0.92 (95% CI 0.85-1.00)] and stroke [RR 0.84 (0.74-0.94)] but increase in renal failure [RR 1.12 (1.03-1.22)] and pacemaker implantation [RR 1.33 (1.24-1.43)] (Table).

Conclusions: There is increasing contemporary utilization of SA for all operative categories with evidence of reduction of 30-day mortality and stroke but increase in renal failure and pacemaker implantation.
## Relative Risks of Performing Surgical Ablation in Propensity Matched Patients with Atrial Fibrillation During Adult Cardiac Operations 2011-2014

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Overall (N=57,478)</th>
<th>No Ablation (N=28,739)</th>
<th>Ablation Performed (N=28,739)</th>
<th>Relative Risk (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>4.31% (2,480)</td>
<td>4.50% (1,292)</td>
<td>4.13% (1,118)</td>
<td>0.92 (0.85-1.00)</td>
<td>0.0422</td>
</tr>
<tr>
<td>Reoperation for Bleeding</td>
<td>3.61% (2,075)</td>
<td>3.73% (1,075)</td>
<td>3.49% (1,002)</td>
<td>0.93 (0.86-1.02)</td>
<td>0.1195</td>
</tr>
<tr>
<td>Permanent Stroke</td>
<td>1.96% (1,124)</td>
<td>2.13% (612)</td>
<td>1.78% (512)</td>
<td>0.84 (0.74-0.94)</td>
<td>0.0028</td>
</tr>
<tr>
<td>Transient Ischemic Attack</td>
<td>0.38% (218)</td>
<td>0.42% (121)</td>
<td>0.34% (97)</td>
<td>0.80 (0.61-1.05)</td>
<td>0.1064</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>4.62% (2,585)</td>
<td>4.35% (1,219)</td>
<td>4.88% (1,366)</td>
<td>1.12 (1.03-1.22)</td>
<td>0.0107</td>
</tr>
<tr>
<td>Prolonged Ventilation (&gt;24hrs)</td>
<td>16.31% (9,373)</td>
<td>16.75% (4,813)</td>
<td>15.87% (4,560)</td>
<td>0.95 (0.90-0.99)</td>
<td>0.0224</td>
</tr>
<tr>
<td>Pacemaker</td>
<td>6.87% (3,946)</td>
<td>5.89% (1,693)</td>
<td>7.84% (2,253)</td>
<td>1.33 (1.24-1.43)</td>
<td>&lt; .0001</td>
</tr>
<tr>
<td>Phrenic Nerve Injury</td>
<td>0.06% (33)</td>
<td>0.06% (16)</td>
<td>0.06% (17)</td>
<td>1.06 (0.53-2.14)</td>
<td>0.8655</td>
</tr>
<tr>
<td>Readmission 30-days</td>
<td>13.36% (7,347)</td>
<td>12.79% (3,511)</td>
<td>13.92% (3,836)</td>
<td>1.09 (1.03-1.15)</td>
<td>0.0011</td>
</tr>
</tbody>
</table>

### Surgical Ablation Trends By Operative Procedure

MVRR – Mitral Valve Replacement or Repair; CABG – Coronary Artery Bypass Grafting; AVR – Aortic Valve Replacement; OTHER – other combination of concomitant operations; Stand Alone – only surgical ablation performed; MVR – Mitral Valve Replacement

**NOTES:**
41. Transcervical Extended Mediastinal Lymphadenectomy (TEMLA) – Experience from a North American Cancer Center

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Author Institution(s): 1Roswell Park Cancer Institute, Buffalo, NY; 2Cancer Institute of New Jersey, New Brunswick, NJ

Objectives: Accurate staging of the mediastinum is a critical element of therapeutic decision making in NSCLC. We sought to determine the efficacy of transcervical extended mediastinal lymphadenectomy (TEMLA) for NSCLC tumors that were large, central, or required induction therapy.

Methods: A retrospective chart review of all patients having TEMLA at our institution from the inception of the TEMLA program (2009) to Dec 2015 was performed. Stage was assessed by PET/CT, TEMLA, and final pathologic review. Lymph node yields, tumor characteristics, and TEMLA-related perioperative morbidities were tabulated as well. The accuracy of TEMLA mediastinal restaging the after neoadjuvant therapy was compared to PET/CT.

Results: 164 patients underwent TEMLA. Of these 159 (97%) were completed successfully. Table 1 summarizes the clinical characteristics of this population. Combined surgical resection along with TEMLA was performed in 142 of these patients with the vast majority undergoing a VATS resection (136/142; 95.7%). The recurrent laryngeal nerve injury rate was 6.7%. 118 of 164 patients underwent TEMLA for restaging after neoadjuvant therapy; 108 of these patients were also restaged by PET/CT. In this patient subgroup, TEMLA was more accurate than PET/CT in staging the mediastinum (90% vs 73%, P<0.005). However, the pneumonia rate in this subgroup of patients was 13%.

Conclusions: Transcervical mediastinal lymphadenectomy (TEMLA) is a safe and superior to PET/CT for restaging of the mediastinum after neoadjuvant therapy for NSCLC. This increased accuracy comes at a cost of a higher than normal post-operative pneumonia rate.

*STSA Member D Relationship Disclosure
<table>
<thead>
<tr>
<th>Patient characteristic</th>
<th>Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (mean)</td>
<td>64.4yrs</td>
</tr>
<tr>
<td>Gender (% female)</td>
<td>51.2%</td>
</tr>
<tr>
<td>Histology (%)</td>
<td></td>
</tr>
<tr>
<td>Adenocarcinoma</td>
<td>90 (54.9%)</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>59 (36.0%)</td>
</tr>
<tr>
<td>Other histology</td>
<td>15 (9.1%)</td>
</tr>
<tr>
<td>FEV1 (Mean %pred)</td>
<td>75.4%</td>
</tr>
<tr>
<td>DLCO (mean %pred)</td>
<td>74.6%</td>
</tr>
<tr>
<td>Clinical stage (%)</td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>18 (11%)</td>
</tr>
<tr>
<td>II</td>
<td>39 (24%)</td>
</tr>
<tr>
<td>III</td>
<td>96 (59%)</td>
</tr>
<tr>
<td>IV</td>
<td>11 (7%)</td>
</tr>
<tr>
<td>Pathologic stage (%)</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>7 (4.3%)</td>
</tr>
<tr>
<td>I</td>
<td>39 (23.8%)</td>
</tr>
<tr>
<td>II</td>
<td>52 (31.7%)</td>
</tr>
<tr>
<td>III</td>
<td>56 (34.1%)</td>
</tr>
<tr>
<td>IV</td>
<td>10 (6.1%)</td>
</tr>
<tr>
<td>Neoadjuvant therapy (%)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>46 (28%)</td>
</tr>
<tr>
<td>Chemotherapy</td>
<td>17 (10.4%)</td>
</tr>
<tr>
<td>Chemoradiation</td>
<td>100 (61%)</td>
</tr>
<tr>
<td>Radiation</td>
<td>1 (0.6%)</td>
</tr>
<tr>
<td>Extent of resection (%)</td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>26 (15.8%)</td>
</tr>
<tr>
<td>Wedge resection</td>
<td>6 (3.6%)</td>
</tr>
<tr>
<td>Lobectomy</td>
<td>115 (70.1%)</td>
</tr>
<tr>
<td>Pneumonectomy</td>
<td>17 (10.4%)</td>
</tr>
<tr>
<td>Modality of resection (%)</td>
<td></td>
</tr>
<tr>
<td>No resection</td>
<td>26 (15.8%)</td>
</tr>
<tr>
<td>VATS</td>
<td>130 (79.2%)</td>
</tr>
<tr>
<td>Open</td>
<td>8 (4.9%)</td>
</tr>
</tbody>
</table>

NOTES:
42. Transversus Abdominis Plane (TAP) Block Improves Perioperative Outcomes After Esophagectomy Compared to Thoracic Epidural (TE)

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Authors: Gal Levy1, Mark Cordes2, Ralph W. Aye1, Alexander S. Farivar1, DBrian E. Louie1

Author Institution(s): 1Swedish Medical Center and Cancer Institute, Seattle, WA; 2Swedish Hospital, Seattle, WA

Objectives: Pain control is challenging during esophagectomy. A thoracic epidural (TE) is commonly used but is a compromised when covering chest and abdominal incisions. Additionally, the sympathetic blockade can have unintended consequences such as hypotension or delayed return of bowel function. A transversus abdominis plane block (TAP) has the potential to control upper abdominal pain without these negative consequences. We aimed to compare a TE (T5-9) with bilateral TAP blocks with PCA for immediate management after esophagectomy.

Methods: Retrospective review of patients undergoing esophagectomy between 2012 and 2015. Primary outcomes were initial volume resuscitation at 72 hours, hypotension (SBP <90 mmHg), length of stay (LOS), return of bowel function and complications. Pain scores (0-10) at 24, 48 and 72 hours were assessed for adequacy of pain control.

Results: Forty patients underwent esophagectomy: bilateral TAP block with PCA (N=20) versus TE (N=20). Both groups were comparable in age, gender, stage and histology. During the initial 72 hours after surgery, hypotension was less prevalent in the TAP group (14% vs 78%, p<0.05) and consequently, the TAP group required significantly less volume resuscitation (10 L vs 17 L, p=0.018). Pain scores were not statistically different between TAP blocks and TE at 24 h (5.9 vs 4.6, p=0.07), 48 h (5.5 vs 4.9, p=0.21), and 72 h (4.8 vs 4.5, p=0.37). There was one death and one pneumonia in the TAP block group but lower overall morbidity (25% vs 60%, p<0.05), lower occurrences of atrial fibrillation (5% vs 25%, p=0.67) and lower anastomotic leak rates (0 vs 10%, p=0.15). The length of stay and return of bowel function was significantly shorter in the TAP group (10 days vs 12, p=0.02) and (5 days vs 7, p<0.05) respectively.

Conclusions: TAP blocks with a PCA during esophagectomy achieve equivocal pain control compared to TE result in less hypotension and fluid resuscitation with fewer complications.
Office-Based Spirometry: A New Model of Care in Preoperative Assessment for Low-Risk Pulmonary Resections

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Authors: Jessica L. Hudson, Jennifer Bell, A. Sasha Krupnick, Daniel Kreisel, D Traves D. Crabtree, G. Alexander Patterson, Bryan F. Meyers, Varun Puri

Author Institution(s): Washington University School of Medicine, St. Louis, MO

Objectives: Formal pulmonary function testing with laboratory spirometry (LS) is currently standard of care for risk stratification prior to lung resection. We have previously shown that LS and handheld office spirometry (OS) are clinically comparable for forced expiratory volume in 1 second (FEV1) and forced vital capacity. We investigated the safety of preoperative risk stratification for lung resection based solely on OS.

Methods: Patients deemed low-risk for lung resection by predetermined criteria were enrolled in a single-center prospective study and underwent preoperative OS. When FEV1% was >60% by OS, formal LS was not performed. Patients in the OS group were compared to those who underwent LS and lung resection in a propensity score matched model. Standardized mean differences determined covariate balance in the model. McNemar’s test and log-rank test were performed respectively for categorical and continuous paired outcome data.

Results: 65 prospectively enrolled patients met inclusion criteria, received OS, and underwent pulmonary resection. 1,444 patients in the institutional database (50% of resections from 2008-15) also met inclusion criteria and underwent LS. The c-statistic of the propensity score model was 0.966, resulting in 44 matched pairs (68%). There were no mortalities and only one 30-day readmission per group. The risk of major morbidity was similar at 6 patients per group (13.6%). All analyses of morbidity in discordant pairs had p >0.56. Likewise, there was no association between length of stay and exposure to OS vs LS (p=0.31). The estimated annual cost savings to the institution from performing OS only and avoiding LS was $65,000.

Conclusions: Low-risk patients undergoing lung resection can be adequately and safely assessed using handheld OS without the need for formal LS, with significant cost savings. With upcoming bundled care reimbursement paradigms, such safe and effective strategies are likely to be more widely employed.

NOTES:
Characteristics of 1509 patients being evaluated for lung resection screened with office spirometry vs formal laboratory spirometry techniques

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Unmatched groups</th>
<th>Propensity score matched groups</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of patients (%)</td>
<td>Office spirometry (N=65)</td>
</tr>
<tr>
<td>Age, mean (SD), in years</td>
<td>58.02 (12.31)</td>
<td>62.58 (12.21)</td>
</tr>
<tr>
<td>Male sex</td>
<td>30 (46.15)</td>
<td>682 (43.77)</td>
</tr>
<tr>
<td>Race</td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>51 (84.48)</td>
<td>1254 (86.84)</td>
</tr>
<tr>
<td>Black</td>
<td>13 (20.00)</td>
<td>161 (11.29)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (1.54)</td>
<td>27 (1.87)</td>
</tr>
<tr>
<td>Body mass index, mean (SD)</td>
<td>25.66 (6.35)</td>
<td>28.15 (6.61)</td>
</tr>
<tr>
<td>Smoking</td>
<td>27 (41.54)</td>
<td>381 (26.39)</td>
</tr>
<tr>
<td>Former smoker (quint &gt;1 month prior)</td>
<td>26 (40.00)</td>
<td>686 (47.51)</td>
</tr>
<tr>
<td>Current smoker</td>
<td>9 (13.85)</td>
<td>376 (26.04)</td>
</tr>
<tr>
<td>Packs per year, mean (SD), in pack-years</td>
<td>36.68 (20.83)</td>
<td>43.97 (30.79)</td>
</tr>
<tr>
<td>FEV1% predicted, mean (SD), in %</td>
<td>89.42 (15.90)</td>
<td>87.26 (16.23)</td>
</tr>
<tr>
<td>FVC% predicted, mean (SD), in %</td>
<td>88.73 (22.24)</td>
<td>95.17 (16.53)</td>
</tr>
<tr>
<td>Number of preoperative comorbidities, mean (range)</td>
<td>0.79 (0-3)</td>
<td>1.03 (0-5)</td>
</tr>
<tr>
<td>Disease category</td>
<td>12 (18.46)</td>
<td>211 (14.61)</td>
</tr>
<tr>
<td>Malignant</td>
<td>53 (81.54)</td>
<td>1226 (84.90)</td>
</tr>
<tr>
<td>Surgery type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wedge resection</td>
<td>39 (60.00)</td>
<td>519 (35.94)</td>
</tr>
<tr>
<td>Segmentationectomy</td>
<td>NA</td>
<td>59 (4.09)</td>
</tr>
<tr>
<td>Lobectomy</td>
<td>24 (36.92)</td>
<td>355 (56.44)</td>
</tr>
<tr>
<td>Bilobectomy</td>
<td>2 (3.08)</td>
<td>39 (2.70)</td>
</tr>
<tr>
<td>Bullectomy</td>
<td>NA</td>
<td>12 (0.83)</td>
</tr>
<tr>
<td>Incision type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoracoscopy</td>
<td>48 (73.85)</td>
<td>496 (34.35)</td>
</tr>
<tr>
<td>Thoracotomy</td>
<td>14 (21.54)</td>
<td>936 (64.82)</td>
</tr>
<tr>
<td>Thoracoscopy converted to thoracotomy</td>
<td>2 (3.08)</td>
<td>8 (0.55)</td>
</tr>
<tr>
<td>Sternotomy</td>
<td>1 (1.54)</td>
<td>3 (0.21)</td>
</tr>
<tr>
<td>Other</td>
<td>NA</td>
<td>1 (0.07)</td>
</tr>
</tbody>
</table>

Abbreviations: SD, standard deviation. NA, not applicable.

Propensity score distribution after matching for office spirometry versus formal laboratory spirometry

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44. Video-Thoracoscopic Management of Post-Pneumonectomy Empyema

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Authors: Domenico Galetta, Alessandro Borri, Roberto Gasparri, Francesco Petrella, Lorenzo Spaggiari

Author Institution(s): European Institute of Oncology, Milan, Italy

Objectives: Postpneumonectomy empyema (PPE) is a serious complication even when it is not associated with bronchopleural fistula (BPF). Besides irrigation, an aggressive treatment is usually applied for removing infected material. However, a minimally invasive approach might achieve satisfactory results in selected patients.

Methods: We retrospectively identified 18 patients presenting with PPE receiving video-thoracoscopic approach. There were 14 males and 4 females. (mean age, 62 years; range, 44-73). Empyema was confirmed by thoracentesis and bacteriological examination. All patients had immediate chest tube drainage and underwent thoracoscopic debridement of the empyema. No irrigation was used postoperatively. Fifteen patients had no proven BPF; 2 had suspicious of a BPF, and one had a minor (<3 mm) BPF.

Results: Median time from pneumonectomy to empyema diagnosis was 129 days (range, 7-10590). Median time from drain position to VATS procedure was 10 days (range, 2-78). A bacterium was isolates in 13 cases (72.2%). There was no mortality and no morbidity related to the procedure. The average duration of thoracoscopic debridement was 56 minutes (range, 40-90). Median postoperative stay was 7 days (range, 1-18). Only in one patient an open-window thoracostomy was performed. Median follow-up of the 18 patients receiving thoracoscopy was 41.5 months (range, 1-78 months). None had recurrent empyema. The patient with a minor BPF remained asymptomatic and is doing well at 48 month follow-up.

Conclusions: Thoracoscopy might be a valuable approach for patients presenting with PPE with or without minimal BPF. Video-thoracoscopic debridement of postpneumonectomy space is an efficient method to treat PPE.
45. Medium-Term Outcomes After Implantation of Expanded-Polytetrafluoroethylene Valved Conduit (ePTFE VC) for Right Ventricular Outflow Tract

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Authors: *Yoshio Ootaki (Otaki), Allison Welch, Michael J. Walsh, Michael Quartermain, *Ross M. Ungerleider

Author Institution(s): Wake Forest Baptist Health, Winston Salem, NC

Discussant: D*James A. Quintessenza, All Children’s Hospital, St. Petersburg, FL

REGULATORY DISCLOSURE: This presentation describes the off-label use of an Expanded-Polytetrafluoroethylene Valved Conduit, which has an FDA status of investigational.

Objectives: Pulmonary valve replacement (PVR) is becoming the most frequent congenital heart operation performed on adolescents and young adults. Multiple surgical options are available including autologous pericardium, mechanical valves, allografts, and bioprosthetic valves. Each option has limitations with durability, endocarditis or freedom from reintervention for stenosis or insufficiency, particularly in the pediatric population. We report our experience a uniquely designed, trileaflet expanded-polytetrafluoroethylene valved conduit (ePTFE VC) for right ventricular outflow tract reconstruction.

Methods: Beginning in 2012, ePTFE VC were implanted in 24 patients with a median age of 10.2 years (1 year to 15 years). Bileaflet valved conduits were used initially in 3 patients, and our novel trileaflet valved conduit was used in 21 patients (Figure 1). Our unique trileaflet ePTFE VC is easy to construct and due to design characteristics, is 1-2 cm shorter than similar bileaflet models. Our ePTFE VC is fashioned from commercially available ePTFE tube graft (16 mm in 1 patient, 20 mm in 6 patients, 24 mm in 17 patients) and 0.1 mm thick ePTFE membrane for the leaflet material on a sterile back table while the sternum is being opened by a colleague. Valve function was assessed by echocardiography after the implantation.

Results: There were no hospital deaths. Mean follow up was 2.2 years (4 month to 4.2 years) and during this time there was no reoperation for the ePTFE VC. There was one intervention for stenosis at the distal anastomosis. Pulmonary insufficiency was mild or less in 22 patients (92%). The mean peak pressure gradient between the right ventricle and the pulmonary artery measured by echocardiography was 19.2 ± 7.6 mmHg. There have been no cases of endocarditis.

Conclusions: Compared to historical data for other PVR options, our ePTFE VC shows superior medium-term performance, with less reinterventions, endocarditis or significant valve dysfunction.
46. Efficacy of an Extracellular Matrix in Systemic Loading Conditions in Congenital Heart Disease Surgical Repair

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Authors: Adeel Ashfaq¹, Amit Iyengar¹, Oh Jin Kwon¹, Saad Soroya¹, Son Nguyen¹, Ryan Ou¹, Brian Reemtsen²

Author Institution(s): ¹David Geffen School of Medicine at UCLA, Los Angeles, CA; ²Mattel Children’s Hospital, Los Angeles, CA

Discussant: *Lauren Kane, Texas Children’s Hospital / Baylor College of Medicine, Houston, TX

REGULATORY DISCLOSURE: This presentation describes the use of the CorMatrix Patch by CorMatrix Cardiovascular Inc., which is FDA approved.

Objectives: Extracellular matrices (ECM) are commonly used to repair congenital heart defects; however there is a lack of literature pertaining to outcomes with ECM use in high pressure conditions. We aimed to evaluate the efficacy of an ECM used in systemic, high pressure loading conditions in congenital heart defect repair.

Methods: Between January 2011 and August 2014, a total of 202 patients underwent congenital heart disease repair using the ECM placed in a systemic pressure condition, and were included in the study. The operative sites with the appropriate loading conditions included: defects in the ventricular septum, mitral valve, aortic valve, ascending aorta, and aortic arch. Patients were followed and evaluated for mortality and reoperations due to loss of ECM integrity. Echocardiograms were evaluated for graft malfunction such as aneurysmal dilation, VSD formation, valve malfunction, or outflow tract obstruction.

Results: Patients were followed for an average of 527 days (Median=374). Out of the 202 patients, 7 (3.5%) died due to complications unrelated to ECM, and 9 (4%) underwent reoperations due to complications of ECM integrity. Reoperations were as follows: 3 of 6 patients receiving aortic leaflet replacement required reoperation for leaflet failure; 3 of 12 patients receiving mitral valve leaflet repairs required reoperation for leaflet failure (All 3 were less than 1 year-old); 2 of 142 patients with VSD repair required reoperation for residual shunting; and 1 patient required a balloon angioplasty after coarctation patch repair. The average time to reoperation was 198 days (Median=67).

Conclusions: This modern case series suggests that the ECM is efficacious and sustainable under systemic conditions in congenital heart defect repair. However, concerns remain about the use of ECM in aortic valve repair and infant mitral valve repair. Further studies are needed to evaluate long-term ECM integrity.
Extracellular Matrix Placement Sites and Reoperations

<table>
<thead>
<tr>
<th>ECM Placement Site (n)</th>
<th>Reoperations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ventricular Septum 142</td>
<td>2 (Residual Shunting)</td>
</tr>
<tr>
<td>Aorta 44</td>
<td>None</td>
</tr>
<tr>
<td>Mitral Valve Leaflet 12</td>
<td>3 (Leaflet Repair)</td>
</tr>
<tr>
<td>Aortic Valve Leaflet 6</td>
<td>3 (Leaflet Repair)</td>
</tr>
<tr>
<td>Ventricular Assist Device Suture Site 3</td>
<td>None</td>
</tr>
<tr>
<td>Left Ventricle 1</td>
<td>None</td>
</tr>
</tbody>
</table>

*Several patients has multiple patches placed, thus percentages are not reported.

NOTES:
47. Brom (Multisinus) Aortoplasty for Supravalvar Aortic Stenosis

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Authors: Michael C. Monge1,2, *Carl L. Backer1,2, Osama Eltayeb1,2, Joyce T. Johnson1,2, Andraida R. Popescu1,2, Cynthia K. Rigsby1,2, John M. Costello1,2

Author Institution(s): 1Ann & Robert H Lurie Children's Hospital, Chicago, IL; 2Northwestern University Feinberg School of Medicine, Chicago, IL

Discussant: *James D. St. Louis, Children's Mercy Hospital and Clinics, Kansas City, MO

Objectives: Controversy remains regarding the optimal surgical approach for children with supravalvar aortic stenosis (SAS). There are proponents of one-patch, two-patch, three-patch, and autologous slide aortoplasty.

Methods: The three-patch technique was first described by Gerard Brom from Brussels, Belgium in 1988. Since 1997 we have used the Brom three-patch aortoplasty to treat 20 patients with SAS. In recent years we have used computed tomographic (CT) imaging for preoperative evaluation rather than cardiac catheterization as it does not require general anesthesia.

Results: In 20 consecutive patients with SAS, the mean age was 3.7 ± 5.9 years, median age was 1.5 years. Twelve patients had Williams syndrome. Ten patients had advanced preoperative medical imaging (7 CT, 3 MRI). Mean cardiopulmonary bypass time was 172 ± 29 minutes. Mean cross-clamp time was 110 ± 21 minutes. Nine patients had simultaneous pulmonary artery stenosis patching. Median length of stay was 7 days. There was no operative or late mortality. Mean follow-up time is now 6 ± 5 years. There were no reoperations on the aortic root. Eight patients have no or trivial aortic insufficiency (AI), 3 patients have mild AI, and 1 patient has moderate AI. One patient who had infant balloon dilation of the aortic valve and later subacute bacterial endocarditis has moderate to severe aortic valve insufficiency (AI) and stenosis (AS). One patient has moderate residual supravalvar AS; all the others have essentially no AS. None had signs of late coronary insufficiency.

Conclusions: CT imaging is our diagnostic modality of choice for SAS. Multisinus patch aortoplasty restores the normal aortic root geometry and relieves coronary orifice stenosis in children with supravalvar aortic stenosis. Long-term outcomes are excellent with essentially no recurrent SAS and preservation of aortic valve function.

*STSA Member D Relationship Disclosure

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48. A New Kaolin Impregnated Hemostatic Sponge (QuikClot®) Is Effective for Intraoperative Hemostasis in Norwood Operation

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Authors: Takeshi Shinkawa, Carl Chipman, Jessica Holloway, Xinyu Tang, Jeffrey M. Gossett, Michiaki Imamura

Author Institution(s): University of Arkansas for Medical Sciences, Little Rock, AR

Discussant: Charles B. Huddleston, Cardinal Glennon Children’s Hospital, St. Louis University School of Medicine, St. Louis, MO

Objectives: A newly developed kaolin impregnated hemostatic sponge (QuikClot®) is reported to reduce intraoperative blood loss in trauma or non-cardiac surgery. The objective of this study was to assess the effectiveness of this device in pediatric cardiac surgery.

Methods: This is a retrospective review of all patients who underwent Norwood operation in infancy between 2011 and 2015 at a single institution. The patients who had postoperative extracorporeal membrane oxygenation support were excluded. The patients were divided into 2 groups based on the kaolin impregnated hemostatic sponge usage, and the operative outcomes were compared between groups.

Results: Twenty-nine Norwood operations during the study period were included. All patients had cardiopulmonary bypass primed with packed red blood cell and fresh frozen plasma, and deep hypothermia to 18 degrees Celsius with antegrade regional cerebral perfusion. The packed red blood cell, platelet concentrate, cryoprecipitate, and the factor VII were given as necessary after cessation of cardiopulmonary bypass. A kaolin impregnated hemostatic sponge was used intraoperatively in 13 patients (Group Q) and not used in 16 patients (control). There was no significant difference in preoperative profiles and cardiopulmonary bypass time between the groups. The intraoperative platelet, cryoprecipitate, and factor VII dosage were significantly less in group Q compared to control (55 ml, 10 ml, 45 mcg/kg vs. 72 ml, 15 ml, 45 mcg/kg; p=0.028, 0.011, 0.036). The bleeding complication (2nd cardiopulmonary bypass run for hemostasis or mediastinal exploration in the ICU) was significantly lower in group Q compared to control (0 vs. 31 %, p=0.048).

Conclusions: A new kaolin impregnated hemostatic sponge was effective to reduce blood product use and postoperative bleeding complications in Norwood operation at a single institution.

Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Control (No QuikClot use; n=16)</th>
<th>Group Q (QuikClot use; n=13)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>packed Red Blood Cell after bypass (ml)</td>
<td>268 (238, 295)</td>
<td>252 (0, 270)</td>
<td>0.10</td>
</tr>
<tr>
<td>Platelet dose (ml)</td>
<td>72 (60, 86)</td>
<td>55 (45, 70)</td>
<td>0.028</td>
</tr>
<tr>
<td>Cryoprecipitate dose (ml)</td>
<td>15 (10, 20)</td>
<td>10 (10, 10)</td>
<td>0.011</td>
</tr>
<tr>
<td>Factor VII (mcg/kg)</td>
<td>45 (0, 180)</td>
<td>0 (0, NA)</td>
<td>0.036</td>
</tr>
<tr>
<td>Bleeding complication</td>
<td>5 (31%)</td>
<td>0 (0%)</td>
<td>0.048</td>
</tr>
</tbody>
</table>

Variables were summarized as median (25th percentile, 75th percentile) or number (percentage). p-values are based on Mann-Whitney U tests and Fisher’s exact test.

*STSA Member D Relationship Disclosure

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49. Midterm Results of Hybrid Arch Repair With Zone 0 Stent Graft Deployment

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Authors: Seyed Hossein Aalaei Andabili, Charles T. Klodell, Teng Lee, Philip Hess, Tomas Martin, Adam Beck, Robert Feezor, Salvatore T. Scali, Thomas M. Beaver

Author Institution(s): 1 University of Florida, Gainesville, FL; 2 Indiana University, Indianapolis, IN; 3 Florida Hospital Orlando, Orlando, FL

Objectives: Hybrid technique can facilitate treatment of distal aortic arch pathology. We reviewed outcomes of single-stage hybrid arch (HybridArch) procedures at our center.

Methods: Single university center retrospective review (Jun-2010 to Aug-2015) of 48 patients undergoing replacement of the ascending aorta, arch debranching, with Zone 0 antegrade stent graft placement.

Results: There were 25 (52%) elective and 23 (48%) emergent patients with a mean age±SD 64±11yrs. Twenty seven (56%) patients had aortic aneurysm and 21 (44%) acute/chronic dissection. Overall in-hospital mortality was 17% (8/48): 17% (4/23) in emergent and 16% (4/25) in elective patients (P=1). In-hospital mortality was associated with age>65 [OR=9.5 (1.2-36)], preoperative INR>1.3 [OR=14.2 (2.1-95.8)], and postoperative acute kidney injury (AKI) [OR=5.6 (1.1-29)]. Post-operative stroke and paraplegia occurred in 3(6%) and 2(4%) patients, respectively. Six (13%) patients were re-intubated. Based on AKIN criteria, 12 (25%) patients developed AKI. Emergent patients had longer ICU admission than elective, 7.7 days (range: 3.1-48.2) vs 4.2 (range: 3.3-40.8) days (p=0.034). Median length of ventilation and hospital stay were not different between two groups. At one year follow up, 2 (2/40, 5%) patients were noted to have a type II endoleak, and 2 other patients had chronic dissection of the distal aorta: one underwent graft expansion, while another had distal aortic reconstruction. Median follow up time was 17 months (range: 1-63); following discharge overall survival rate was 92% at 6 months and 89% at 1-3 years (Fig-1).

Conclusions: HybridArch techniques facilitate repair of complex arch aortic pathology and obviate the need for second stage surgery. Mortality was higher in patients with preoperative INR>1.3, age >65yrs, and postoperative AKI; and following discharge midterm survival was 89% at 3 years.
Figure-1. Survival rate of patients who underwent single-stage HybridArch repair

NOTES:
Transmyocardial Laser Revascularization (TMR) For Class IV Angina: 30-Day Outcomes from a Contemporary, Multi-Center Patient Registry

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Authors: D’V. Seenu Reddy, Keith B. Allen, Eric Peck, Thomas R. Pollard, Robert J. Still, Joseph Wilson

Author Institution(s): 1St. Luke’s Mid America Heart Institute, Kansas City, MO; 2Eisenhower Medical Center, Rancho Mirage California, CA; 3Parkwest Medical Center, Knoxville, TN; 4Baptist Medical Center, Jacksonville, FL; 5Bakersfield Memorial Hospital, Bakersfield, CA, CA; 6Centennial Hospital, Nashville, TN

Objectives: Transmyocardial revascularization (TMR) is an effective treatment for symptomatic relief of angina. The objectives of this patient registry were to define further the disease characteristics of the population being treated, evaluate rates of 30-day postoperative mortality and major adverse cardiac events (MACE), and assess preoperative and operative risk factors.

Methods: Between May 2013 - March 2015, 203 patients (189 (93.1%) TMR+CABG, 13 (6.4%) sole therapy) with Canadian Cardiovascular Society (CCS) class IV angina and regions of myocardium not amenable to direct coronary revascularization, were enrolled from 25 centers. Patient demographics, TMR procedure, 30-day follow-up, and CCS angina score information were prospectively collected. Multivariate analyses evaluated the relationship between 30-day mortality and 30-day MACE (cardiac-related death, myocardial infarction, congestive heart failure, cerebrovascular accident, and serious arrhythmia), with preoperative and operative variables. Mean age was 64.3 ± 10.2 and 74.4% were male. Mean pre-operative ejection fraction (EF) was 52.2 ± 9.8%.

Results: Sole therapy patients were younger and had more pre-operative comorbidities vs. TMR+CABG patients. Thirty-day follow-up was 98.5% complete (n=200/203). Rates of 30-day mortality and MACE were 0.5% (1/200) and 9.5% (19/200), respectively. Diabetes was the only statistically significant predictor of MACE. Diabetics had a 3.3 times greater risk of MACE vs. non-diabetics (p=0.043). Rehospitalization occurred in 8.0% (16/200) of patients and 98.9% (183/185) reported a ≥2 class reduction in angina.

Conclusions: The data demonstrate low operative mortality and incidence of MACE at 30-day follow-up in patients with Class IV angina undergoing either sole therapy or adjunctive TMR, with excellent reduction in angina.

Summary of 30-Day Outcomes, n (%)*

<table>
<thead>
<tr>
<th>Event</th>
<th>All Patients (n=200)</th>
<th>Adjuvant TMR+CABG (n=187)</th>
<th>Sole Therapy TMR (n=13)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality</td>
<td>1 (0.5%)</td>
<td>1 (0.5%)</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>MACE</td>
<td>19 (9.5%)</td>
<td>18 (9.6%)</td>
<td>1 (7.7%)</td>
</tr>
<tr>
<td>A-fib</td>
<td>13 (6.5%)</td>
<td>12 (6.4%)</td>
<td>1 (7.7%)</td>
</tr>
<tr>
<td>Rehospitalization</td>
<td>16 (8.0%)</td>
<td>14 (7.5%)</td>
<td>2 (15.4%)</td>
</tr>
<tr>
<td>≥ 2 Class Reduction in Angina</td>
<td>183/185 (98.9%)</td>
<td>171/172 (99.4%)</td>
<td>12/13 (92.3%)</td>
</tr>
</tbody>
</table>

*30-day follow-up available for 200/203 of all patients, 187/189 of TMR+CABG, and 13/13 of sole therapy.
51. Intermediate Outcomes After Conservative Repair of Type A Aortic Dissection

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Authors: Fernando Fleischman, James M. Tatum, Daniel Logsdon, W H. Gray, Robbin G. Cohen, Amy Hackmann, Mark J. Cunningham, Vaughn A. Starnes, D Michael E. Bowdish

Author Institution(s): University of Southern California, Los Angeles, CA

Objectives: Controversy exists regarding the extent of repair required in type A aortic dissection. We resect all proximal and arch intimal tears and repair the corresponding sections of the aorta, but only address disease essential for survival.

Methods: Between 2005 and 2015, 179 patients had repair of type A aortic dissections (age 61+/-13.4 years, range 29-88 years; 70% male). Arterial cannulation was isolated axillary in 107 (60%), isolated central in 6 (3%), isolated femoral in 14 (8%) and through a combination of cannulation sites in 52 (29%). Repair was categorized by site of proximal and distal anastomosis. The proximal anastomosis was at the sinotubular junction in 136 (76.4%), the aortic root in 39 (21.9%), and valve sparing root replacement in 3 (1.7%). Distal anastomosis was distal ascending aorta in 35 (20.0%), arch undersurface in 105 (59.0%) and total arch replacement in 38 (21.4%). Innominate or axillary artery dissections had been identified on imaging in 58 (32.6%). Mortality was confirmed utilizing Social Security Death Index or by patient contact. Mean follow-up is 3.0+/-2.7 (Range 0-10.7) years. Kaplan-Meier and cox-proportional hazard analysis was used to assess survival and model contributing factors.

Results: Survival was 92.2%, 85.7%, 83.8% and 77.7% at 30-days, 1, 3 and 5 years. Complications were cerebrovascular accidents in 13 (7.4%), acute renal failure in 32 (18.2%), liver failure in 21 (12.1%), and limb ischemia in 5 (2.8%). Intraoperative death occurred in 3 (1.6%), <30-day mortality in 14 (7.8%). Axillary cannulation did not affect incidence of post-operative complications regardless of innominate or axillary artery dissection. Level of anastomosis did not affect survival (Proximal: hazard ratio [HR]: 1.085, 95% confidence interval [CI]: 0.47, 2.47, p = 0.84, Distal: HR: 1.083. CI: 0.65, 1.88, p = 0.78).

Conclusions: A conservative approach to the repair of acute type A dissection results in excellent survival to 5 years.
K-M Survival after Repair of Type A Aortic Dissection

Number at risk

0.00 0.25 0.50 0.75 1.00

Cumulative Survival

0 1000 2000 3000 4000

Time (days)

175 76 34 8 0

NOTES:
52. Timing of Operation for Tricuspid Regurgitation After Heart Transplant

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Authors: ‘A. Michael Borkon, Kaitlyn Carl, Sanjeev Aggarwal, ‘Keith B. Allen, Alex Pak, John R. Davis, Eric Thompson, Jingyan Wang, Andrew Kao

Author Institution(s): Mid America Heart Institute of Saint Luke’s Hospital, Kansas City, MO

Discussant: ‘Anthony L. Estrera, University of Texas Houston Medical School, Houston, TX

Objectives: Significant tricuspid regurgitation (TR) developing after heart transplantation (HT) may reduce quality of life and increase late mortality. This study examines outcomes for patients with at least moderate TR after HT and the importance of timing for tricuspid valve operation in this group of patients.

Methods: Between January 1, 2000 and July 1, 2015, 460 HT performed in 456 patients at our institution were retrospectively studied. Patients dying within 30-days were excluded. Echocardiograms at post-transplant time points were obtained for 451 HT. Severity of TR was graded on a scale of none to severe. Moderate/severe TR was found in 75 HT patients. Results from this group were compared to patients with mild or no TR. During this period, 31 HT (TVR) underwent tricuspid repair (3) or replacement (28). 26 TVR patients could be matched with 128 HT without TVR by recipient gender, age at HT, ischemic time, and era of transplant. Data was analyzed with uni-variable, Kaplan Meier analyses and Cox proportional hazard modeling.

Results: Moderate/severe TR was more frequent in HT with a higher number of post-transplant biopsies (19.9±7.9 vs. 14.1±5.2, p<0.001) and treatable rejection episodes (1.2±1.6 vs. 0.5±1.1, p<0.001), and lack of annuloplasty at time of HT (80.0% vs. 93.6%, p<0.001). HT with moderate/severe TR had significantly higher incidence of composite death, re-transplant, or need for TV surgery compared to HT with none/mild TR (p=0.0023). Of 31 patients undergoing TVR, there was only one hospital death; however, the hazard ratio for death, re-transplant, or need for TV surgery in HT undergoing TVR compared to HT not undergoing TVR was 4.258 (p<0.0001).

Conclusions: Development of moderate/severe TR after HT is associated with poor composite outcomes. While TVR can be carried out with low mortality, this group of HT patients continues to do poorly, suggesting a need for earlier operation and a less invasive means of rejection diagnosis.
When adjusted by gender, age at transplant, ischemic time and transplant date, time-dependent variable TVR was associated with increased mortality, and graft failure, $p = 0.0001$. Hazard ratio = 4.258 (95% CI: 2.419, 7.497) at 5% significant level.

NOTES:
53. Atrial Resection Without Cardiopulmonary Bypass for Lung Cancer: Experience from a Single Institution

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Authors: Domenico Galetta1, Alessandro Borri, Roberto Gasparri, Francesco Petrella, Lorenzo Spaggiari

Author Institution(s): European Institute of Oncology, Milan, Italy

Objectives: Results of resection of lung cancer invading the left atrium (T4 atrium) without cardiopulmonary bypass (CPB) remain controversial. We reviewed our experience analyzing surgical results and postoperative outcomes.

Methods: Patients who underwent extended lung resection for T4 atrium without CPB between September 1998 and March 2016 were retrospectively reviewed using a prospective database.

Results: Forty-four patients were collected (34 men, median age of 63 years). Twenty-five patients underwent preoperative mediastinal staging and 27 received induction treatment (IT). Lung resection included 40 (90.9%) pneumonectomies, 3 (6.8%) lobectomies, and one bilobectomy (2.3%). Pathological nodal status was N0 in 10 patients (22.7%), N1 in 18 (40.9%), and N2 in 16 (36.4%). Four patients receiving IT had complete pathological response (9.1%). Ten patients (22.7%) had microscopic tumor evidence on atrial resected margins. Mortality was nil. Major complication rate was 11.4%: one BPF, one cardiac herniation, and three cases of hemothorax all requiring re-intervention. Minor complication rate was 25%: 8 atrial arrhythmias, and 3 atelectases. After a median survival of 37 months (range, 1-144 months), 20 patients (45.4%) were alive. Five-year survival and disease-free interval were 39% and 45.8%, respectively. Patients with N0 disease and R0 had a best prognosis (log-rank test: p=0.03, and p=0.01, respectively). IT neither influenced survival nor postoperative complications. At multivariate analysis, pN0 (p=0.04 (95% CI: 0.65-9.66)) and negative atrial margins (p=0.02 (95% CI: 0.96-8.35)) were positive independent prognostic factors.

Conclusions: Resection of T4 atrium is technically feasible without mortality and with acceptable morbidity. Patients with N2 cancers should not be operated on. Our results suggest that lung cancer invading the left atrium should not be systematically considered as a definitive contraindication to surgery.
Comparing Outcomes After Pulmonary Resection for Lung Cancer Between Veterans Administration Medical Center and an Academic Medical Center

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Authors: Travis Geraci1, Vanessa Baratta1, John Young1, Ann-Marie Dunican2, Richard Jones1, Thomas Ng1

Author Institution(s): 1Warren Alpert Medical School of Brown University, Providence, RI; 2Providence VAMC, Providence, RI

Objectives: Hospital and surgeon volume each have an association with postoperative outcomes. The volume of lung cancer surgery at our Veterans Administration Medical Center (VAMC) is lower than at our Academic Medical Center (AMC). We compared the outcomes after lobectomy for lung cancer at VAMC and AMC, in order to identify specific areas of clinical care requiring quality improvement.

Methods: Data was derived from a prospective database from a single surgeon in order to keep surgeon experience constant. Included were all male patients undergoing lobectomy for non-small cell lung cancer. Postoperative morbidity, mortality and overall survival were compared after propensity score matching.

Results: From 2004-2013, 419 patients were evaluated (338 AMC, 81 VAMC). Unadjusted comparison of demographics, found VAMC patients to be younger (p=0.027), more often active smokers (p<0.001), lower %DLCO (p=0.028), and higher Charlson Co-morbidity Index (p=0.002); while body-mass index, %FEV1 and ASA were not different. Outcomes comparison after propensity score matching of 81 AMC with 81 VMAC patients, found higher rate of major complication (27.2% vs 12.3%, p =0.018) and longer hospital stay (median 7.5 vs 6.0 days, p<0.001) for VAMC, but no difference in 90 day mortality (VAMC 6.2% vs AMC 4.9%, p=1.000). Pneumonia was the specific complication found to be higher at VAMC as compared with AMC (11.1% vs 1.2%, p=0.009). There was no difference in 5 year overall survival for stage I disease (VAMC 68.2% vs AMC 69.0%, p=0.950).

Conclusions: With the surgeon variable kept constant, and after adjusting for patient factors, the rate of major complication after lobectomy for lung cancer is higher at VAMC as compared with AMC. The difference is largely attributable to a higher rate of postoperative pneumonia at VAMC. Complications after pulmonary resection at VAMC could be reduced by implementing quality improvement initiatives aimed at reducing the rate of postoperative pneumonia.
Perioperative Outcomes of Patients Undergoing Pulmonary Lobectomy on Clopidogrel

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Authors: Scott Atay, Arlene Correa, Wayne L. Hofstetter, Reza J. Mehran, David C. Rice, Jack A. Roth, Boris Sepesi, Ji Stephen G. Swisher, Ara Vaporciyan, Garrett Walsh, Mara Antonoff

Author Institution(s): University of Texas MD Anderson Cancer Center, Houston, TX

Objectives: Perioperative management of anti-platelet therapy for patients undergoing pulmonary resection must balance the risk of cardiovascular events with that of hemorrhage. An optimal approach has not been defined in this population. We sought to characterize outcomes of patients undergoing pulmonary lobectomy on anti-platelet therapy with clopidogrel.

Methods: A retrospective review of a prospective institutional database was performed, identifying all patients undergoing pulmonary lobectomy from 2005-2015 who received perioperative clopidogrel. Patients were divided into groups based on the timing of clopidogrel discontinuation prior to operation: (I) ≤5 days, (II) 6-14 days, and (III) >14 days. Analyses were performed to assess the impact of timing of discontinuation on both cardiovascular and hemorrhagic events.

Results: Sixty-two patients with complete datasets were identified and included in the analysis. The indication for clopidogrel was coronary artery disease in 44 (71%) patients, 35 (56%) of whom had prior stent placement. Overall incidence of transfusion and major cardiovascular events were 16% (10/62) and 6.5% (4/62), respectively. There were 4 post-operative non-ST elevation myocardial infarctions. Three were in patients with stents, all placed >1 year prior to surgery. None were secondary to acute in-stent thrombosis. Transfusion rates were lower in group, III as compared to, II (0% vs. 24%, p=0.045). No significant differences were identified between groups in terms of mortality, estimated blood loss, or operative duration (Table).

Conclusions: No significant outcome differences were identified among groups in terms of perioperative cardiovascular or hemorrhagic events. While these findings suggest that clopidogrel may be discontinued shortly before surgery with limited risk of bleeding, we also found that holding therapy for >14 days pre-operatively did not appear to increase the risk of major cardiovascular events.
### Post-operative events

<table>
<thead>
<tr>
<th>Event</th>
<th>≤5 days n=8</th>
<th>6-14 days n=38</th>
<th>&gt;14 days n=16</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mortality (30-day)</td>
<td>0</td>
<td>1 (2.6%)</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Myocardial infarction</td>
<td>0</td>
<td>4 (10.5%)</td>
<td>0</td>
<td>0.446</td>
</tr>
<tr>
<td>Estimated blood loss (ml)</td>
<td>75</td>
<td>200</td>
<td>138</td>
<td>0.056</td>
</tr>
<tr>
<td>Operative duration</td>
<td>182</td>
<td>182</td>
<td>175</td>
<td>0.695</td>
</tr>
<tr>
<td>Transfusion</td>
<td>1 (12.5%)</td>
<td>9 (24%)</td>
<td>0</td>
<td>0.075*</td>
</tr>
<tr>
<td>Post-op length of stay (days)</td>
<td>4</td>
<td>6.5</td>
<td>6</td>
<td>0.046</td>
</tr>
<tr>
<td>Atrial Arrhythmia</td>
<td>0</td>
<td>10 (26%)</td>
<td>5 (28%)</td>
<td>0.239</td>
</tr>
<tr>
<td>Sepsis</td>
<td>0</td>
<td>2 (5.2%)</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Re-operation</td>
<td>1 (12.5%)</td>
<td>1 (2.6%)</td>
<td>0</td>
<td>0.307</td>
</tr>
<tr>
<td>Renal failure</td>
<td>0</td>
<td>1 (2.6%)</td>
<td>0</td>
<td>1.0</td>
</tr>
<tr>
<td>Discharge with chest tube</td>
<td>0</td>
<td>4 (10.5%)</td>
<td>2 (11%)</td>
<td>0.846</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>0</td>
<td>5 (13%)</td>
<td>1 (6%)</td>
<td>0.570</td>
</tr>
<tr>
<td>CVA/TIA</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.0</td>
</tr>
</tbody>
</table>

* = p-value across all 3 groups  ** = p-value comparing groups, II and, III

**NOTES:**

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Authors: Siyuan Cao1, Gail Darling2, *Stephen C. Yang1

Author Institution(s): 1The Johns Hopkins Medical Institution, Baltimore, MD; 2General Thoracic Surgery Club Clinical Trials Group/University of Toronto, Toronto, Ontario, Canada

Objectives: There remain limited consensus and guidelines on the long-term postoperative surveillance and care of the patient following esophagectomy for cancer. In this study, we report survey results on the postoperative surveillance practices of thoracic surgeons in their follow up of esophageal cancer patients.

Methods: An on-line IRB-approved survey was sent to the General Thoracic Surgical Club (n=265) to assess postoperative surveillance plans and views on long-term care needs in patients with esophageal cancer. General descriptive analyses using frequencies and proportions on the quantitative data was performed.

Results: Respondents (n=63) comprised of 97% general thoracic and 3% cardiothoracic surgeons. Most (32%) performed 10-19 esophagectomies/year, and followed their own patients long-term (92%). Surveillance goals were aligned, with 60%, 33%, and 5% of respondents ranking overall survival/cancer recurrence, quality of life/symptoms, and access to care as top priorities, respectively. However, there was variance in timing and frequency of follow up visits. Chemotherapy and radiation were used by 84% of surgeons, but utilization was guided by different criteria. Nutritional consult, pain management, and complementary medicine were used 76%, 56%, and 10% of the time, respectively, guided by patient symptoms. Surveillance studies were utilized by 80%, but study type, frequency, and indications varied widely (Figure 1). Dedicated survivorship clinics or activities existed in 43% of the responses.

Conclusions: In following postoperative esophageal cancer patients, surgeons have similar goals and use a combination of clinic visits, adjuvant therapy, and lab tests/imaging studies. However, surveillance plans differ in frequency and type of follow up, and often guided by different criteria. A consensus is needed for more concrete guidelines and survivorship care plans for these patients. This ultimately will improve the patient experience after surgery.

*STSA Member  D Relationship Disclosure

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Figure 1: Frequency and type of tests ordered for surveillance following esophagectomy for cancer

NOTES:
57. AvalonElite DLC Provides Reliable Total Cavopulmonary Assist in Failing Fontan Sheep Model Using Valved Extracardiac Conduit

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Authors: Cheng Zhou1, Dongfang Wang1, Cherry Ballard-Croft1, Guangfeng Zhao2, Stephen Topaz2, Joseph Zwischenberger1

Author Institution(s): 1University of Kentucky, Lexington, KY; 2W-Z Biotech, LLC, Lexington, KY

Discussant: Umar Boston, Lebonheur Children’s Hospital, Memphis, TN

REGULATORY DISCLOSURE: This presentation describes the off-label use of AvalonElite DLC by Maquet, which has an FDA status of investigational.

Objectives: The AvalonElite Double-lumen Cannula (DLC) provides total cavopulmonary assist (CPA), but is not reliable. A modification with paired umbrellas improves performance, but is in early development stage. We propose off label application of AvalonElite DLC to support failing Fontan circulation with 2 valves added in SVC and IVC to guarantee reliable CPA performance. This concept was tested in a 6 hr failing Fontan sheep model.

Methods: A valved extracardiac conduit (ECC) was used to create failing Fontan adult sheep model (n=6). Through a thoracotomy, SVC and IVC were cut off from RA and connected to the valved ECC (Fig). The ECC was connected to right PA by side to side anastomosis to create total cavopulmonary connection. One ECC valve was located above and the other one below cavopulmonary anastomosis. A 27 Fr AvalonElite DLC was inserted from RJV-SVC into ECC. The infusion lumen opening was positioned between the two ECC valves. Coupled with a pump, this DLC drainage lumen withdrew blood from SVC/IVC, and infusion lumen sent blood to ECC. Two ECC valves bracket infusion blood to pulmonary artery for efficient CPA. Blood was sampled for blood count and metabolism.

Results: A successful failing Fontan model with valved ECC was successfully created in all 6 sheep. CVP was elevated from 9±1 to 17±1 mmHg, systolic arterial pressure decreased from 103±9 to 51±13 mmHg, and cardiac output decreased from 3.6±0.3 to 1.4±0.2 l/min. The serum lactate level was increased from 1.6 to 3.6 mmol/L, indicating poor perfusion. At 4 L/min CPA, failing Fontan circulation was completely converted to normal baseline level. At end of 6 hr CPA, serum lactate returned to 1.7 mmol/L, indicating adequate perfusion. Necropsy revealed intact valved ECC with well positioned DLC. No major thrombosis was found.

Conclusions: Adding two valves in SVC and IVC, guaranteed reliable CPA performance of AvalonElite DLC in failing Fontan circulation sheep model.

IMAGE #57_2524399_A.jpg
58. Influence of Weight at Time of First Palliation on Survival in Patients With Single Ventricle

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Authors: TK Susheel Kumar¹, Sushitha Surendran¹, Jeffrey A. Towbin¹, Jerry Allen¹, James B. Tansey¹, Umar Boston¹, David Zurakowski², *Christopher J. Knott-Craig¹

Author Institution(s): ¹Lebonheur Children’s Hospital, Memphis, TN; ²Boston Children’s Hospital, Boston, MA

Discussant: *James Gangemi, University of Virginia Health System, Charlottesville, SC

Objectives: We sought to determine the influence of various factors on survival following staged palliation in patients with single ventricles at our institution.

Methods: A retrospective study of all single ventricle patients who underwent staged palliation at our institution over an eight year period was conducted. The data was collected from the Society of Thoracic Surgeons Congenital Heart Surgery database and patient charts. Information on age and weight at stage of first palliation, prematurity, chromosomal, non-cardiac anomalies and type of palliation was collected. Hospital mortality and unplanned reintervention following each stage of palliation was also collected.

Results: 72 patients underwent staged palliation over an eight year period. There were 13 interstage deaths. There was no hospital mortality following Glenn or Fontan operations. On univariate analysis low weight at the time of first palliation, prematurity and presence of non-cardiac anomalies were predictors of interstage mortality. However, multivariable cox regression analysis revealed weight at stage 1 palliation as a strong predictor of interstage mortality. Type of stage 1 palliation did not have any influence on outcome. No difference in survival was noted following Glenn operation.

Conclusions: Weight at stage 1 palliation influences interstage mortality. The type of stage 1 palliation has no bearing on outcome.

TABLE 1: Univariate Analysis of Survivors and Non-Survivors

<table>
<thead>
<tr>
<th>Variable</th>
<th>Survivors (n = 59)</th>
<th>Non-Survivors (n = 13)</th>
<th>p-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, days</td>
<td>5 (3-8)</td>
<td>4 (2-7)</td>
<td>0.20</td>
</tr>
<tr>
<td>Weight, Kg</td>
<td>3.2 (2.8-3.8)</td>
<td>2.4 (2.1-2.9)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Weight &lt; 2.6 kg</td>
<td>11 (19%)</td>
<td>9 (69%)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Gender, M/F</td>
<td>34/25</td>
<td>10/3</td>
<td>0.23</td>
</tr>
<tr>
<td>Prematurity</td>
<td>6 (10%)</td>
<td>5 (39%)</td>
<td>0.02*</td>
</tr>
<tr>
<td>Chromosomal anomaly</td>
<td>3 (5%)</td>
<td>2 (15%)</td>
<td>0.22</td>
</tr>
<tr>
<td>Non-cardiac anomalies</td>
<td>16 (27%)</td>
<td>7 (54%)</td>
<td>0.10 (trend)</td>
</tr>
<tr>
<td>Type of palliation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MBT</td>
<td>30 (51%)</td>
<td>5 (38%)</td>
<td></td>
</tr>
<tr>
<td>PAB</td>
<td>9 (15%)</td>
<td>3 (23%)</td>
<td></td>
</tr>
<tr>
<td>Norwood</td>
<td>20 (34%)</td>
<td>5 (38%)</td>
<td>0.67</td>
</tr>
</tbody>
</table>

*STSA Member  D Relationship Disclosure
59. Repair of Transposition of the Great Arteries With Intact Ventricular Septum—Results With a Standardized Method of Coronary Transfer

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Authors: *Kirk R. Kanter

Author Institution(s): Emory University School of Medicine, Atlanta, GA

Discussant: *Constantine Mavroudis, Florida Hospital for Children, Orlando, FL

Objectives: We hypothesized that a standardized method for coronary artery transfer for the arterial switch operation for transposition of the great arteries with intact ventricular septum (TGA/IVS) could improve outcomes.

Methods: Since 2002, 107 consecutive neonates with TGA/IVS aged 5.8±11.4 days (median 4d) weighing 3.4±0.6 kg (median 3.4kg; range 1.9-6.0kg) had a standardized method of coronary transfer (Figure). Six (5.6%) had emergency operations for low saturations despite balloon septostomy. Five (4.7%) had simultaneous repair of an associated coarctation or hypoplastic aortic arch. 37 (34.6%) had coronary artery branching anomalies including 3 with intramural single coronary arteries (Table).

Results: Mean crossclamp and cardiopulmonary bypass times were 61±22 min (median 57) and 144±43 min (median 137). Extracorporeal membrane oxygenation was used in 2 pts, one for cardiac dysfunction 2 days postoperatively and 1 for pulmonary hypertension—both were weaned. Delayed sternal closure was used in 14 (13.1%). Median ICU stay was 4 days and median hospital stay 8 days. There was 1 early death of sepsis at 48 days in a child with a single intramural coronary artery with preserved postoperative ventricular function. On follow-up from one month to 14 years, there was one late death of unknown causes. 9 patients (8.4%) had late reinterventions without mortality: 8 for supravalvular aortic or pulmonary stenosis and 1 coronary revision. No patient has ventricular dysfunction on latest echocardiogram.

Conclusions: Using a simple standardized and reproducible approach to coronary transfer, repair of TGA/IVS can be performed safely with good long-term results in a variety of coronary anatomies and preoperative states.

Patient Characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preoperative balloon septostomy</td>
<td>60 (56.1%)</td>
</tr>
<tr>
<td>Emergent operation for hypoxemia</td>
<td>6 (5.6%)</td>
</tr>
<tr>
<td>Preoperative sepsis</td>
<td>4 (3.7%)</td>
</tr>
<tr>
<td>Small muscular VSD</td>
<td>6 (5.6%)</td>
</tr>
<tr>
<td>Associated coarctation/hypoplastic arch repair</td>
<td>5 (4.7%)</td>
</tr>
<tr>
<td>Circumflex from right coronary artery</td>
<td>20 (18.7%)</td>
</tr>
<tr>
<td>Single coronary artery</td>
<td>11 (10.3%)</td>
</tr>
<tr>
<td>Other coronary anomaly</td>
<td>6 (5.6%)</td>
</tr>
</tbody>
</table>
Standardized Coronary Transfer for Two-Coronary System

NOTES:
60. Neonatal Transfer Does Not Impact Mortality Within a Regionalized Pediatric Cardiac Surgery Network

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Authors: Michael F. Swartz, George M. Alfieris

Author Institution(s): University of Rochester, Rochester, NY

Discussant: Dalip Nath, Children’s National Medical Center, Washington, DC

Objectives: Following the regionalization of pediatric cardiac surgical care, neonates are commonly transferred from their birth hospital to a different hospital for surgery. The impact of transferring a neonate for surgery, particularly over a considerable distance (>10 miles), has been left un-explored. We sought to identify the impact of transferring a neonate for cardiac surgery.

Methods: Between 2005-2014, we queried the New York State Cardiac Surgery database from a single institution to identify neonates that were either transferred for surgery, or were born within the cardiac surgery center. Outcomes were compared between groups, with subgroup analysis between single ventricle and bi-ventricular repairs.

Results: A total of 116 neonates were born at the cardiac surgery center, and 240 were transferred 80.2 ± 17.2 miles. Age at operation, and need for pre-operative ventilation were significantly lower from neonates who were born at the cardiac surgery center (Table 1). In addition, there was a greater percentage of neonates with single ventricle anatomy born at the cardiac surgery center (44.8 vs 30%; p=0.03). Despite these differences, there were no significant differences in post-operative morbidity (Table 1). Birth at a cardiac surgery center did not impact 30 day survival (Birth: 88.6 vs. Transfer:91.5%; p=0.7) (Figure 1). The thirty day survival of single ventricle palliations (76 vs 80%; p=0.7) or Bi-ventricular repairs (95.3 vs 96.4%; p=0.7) was not significant between groups.

Conclusions: This data suggests that the transfer of neonates from outlying hospitals may not significantly impact 30-day survival or post-operative outcomes in our current model of regionalization.

Peri-Operative Demographics

<table>
<thead>
<tr>
<th></th>
<th>Card Hosp Birth (n=116)</th>
<th>Transfer (n=240)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at Operation (days)</td>
<td>6.7 ± 5.2</td>
<td>10.1 ± 6.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Male Gender</td>
<td>55% (64)</td>
<td>58% (139)</td>
<td>0.6</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>3.2 ± 0.9</td>
<td>3.1 ± 0.6</td>
<td>0.5</td>
</tr>
<tr>
<td>Bi-Ventricular Repair</td>
<td>55.2% (64)</td>
<td>70% (60)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Single Ventricle Palliation</td>
<td>44.8% (52)</td>
<td>30% (72)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Pre-Operative Risks</td>
<td>No Risks</td>
<td>6% (7)</td>
<td>6% (15)</td>
</tr>
<tr>
<td>Ventilation</td>
<td>45% (52)</td>
<td>65% (156)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Inotropes</td>
<td>9% (10)</td>
<td>16% (38)</td>
<td>0.06</td>
</tr>
<tr>
<td>Post-Operative Morbidity</td>
<td>No Events</td>
<td>74% (86)</td>
<td>79% (190)</td>
</tr>
<tr>
<td>Ventilation &gt; 10 days</td>
<td>8% (9)</td>
<td>5% (11)</td>
<td>0.2</td>
</tr>
<tr>
<td>Sepsis</td>
<td>13% (15)</td>
<td>8% (19)</td>
<td>0.2</td>
</tr>
<tr>
<td>Un-planned re-intervention</td>
<td>2% (2)</td>
<td>1% (2)</td>
<td>0.6</td>
</tr>
<tr>
<td>Operative Length of Stay (days)</td>
<td>26.7 ± 24.1</td>
<td>22.5 ± 27.3</td>
<td>0.2</td>
</tr>
</tbody>
</table>

Abbreviations: Card Hosp Birth-Cardiac Hospital Birth

*STSA Member D Relationship Disclosure
Thirty day survival for neonates who required transfer, or were born at the cardiac surgery hospital (Card Hosp Birth)

NOTES:
61. Lung Transplant Outcomes in Patients With Re-Vascularized Coronary Artery Disease

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Author Institution(s): UTHSCSA, San Antonio, TX

Objectives: In lung transplant candidates, the degree of coronary artery disease deemed acceptable varies among transplant centers. The impact of prior percutaneous intervention (PCI) and coronary artery bypass grafting (CABG) surgery on lung transplant (LT) outcomes needs further scrutiny.

Methods: We performed a retrospective review of 306 consecutive LTs performed at the University of Texas Health Science Center from March 2004 to January 2015 and analyzed demographics and postoperative outcomes. We considered two groups: patients with CAD who had undergone a prior CABG or PCI (n=45, 15%) and the control, which consisted of patients with and without CAD who did not undergo prior re-vascularization (n=261, 85%). Redo LTs were excluded. A paired t test was used for group comparisons. Kaplan-Meier and Cox proportional hazards analyses were used to test group differences in time-to-event outcomes.

Results: Demographic data were comparable among groups, except age and presence of CAD were higher in the CABG/PCI group. Single lung transplant was higher in the CABG/PCI group (22 [49%] vs 75 [29%], p=0.01). The CABG/PCI group was more likely to have renal failure requiring dialysis (3 [6.7%] vs 1 [0.38%, p=0.01) and additional catheterization post-transplant (8 [17.8%] vs 14 [5.36%, p=0.01). There was no difference in operative mortality. The overall survival difference represented as a hazard ratio of CABG/PCI vs control was 1.46 [0.91, 2.34] p=0.12. When adjusted for the higher rate of single lung transplant in the CABG/PCI group the hazard ratio was 1.26 [0.77, 2.06] p=0.36.

Conclusions: LT patients with CAD that required re-vascularization likely have worse overall survival compared to the control. The hazard ratio is mitigated when adjusted for the higher rate of single lung transplant in the CABG/PCI group. Prior CABG/PCI patients should be counseled about their higher risk and/or more effort made to perform bilateral transplants in these patients.
## Demographics

<table>
<thead>
<tr>
<th>Patient Demographic</th>
<th>CABG/STENT (n=45)</th>
<th>Control (n=261)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>61.88</td>
<td>56.74</td>
<td>0.02</td>
</tr>
<tr>
<td>Smoking History</td>
<td>29 (64.4%)</td>
<td>102 (60.92%)</td>
<td>0.78</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>26 (58%)</td>
<td>86 (33%)</td>
<td>0.002</td>
</tr>
<tr>
<td>Hypertension</td>
<td>23 (51%)</td>
<td>103 (39%)</td>
<td>0.19</td>
</tr>
<tr>
<td>Diabetes Mellitus</td>
<td>9 (20%)</td>
<td>56 (21%)</td>
<td>0.98</td>
</tr>
<tr>
<td>Diagnosed CAD</td>
<td>45 (100%)</td>
<td>92 (35%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Prior Open Lung Biopsy</td>
<td>6 (13%)</td>
<td>35 (13%)</td>
<td>1</td>
</tr>
<tr>
<td>Prior CABG</td>
<td>14 (31%)</td>
<td>0 (0%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Prior Valve Replacement</td>
<td>0 (0%)</td>
<td>2 (0.77%)</td>
<td>1</td>
</tr>
<tr>
<td>Prior Thoracotomy</td>
<td>0 (0%)</td>
<td>8 (3%)</td>
<td>0.61</td>
</tr>
</tbody>
</table>

### Post-Operative Outcomes

<table>
<thead>
<tr>
<th>Medical Event</th>
<th>CABG/STENT (n=45)</th>
<th>Control (n=261)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Lung Transplant</td>
<td>22 (49%)</td>
<td>75 (29%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Bilateral Lung Transplant</td>
<td>23 (51%)</td>
<td>186 (71%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Operative Mortality</td>
<td>1 (2.2%)</td>
<td>7 (2.6%)</td>
<td>0.9</td>
</tr>
<tr>
<td>Takeback for bleeding/hemothorax</td>
<td>6 (13%)</td>
<td>46 (18%)</td>
<td>0.62</td>
</tr>
<tr>
<td>Infection requiring prolonged hospitalization</td>
<td>3 (6.7%)</td>
<td>8 (3.1%)</td>
<td>0.21</td>
</tr>
<tr>
<td>Atrial fibrillation requiring cardioversion</td>
<td>2 (4.4%)</td>
<td>16 (6.1%)</td>
<td>1</td>
</tr>
<tr>
<td>Acute renal failure requiring dialysis</td>
<td>3 (6.7%)</td>
<td>1 (0.38%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Reperfusion injury requiring prolonged intubation</td>
<td>0 (0%)</td>
<td>5 (1.9%)</td>
<td>1</td>
</tr>
<tr>
<td>Pneumothorax requiring replacement of a chest tube</td>
<td>4 (8.9%)</td>
<td>22 (8.4%)</td>
<td>1</td>
</tr>
<tr>
<td>Cardiac arrest requiring CPR</td>
<td>1 (2.2%)</td>
<td>1 (0.38%)</td>
<td>0.27</td>
</tr>
<tr>
<td>Cerebrovascular Accident</td>
<td>2 (4.4%)</td>
<td>4 (1.5%)</td>
<td>0.22</td>
</tr>
<tr>
<td>Tracheostomy placement</td>
<td>6 (13.3%)</td>
<td>19 (7.3%)</td>
<td>0.28</td>
</tr>
<tr>
<td>Coronary Catheterization</td>
<td>8 (17.8%)</td>
<td>14 (5.4%)</td>
<td>0.01</td>
</tr>
<tr>
<td>Other</td>
<td>2 (4.4%)</td>
<td>15 (5.8%)</td>
<td>1</td>
</tr>
</tbody>
</table>

![Survival Curve with 95% Confidence Intervals](image)

**Figure 3:** Proportion alive with and without CABG/STENT (log-rank p=0.12)

**NOTES:**

- Survival Curve with 95% Confidence Intervals
- STSA 63rd Annual Meeting
62. Donation After Cardiac Death Donors: A Single Center Experience

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Authors: Joseph Costa, Sowmya Sreekandh, Lori Shah, Hilary Robbins, Kashif Raza, Selim Arcasoy, D*Joshua R. Sonett, Frank D’Ovidio

Author Institution(s): Columbia University Medical Center, New York, NY

Objectives: Donation after cardiac death (DCD) donors remain an underutilized source of lungs. Well-established donor assessment protocols and implementation of a consistent surgical team have been advocated when considering using lung allografts from DCD donors. We present our center’s experience using lungs from DCD donors.

Methods: Starting 2007 to February 2016, 67 Maastricht Class, III DCD donor lung allografts were assessed. A comparative cohort was used of 254 brain dead donors (BDD) assessed during 2012 – 2015 by the same team also using a consistent assessment protocol. Post-transplant primary graft dysfunction (PGD) and survival were monitored in both cohorts, as well as recipient and donor characteristics collected.

Results: Lungs were procured from 42/67 DCD donors (37% dry run rate) resulting in 43 transplants (21 double, 6 Right and 16 Left). Table 1 shows relevant timings at DCD procurement and the reasons for declining lungs. In the comparative cohort lungs were procured in 147/254 BDD (42% dry run rate), resulting in 153 transplants (76 double, 26 Right, 51 Left). PGD 2 and 3 at 72 hours in DCD donor recipients was 3/43 (7%) and 2/43 (5%) respectively. Comparatively in BDD recipient cohort at 72 hours, PGD 2 and 3 was 21/153 (14%) and 17/153 (11%). 90-day and 1-year recipient survival was 100% and 90% respectively for recipients of DCD lungs and 96% (146/153) and 92% 140/153 using allografts from BDD.

Conclusions: Our center experience reaffirms the use of lung allografts from DCD donors, as a viable source with favorable outcomes. In particular, recipients from DCD donors showed equivalent or possibly better PGD rate at 72hrs and survival compared to recipients from BDD.

<table>
<thead>
<tr>
<th>DCD Donor accepted (42)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Time (min):</td>
<td></td>
</tr>
<tr>
<td>Withdrawal to Declaration of Death</td>
<td>28 (20 – 33)</td>
</tr>
<tr>
<td>Withdrawal to Systolic &lt; 50 mm Hg</td>
<td>16.5 (10 – 24)</td>
</tr>
<tr>
<td>Systolic &lt; 50 mm Hg to Cold Perfusion</td>
<td>12 (11 – 17)</td>
</tr>
<tr>
<td>Withdrawal to Cold Perfusion</td>
<td>32 (22 – 37)</td>
</tr>
<tr>
<td>Withdrawal to Sat &lt; 70%</td>
<td>6 (3 – 9)</td>
</tr>
<tr>
<td>Sat &lt; 70% to re-Ventilation</td>
<td>23.5 (19 – 30)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DCD Donor declined (25)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bilateral Purulent Secretions</td>
<td>10 (40%)</td>
</tr>
<tr>
<td>Bullous disease</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>Lesions</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>Effluent Clot</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Did not expire</td>
<td>6 (24%)</td>
</tr>
<tr>
<td>Hyperemic Edematous Airways</td>
<td>2 (8%)</td>
</tr>
<tr>
<td>EVLP Right Declined (purulence) – Single Left Lung</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Single Right Decline – No back up for Single Left</td>
<td>1 (4%)</td>
</tr>
</tbody>
</table>

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63. Minimally Invasive Left Ventricular Assist Device (LVAD) Implantation Reduces Blood Product Utilization After Heart Transplant

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Authors: Denis Gilmore1, Shi Huang1, Yulia Khalina1, Monica Djunaidi1, Mary Keebler1, Mark Wigger1, D Simon Maltais2, Ashish Shah1, Matthew Danter1

Author Institution(s): 1Vanderbilt Medical Center, Nashville, TN; 2Mayo Clinic, Rochester, MN

Objectives: Intrapericardial VADs allow for minimally invasive implantation, potentially reducing operative time and blood product use. This study examines the influence of minimally invasive LVAD implantation on blood product utilization and operative time in a large contemporary cohort.

Methods: A single institution, retrospective review of prospectively collected data from 2011-2015 on all patients undergoing heart transplant (HTx) was conducted. Patients were analyzed as follows: those without previous VAD (NoVAD), VAD implant via sternotomy (sVAD) and VAD implant via a mini-thoracotomy (VADmini). Pre-operative demographics, intraoperative blood utilization and operative times were collected. The primary endpoint of total utilization of blood products including red blood cells, platelets, cryoprecipitate and fresh frozen plasma intraoperatively was compared using Kruskal-Wallis test and multiple regression analysis was conducted.

Results: 164 heart transplants were performed over 5 years. 75 involved LVAD explantation (62 sVAD, 15 VADmini). The median age for all groups was 53 years. The mean time to transplant from VAD implant was 284 days in the VADmini and 372 days in the sVAD group. Ischemic time was not significant between the sVAD and VADmini groups with times of 173 min and 201 min. There was no difference in operative times between the sVAD (450 min) and VADmini group (458 min). The median total blood product use for sVAD, VADmini, and noVAD was 18, 12, and 7 units respectively. After adjusting for co-variates, sVAD approach had a significant higher blood product usage than VADmini. (p=0.04) There was no significant difference in total blood product usage between the VADmini and noVAD (p=0.4) groups.

Conclusions: This study represents the largest cohort comparing heart transplant following sternal sparing approaches to VAD implant. Minimally invasive approaches to LVAD implantation is associated with less blood utilization during HTx.
Minimally invasive left ventricular assist device implantation significantly reduces blood product utilization at time of cardiac transplantation compared to conventional sternotomy. Furthermore, there is no significant difference in total blood product utilization between minimally invasive LVAD and no prior VAD.

NOTES:
64. Is There A Difference In Bleeding After Left Ventricular Assist Device Implant: Centrifugal Versus Axial?

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Authors: Ann C. Gaffey, Carol W. Chen, Jennifer J. Chung, Jason Han, Joyce Wald, Michael A. Acker, Pavan Atluri

Author Institution(s): University of Pennsylvania, Philadelphia, PA

Objectives: Continuous-flow left ventricular assist devices (CF-LVAD) have become the standard of care for patients with end stage heart failure. Device reliability has increased, bringing the potential for VAD as compared to transplant into debate. However, complications continue to limit VADs as first line therapy for transplant eligible patients. Bleeding, particularly, is a major source of morbidity. A debate exists as to the difference in bleeding profile between the major centrifugal and axial flow devices. We hypothesized that there would be similar adverse bleeding event profiles between the 2 major CF-LVADs.

Methods: We retrospectively investigated isolated CF LVADs performed at our institution between July 2010 and July 2015 (n=139): 76% (n=105) HMII and 24% (n=34) HVAD. We reviewed demographic, perioperative and short- and long-term outcomes.

Results: There was no significant difference in demographics or comorbidities. There was a low incidence of history of GI bleed 3.9% in HMII and 2.9% in HVAD (p=0.78), pre-implant. Preoperatively, the cohorts did not differ in coagulation measures (p=0.95) or hemoglobin value (p=0.23). Within the post-operative period (30 days), there was no difference in product transfusion: red blood cells (8.2 ± 1.0 vs 4.9 ± 1.6 U, p=0.10), fresh frozen plasma (3.3 ± 0.5 vs 2.0 ± 0.6 U, p=0.19), and platelets (1.1 ± 0.2 vs 1.2 ± 0.5 U, p=0.89). Post-operatively, a higher but not significantly different number of HMII patients returned to the operating room for bleeding (n=27, 25.7%) compared to HVAD (n=6, 18.2%, p=0.35). There was no difference in complication rates of stroke (p=0.65), re-intubation (p=0.60), drive-line infection (p=0.05), and GI bleeding (p=0.31). The patients had equivalent ICU LOS (p=0.86) and index hospitalization LOS (p=0.59).

Conclusions: We found no difference in the rate of bleeding complications between the current commercially available axial and centrifugal flow devices.

<table>
<thead>
<tr>
<th>Variables</th>
<th>HMII (n=105)</th>
<th>HVAD (n=34)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56.5 ± 13.9</td>
<td>57.2 ± 14.6</td>
<td>0.82</td>
</tr>
<tr>
<td>Partial thromboplastin time (PTT)</td>
<td>52.6 ± 2.5</td>
<td>52.3 ± 3.9</td>
<td>0.95</td>
</tr>
<tr>
<td>INTERMACS Class I</td>
<td>12 (14.3)</td>
<td>5 (14.7)</td>
<td>0.19</td>
</tr>
<tr>
<td>INTERMACS Class II</td>
<td>29 (37.1)</td>
<td>14 (41.2)</td>
<td>0.19</td>
</tr>
<tr>
<td>INTERMACS Class III</td>
<td>36 (34.3)</td>
<td>15 (44.1)</td>
<td>0.19</td>
</tr>
<tr>
<td>Ischemic etiology of heart failure</td>
<td>47 (54.2)</td>
<td>12 (55.2)</td>
<td>0.59</td>
</tr>
<tr>
<td>Post-operative bleeding requiring operative exploration, n (%)</td>
<td>27 (25.7)</td>
<td>6 (18.2)</td>
<td>0.35</td>
</tr>
<tr>
<td>Incidence of GI bleeding (post-operative), n (%)</td>
<td>12 (11.5)</td>
<td>2 (5.9)</td>
<td>0.28</td>
</tr>
<tr>
<td>Incidence of GI bleeding (3 months), n (%)</td>
<td>20 (17.7)</td>
<td>17 (19.5)</td>
<td>0.35</td>
</tr>
</tbody>
</table>

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200 STSA 63rd Annual Meeting
65. A Surprising Alliance: Two Giants of the 20th Century

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Authors: *Robert M. Sade

Author Institution(s): Medical University of South Carolina, Charleston, SC

This presentation will provide a view into the remarkable life and times of two of the most famous historical figures of the 20th century, who joined forces to pursue cardiopulmonary bypass in the early 1930s: the surgeon Alexis Carrel and the aviator-engineer Charles Lindbergh. Carrel won the Nobel Prize in Physiology or Medicine in 1912 for his work that began in 1896 when he was a surgical resident. Before 1910, he replaced carotid artery with jugular vein, transplanted kidneys, hearts, ovaries, spleens, intestines, thyroid and adrenal glands, operated on the mitral valve, and did the first coronary artery bypass graft, among other innovative procedures. Lindbergh was an engineer who became one of the most famous men in the world when he flew solo for over 33 hours from New York to Paris in the Spirit of St. Louis. When his sister-in-law was dying of mitral stenosis, Lindbergh questioned why doctors could not operate inside the heart. In 1930 he was introduced to Carrel and spent several years working with him with the objective of developing a heart-lung bypass machine for operating inside the heart. Carrel’s scientific expertise and Lindbergh’s engineering brilliance led for the first time to a successful perfusion apparatus. Their pump oxygenators were able to maintain functional vital organs, including beating hearts, for days to weeks. John Gibbon’s first paper on heart-lung bypass in 1937 cited Lindbergh’s 1935 paper on the apparatus, which journalists named the “artificial heart.” Before a fully functional heart-lung bypass machine could be created, however, the work of Carrel and Lindbergh work was interrupted by the start of WW II. Both men became political pariahs because of their association with the German government before and during the war. The internationally renowned scientist Carrel was vilified as a Nazi collaborator and died in disgrace in 1944. The world-famous Lindbergh’s leadership of the US isolationist movement led to recrimination and hostility and his popularity plummeted. His request for reinstatement of his military rank (US Army Air Force Colonel) was denied by two US presidents. After the war ended, his many contributions to the aeronautic industry and environmental preservation led to his public rehabilitation. President Eisenhower restored his US Air Force commission, and he died a Brigadier General in 1974.
66. Individual Assessment of Frailty Parameters in High- and Extreme-Risk Patients Who Underwent Transcatheter Aortic Valve Replacement

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Author Institution(s): Emory University, Atlanta, GA

Objectives: Frailty has been proposed as a risk factor for patient’s undergoing transcatheter aortic valve replacement (TAVR). The full effect of frailty on post-TAVR outcomes remains incompletely understood. The objective of this study was to evaluate the weight of four commonly used frailty parameters as predictors of 30-day outcomes and 1-year mortality in patients undergoing TAVR.

Methods: A retrospective review of prospectively collected data from 2011-2015 on 361 patients undergoing TAVR at a university hospital. Patients had a 4-parameter frailty assessment done before TAVR that include: serum albumin (g/dl), 5-meter walk (sec), grip strength (kg) and KATZ questionnaire of activities of daily livings. Logistic regression was used to examine the association between the selected frailty markers and 30-day composite endpoint and we delineated a cutoff point for each frailty markers.

Results: Median age was 82 years [IQ: 76-86] and 46.3% (167/361) were female. The rate of 30-day mortality, stroke and re-admission was 5.8%, 1.4% and 3.9%, respectively. The composite of outcomes occurred in 28% of patients. Of these 4 frailty parameters, the only significant predictor for the 30-day composite outcome was a low serum albumin 0.38 (p=0.02). Furthermore, none of the frailty markers were associated with increased mortality at 1 year.

Conclusions: In high-risk patients undergoing TAVR, a low serum albumin was the only frailty marker associated with increased risk for the 30-day composite outcomes. None of the 4 frailty parameters studied predicted mortality at 1 year. In this high- and extreme-risk TAVR population, a re-evaluation of the current frailty parameters and the cut-off values are necessary to enhance their predictive nature.

Cutoff points for each frailty variable and the corresponding area under the ROC curve (AUC)

<table>
<thead>
<tr>
<th>Frailty Markers</th>
<th>Cut-off points</th>
<th>Area Under the Curve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-procedure albumin levels (g/dL)</td>
<td>3.4</td>
<td>0.761</td>
</tr>
<tr>
<td>Grip strength (kg) in males</td>
<td>43-44</td>
<td>0.782</td>
</tr>
<tr>
<td>Grip strength (kg) in females</td>
<td>35-39</td>
<td>0.605</td>
</tr>
<tr>
<td>ADLs</td>
<td>4</td>
<td>0.676</td>
</tr>
</tbody>
</table>

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204 STSA 63rd Annual Meeting
Surgeon Leadership in the Operating Room: What Behaviors Best Support Surgical Teamwork?

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Authors: Juliana Stone1, Francesca Gino2, Emma L. Aveling1, Morgan Shields1, Cameron Wright1, Thor Sundt1, Sara Singer1, 3

Author Institution(s): 1Massachusetts General Hospital, Boston, MA; 2Harvard Business School, Boston, MA; 3Harvard TH Chan School of Public Health, Boston, MA

Objectives: The importance of effective team leadership for achieving surgical excellence is widely accepted. There is less agreement on the actual behaviors that accomplish this goal, and little primary data to inform this discussion. We studied intraoperative interactions in cardiac surgical teams and team member perceptions to identify leadership behaviors that best support surgical teamwork.

Methods: We observed and surveyed cardiac surgical teams (7 surgeons and 113 team members) from September 2013 to April 2015. We documented 2201 surgeon-team member interactions during 22 days of surgery, coded them by type and valence (i.e., positive/negative/neutral), and characterized them as leadership functions: conductor, elucidator, delegator, engagement facilitator, tone setter, human being, and safe space maker. We surveyed non-surgeon team members about surgeons’ performance as team leaders. We created individual surgeon profiles by calculating percentage of interaction types, leader functions, and valence. We correlated these with non-surgeon perceptions of leadership.

Results: 81 non-surgeons rated surgeons’ leadership at 5.4 out of 7 (range 4.2 to 6.2; see table). We observed 33 types of interactions (23/4/6 positive/neutral/negative respectively) of which 24% were elucidating and 20% tone setting. Overall, 66% (range 43% to 84%) were positive and 11% (range 1% to 45%) negative. Percent positive/negative interactions correlated strongly (r=0.85, r=-0.75, p<0.05) with non-surgeon evaluations of leadership. Facilitating engagement related most positively (r=0.80, p=0.03), and negative forms of elucidating, i.e., criticism, related most negatively (r=−0.81, p=0.03).

Conclusions: We identified 7 surgeon-leadership functions and related behaviors that impact perceptions of leadership, offering specific targets for coaching surgeons to improve team performance and patient safety. This framework may be applied to future research studies in other settings as well.
### Perception of surgeons as team leaders and surgeon interactions by leader function and valence

<table>
<thead>
<tr>
<th>Perception of surgeon as team leader--Avg (SD)</th>
<th>S1</th>
<th>S2</th>
<th>S3</th>
<th>S4</th>
<th>S5</th>
<th>S6</th>
<th>S7</th>
<th>Surgeon Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Interactions</td>
<td>218</td>
<td>317</td>
<td>201</td>
<td>417</td>
<td>218</td>
<td>129</td>
<td>426</td>
<td>275</td>
</tr>
</tbody>
</table>

Percent of interactions by leader function

<table>
<thead>
<tr>
<th>Leader Function</th>
<th>Positive</th>
<th>Neutral</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elucidator</td>
<td>24%</td>
<td>38%</td>
<td>17%</td>
</tr>
<tr>
<td>Tone setter</td>
<td>17%</td>
<td>34%</td>
<td>15%</td>
</tr>
<tr>
<td>Engagement facilitator</td>
<td>26%</td>
<td>6%</td>
<td>18%</td>
</tr>
<tr>
<td>Delegator</td>
<td>10%</td>
<td>9%</td>
<td>14%</td>
</tr>
<tr>
<td>Safe space maker</td>
<td>18%</td>
<td>9%</td>
<td>18%</td>
</tr>
<tr>
<td>Conductor</td>
<td>4%</td>
<td>2%</td>
<td>11%</td>
</tr>
<tr>
<td>Human being</td>
<td>0%</td>
<td>1%</td>
<td>6%</td>
</tr>
</tbody>
</table>

Percent of interactions by valence

<table>
<thead>
<tr>
<th>Valence</th>
<th>Positive</th>
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<td>49%</td>
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<tr>
<td>Negative</td>
<td>1%</td>
<td>24%</td>
<td>7%</td>
</tr>
</tbody>
</table>
Laparoscopic Synthetic Patch and Hepatic Buttress Repair of an Intrapericardial Diaphragmatic Hernia After Convergent "Hybrid" Maze Procedure

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Andrew J. Kaufman¹, Eugene Kahn², Jon Villena², Justin Steele², Raja Flores¹

Author Institution(s): ¹Icahn School of Medicine at Mount Sinai, New York, NY; ²Mount Sinai Beth Israel, New York, NY

Objectives: Intrapericardial diaphragmatic hernias (IDH) are the rarest form of diaphragmatic hernia. We report a case of IDH after a convergent maze procedure (CMP). The goal of this video is to describe a rare but potentially life threatening complication of CMP and to illustrate a novel minimally invasive surgical repair using both a synthetic patch and natural tissue.

Methods: An 86 year-old woman presented with acute onset epigastric pain, nausea, and hypotension 16 months after undergoing CMP. A CT scan of the chest revealed an IDH with small bowel in the pericardial space and pericardial effusion. The CT findings were seen 10 months prior but she was diagnosed with a Morgagni hernia despite a normal scan without hernia from 8 years prior.

Results: A laparoscopic repair was performed with complete exclusion of the defect. Upon entering the abdomen, the small bowel had reduced itself into the peritoneum and the epicardium was clearly visible through a 20 mm defect in the central tendon of the diaphragm. This was closed with a 2 mm thick PTFE patch fitted with fenestrations to prevent pericardial tamponade. The mesh was secured with non-absorbable sutures and a 5 mm tacks to eliminate potential for herniation. The triangular ligament and left hepatic lobe were attached as a buttress. The patient went home on post-operative day 2 without complication.

Conclusion: The convergent maze procedure is increasingly utilized for the treatment of atrial fibrillation. This is the second reported case of an intrapericardial diaphragmatic hernia with bowel incarceration after CMP. Early diagnosis and treatment is essential to prevent catastrophic complications. Laparoscopic repair of IDH with PTFE and hepatic buttress is safe and feasible. We suggest routine closure of the diaphragm after CMP. This case report will increase awareness of this complication and reduce the likelihood of misdiagnosis and delays in treatment.

*STSA Member  D Relationship Disclosure

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69. Left Ventricular Outflow Tract Obstruction After Transcatheter Mitral Valve-in-Ring Implantation: A Word of Caution

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: *Sameh Said, Sorin Pislaru, Kunal Kotkar, DCharanjit Rihal, William Mauermann, ’Hartzell Schaff, ’Joseph Dearani

Author Institution(s): Mayo Clinic, Rochester, MN

Objectives: Left ventricular outflow tract obstruction is a well-known albeit a rare complication that can occur after mitral valve replacement. With the current increase in transcatheter valve interventions, new and unique complications may be expected to occur.

Methods: We present a surgical video of severe left ventricular outflow tract obstruction that developed after transcatheter mitral valve implantation. Due to severe symptoms we reoperated the patient.

Results: On cardiopulmonary bypass, we performed transaortic resection of anterior mitral leaflet to relieve the left ventricular outflow tract obstruction.

Conclusion: The key to success of transcatheter MV interventions is careful evaluation of the interventricular septum, aorto-mitral angle, size of the left ventricle and the subvalvular apparatus to avoid such complications.
PAST MEETINGS

PRESIDENT
1954–Hollywood Beach, FL
James D. Murphy*  Paul W. Sanger

1955–White Sulphur Springs, WV

SECRETARY
1954–Hollywood Beach, FL  Hawley H. Seiler*  Hawley H. Seiler

1955–White Sulphur Springs, WV  Hawley H. Seiler*  Hawley H. Seiler

1956–Miami Beach, FL  Hawley H. Seiler*  Hawley H. Seiler

1957–San Antonio, TX  Hawley H. Seiler*  Hawley H. Seiler

1958–Edgewater Park, MS  Hawley H. Seiler*  Hawley H. Seiler

1959–Nassau, Bahamas, B.W.I.  Hawley H. Seiler*  Hawley H. Seiler

1960–Memphis, TN  Hawley H. Seiler*  Hawley H. Seiler

1961–Ocho Rios, Jamaica  Hawley H. Seiler*  Hawley H. Seiler

1962–San Antonio, TX  Hawley H. Seiler*  Hawley H. Seiler

1963–Atlanta, GA  Hawley H. Seiler*  Hawley H. Seiler

1964–Freeport, Grand Bahamas  Hawley H. Seiler*  Hawley H. Seiler

1965–Asheville, NC  Hawley H. Seiler*  Hawley H. Seiler

1966–Dallas, TX  Hawley H. Seiler*  Hawley H. Seiler

1967–Atlanta, GA  Hawley H. Seiler*  Hawley H. Seiler

1968–San Juan, Puerto Rico  Hawley H. Seiler*  Hawley H. Seiler

1969–Washington, DC  Hawley H. Seiler*  Hawley H. Seiler

1970–Miami Beach, FL  Hawley H. Seiler*  Hawley H. Seiler

1971–Orlando, FL  Hawley H. Seiler*  Hawley H. Seiler

1972–Bermuda  Hawley H. Seiler*  Hawley H. Seiler

1973–Louisville, KY  Hawley H. Seiler*  Hawley H. Seiler

1974–Williamsburg, VA  Hawley H. Seiler*  Hawley H. Seiler

1975–New Orleans, LA  Hawley H. Seiler*  Hawley H. Seiler

1976–Acapulco, Mexico  Hawley H. Seiler*  Hawley H. Seiler

1977–Marco Island, FL  Hawley H. Seiler*  Hawley H. Seiler

1978–Marco Island, FL  Hawley H. Seiler*  Hawley H. Seiler

1979–San Antonio, TX  Hawley H. Seiler*  Hawley H. Seiler

1980–White Sulphur Springs, WV  Hawley H. Seiler*  Hawley H. Seiler

1981–Palm Beach, FL  Hawley H. Seiler*  Hawley H. Seiler

1982–Hilton Head Island, SC  Hawley H. Seiler*  Hawley H. Seiler

1983–Marco Island, FL  Hawley H. Seiler*  Hawley H. Seiler

1984–Hilton Head, SC  Hawley H. Seiler*  Hawley H. Seiler

1985–Boca Raton, FL  Hawley H. Seiler*  Hawley H. Seiler

1986–Miami Beach, FL  Hawley H. Seiler*  Hawley H. Seiler

1987–Boca Raton, FL  Hawley H. Seiler*  Hawley H. Seiler

1988–Marco Island, FL  Hawley H. Seiler*  Hawley H. Seiler

1989–Scottsdale, AZ  Hawley H. Seiler*  Hawley H. Seiler

1990–San Juan, Puerto Rico  Hawley H. Seiler*  Hawley H. Seiler

1991–Orlando, FL  Hawley H. Seiler*  Hawley H. Seiler

1992–Wesley Chapel, FL  Hawley H. Seiler*  Hawley H. Seiler

1993–Panama City Beach, FL  Hawley H. Seiler*  Hawley H. Seiler

1994–Marco Island, FL  Hawley H. Seiler*  Hawley H. Seiler

1995–San Antonio, TX  Hawley H. Seiler*  Hawley H. Seiler

1996–Cancun, Mexico  Hawley H. Seiler*  Hawley H. Seiler

1997–Naples, FL  Hawley H. Seiler*  Hawley H. Seiler


1999–Orlando, FL  Hawley H. Seiler*  Hawley H. Seiler

2000–Bermuda  Hawley H. Seiler*  Hawley H. Seiler

2001–Scottsdale, AZ  Hawley H. Seiler*  Hawley H. Seiler

2002–Miami, FL  Hawley H. Seiler*  Hawley H. Seiler

2003–Bonita Springs, FL  Hawley H. Seiler*  Hawley H. Seiler

2004–Cancun, Mexico  Hawley H. Seiler*  Hawley H. Seiler

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2006–Tucson, AZ  Hawley H. Seiler*  Hawley H. Seiler

2007–Bonita Springs FL  Hawley H. Seiler*  Hawley H. Seiler

2008–Scottsdale, AZ  Hawley H. Seiler*  Hawley H. Seiler

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2011–San Antonio, TX  Hawley H. Seiler*  Hawley H. Seiler

2012–Naples, FL  Hawley H. Seiler*  Hawley H. Seiler

2013–Scottsdale, AZ  Hawley H. Seiler*  Hawley H. Seiler

2014–Tucson, AZ  Hawley H. Seiler*  Hawley H. Seiler

2015–Orlando, FL  Hawley H. Seiler*  Hawley H. Seiler

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* Deceased
CLIFFORD VAN METER PRESIDENT’S AWARD
Formerly known as the President’s Award, the Clifford Van Meter President’s Award was established in 2008 to recognize the best scientific paper delivered at the STSA Annual Meeting. In 2013, this Award was augmented to specifically recognize the best adult cardiac surgery paper delivered at the Annual Meeting. The award is given on the basis of originality, content, and presentation. Previous award recipients have uniformly displayed excellence in all areas. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

1964–Bertram A. Glass  New Orleans, Louisiana
1965–Harold C. Urschel, Jr.  Dallas, Texas
1966–Thomas J. Yeh  Savannah, Georgia
1967–Yale H. Zimberg  Richmond, Virginia
1968–J. Alex Haller, Jr.  Baltimore, Maryland
1970–George R. Daicoff  St. Petersburg, Florida
1971–Charles E. Eastridge  Memphis, Tennessee
1972–J. Kent Trinkle  San Antonio, Texas
1973–Donald L. Bricker  Lubbock, Texas
1974–Harvey W. Bender, Jr.  Nashville, Tennessee
1975–Charles E. Martin  Nashville, Tennessee
1976–Gordon F. Murray  Chapel Hill, North Carolina
1977–Denis H. Tyras  St. Louis, Missouri
1978–Joseph I. Miller, Jr.  Atlanta, Georgia
1979–M. Wayne Flye  Galveston, Texas
1980–Francis Robicsek  Charlotte, North Carolina
1981–Ellis L. Jones  Atlanta, Georgia
1982–William G. Malette  Omaha, Nebraska
1983–Robert H. Breyer  Springfield, Massachusetts
1984–Blair A. Keagy  Chapel Hill, North Carolina
1987–Jean-Nicolas Vauthey  New Orleans, Louisiana
1988–Robert A. Gustafson  Morgantown, West Virginia
1989–Harvey I. Pass  Bethesda, Maryland
1990–Vincent L. Gott  Baltimore, Maryland
1991–Ross M. Ungerleider  Durham, North Carolina
1993–Kirk R. Kanter  Atlanta, Georgia
1994–Thomas L. Spray  St. Louis, Missouri
1995–Constantine Mavroudis  Chicago, Illinois
1996–David A. Fullerton  Denver, Colorado
1997–Christopher J. Knott-Craig  Oklahoma City, Oklahoma
1998–James L. Zeller  Charleston, South Carolina
1999–Thomas D’Amico  Durham, North Carolina
2000–Joseph C. Cleveland, Jr.  Denver, Colorado
2001–Neal D. Kon  Winston-Salem, South Carolina
2002–Joseph S. Coselli  Houston, Texas
2003–Robert J. Cerfolio  Birmingham, Alabama
2004–Malcolm DeCamp  Boston, Massachusetts
2005–Seenu V. Reddy  San Antonio, Texas
2006–Andrew W. ElBardissi  Rochester, Minnesota
2007–John Stulak  Rochester, Minnesota
2008–G. Chad Hughes  Durham, North Carolina
2009–Scott H. Johnson  Lansing, Michigan
2010–Kenneth A. Kesler  Indianapolis, Indiana
2011–Robert Stewart  Cleveland, Ohio
2012–Haritha Reddy  Ann Arbor, Michigan
2013–Bartosz Rylski  Freiburg, Germany
2014–Stephanos Mastrobuoni  Brussels, Belgium
2015–Anthony L. Estrera  Houston, Texas
CAROLYN REED PRESIDENT’S AWARD
The Carolyn Reed President’s Award was established in 2013 to recognize the best general thoracic surgery scientific paper delivered at the STSA Annual Meeting. Named in memory of STSA Past President, Carolyn E. Reed, MD, (STSA President, 2006–07), this award will be given on the basis of originality, content, and presentation. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

2013–R. Douglas Adams  Merrillville, Indiana
2014–Pamela Samson  Webster Groves, Missouri
2015–Jonathan Spicer  Montreal, Quebec

GEORGE R. DAICOFF PRESIDENT’S AWARD
The George R. Daicoff President’s Award was established in 2013 to recognize the best congenital heart surgery scientific paper delivered at the STSA Annual Meeting. Named for longtime active member, George R. Daicoff, MD, this award will be given on the basis of originality, content, and presentation. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

2013–Vincent K.H. Tam  Fort Worth, Texas
2014–Jennifer Solms Nelson  Chapel Hill, North Carolina
2015–James D. St. Louis  Wayzata, Minnesota

TIKI AWARD
The quality of slides can greatly enhance or detract from a scientific presentation. In order to emphasize the importance of well-planned and prepared slides, the Southern Thoracic Surgical Association has created the Tiki Award.

This award is given to the person who presents a slide at the annual meeting which is judged by a committee appointed by the President to be the most memorable and noteworthy. This slide can be selected because it is unintelligible, confusing, cluttered, irrelevant, or conversely because it is superbly clear, concise, colorful, pertinent, and/or utilizes state of the art graphics.

1964–Watts R. Webb  New Orleans, Louisiana
1965–J. Alex Haller, Jr.  Baltimore, Maryland
1966–Richard M. Peters  San Diego, California
1967–Myron W. Wheat  St. Petersburg, Florida
1968–Carl H. Almond  Columbia, South Carolina
1969–Francis Robicsek  Charlotte, North Carolina
1970–William A. Neely  Jackson, Mississippi
1971–Paul C. Adkins  Washington, DC
1972–Panagiotis Symbas  Atlanta, Georgia
1973–James L. Alexander  Savannah, Georgia
1974–Lloyd H. Hudson  Flint, Michigan
1975–Richard E. Clark  St. Louis, Missouri
1976–William S. Lyons  Alexandria, Virginia
1977–Maruf A. Razzuk  Dallas, Texas
1978–Harold C. Urschel, Jr.  Dallas, Texas
1979–Maruf A. Razzuk  Dallas, Texas
1980–Francis Robicsek  Charlotte, North Carolina
1981–Robert Sade  Charleston, South Carolina
1982–Kit V. Arom  Minneapolis, Minnesota
1983–Herbert E. Warden  Morgantown, West Virginia
1984–Noel L. Mills  New Orleans, Louisiana
1985–George C. Kaiser  St. Louis, Missouri
OSLER ABBOTT AWARD

The Osler Abbott Award was first given in 1960 and has been awarded annually to that member of the Association who excels in the art of discussionmanship. It was named for Osler Abbott, MD of Atlanta, Georgia, who, in 1950, somehow managed to discuss 26 papers, no mean feat since only 25 were presented and one was his own!

In the early years, sheer volume of discussion was sufficient to earn at least an honorable mention, but volume alone never won the award. More important were factors such as pomposity, arrogance, irrelevancy, and the use of outdated slides which had been shown on two or more occasions. In recent years, the tactics have ranged from extreme subtlety to blatant exhibitionism and from apparent indifference to obvious covetousness.

To place this traditional award on a somewhat higher plane of competition, the Council, in its wisdom, decided to base the decision on Oslerian principles, and selection would come from evaluation of the more memorable of discussions during the scientific sessions.

Thus, the reincarnated purposes of the Osler Abbott Award of the Southern Thoracic Surgical Association are:

1. To focus on the importance of open, frank, and candid discussion in the spirit and substance of the Southern Thoracic Surgical Association and, in this way, to encourage more objective and active participation by all members attending the Annual Meeting.
2. To stimulate a healthy give-and-take among the members and, thereby, enhance the camaraderie and esprit-de-corps which have traditionally characterized the Southern Thoracic Surgical Association.
1960–Joseph W. Peabody, Jr.
1961–Milton V. Davis
1962–E. Converse Peirce, II
1963–Lewis H. Bosher, Jr.
1964–Sam E. Stephenson, Jr.
1965–Bertram A. Glass
1966–Robert E. Carr
1967–Osler A. Abbott
1968–Watts R. Webb
1969–William A. Cook
1970–Edward F. Parker
1971–Minas Joannides, Jr.
1972–J. Alex Haller, Jr.
1973–Harold C. Urschel, Jr.
1974–Bertram A. Glass
1975–Gilbert S. Campbell
1976–James W. Brooks
1977–J. Kent Trinkle
1978–Raymond C. Read
1979–Richard E. Clark
1981–Robert M. Sade
1982–James D. Donahoo
1983–Francis Robicsek
1984–Milton V. Davis
1985–George C. Kaiser
1986–Milton V. Davis
1987–J. Alex Haller, Jr.
1988–Ronald C. Elkins
1989–Bradley M. Rodgers
1990–Harvey W. Bender, Jr.
1991–Kamal A. Mansour
1993–Kit V. Arom
1994–Frederick L. Grover
1995–Constantine Mavroidis
1996–George Daicoff
1997–Ross M. Ungerleider
1998–Lynn Harrison
1999–William A. Baumgartner
2000–Robert J. Cerfolio
2001–Carolyn E. Reed
2002–John H. Calhoun
2003–Constantine Mavroidis
2004–Keith S. Naunheim
2005–Irving L. Kron
2006–Thoralf M. Sundt
2007–W. Steves Ring
2008–John W. Hammon
2009–Kevin D. Accola
2010–Vinod Thourani
2011–Jeffrey P. Jacobs
2012–Duke E. Cameron
2013–Daniel L. Miller
2014–Stephen C. Yang
2015–Joseph A. Dearani

Washington, DC
Dallas, Texas
New York, New York
Richmond, Virginia
Jacksonville, Florida
New Orleans, Louisiana
Fort Worth, Texas
Atlanta, Georgia
New Orleans, Louisiana
Andover, Massachusetts
Charleston, South Carolina
Baltimore, Florida
Charleston, South Carolina
Baltimore, Maryland
Dallas, Texas
New Orleans, Louisiana
Little Rock, Arkansas
Richmond, Virginia
San Antonio, Texas
Little Rock, Arkansas
St. Louis, Missouri
Washington, DC
Baltimore, Maryland
Oklahoma City, Oklahoma
Philadelphia, Pennsylvania
Charlotte, North Carolina
Kauffman, Texas
St. Louis, Missouri
Kauffman, Texas
Baltimore, Maryland
Oklahoma City, Oklahoma
Charlottesville, Virginia
Nashville, Tennessee
Atlanta, Georgia
St. Louis, Missouri
New Orleans, Louisiana
Baltimore, Maryland
Birmingham, Alabama
Charleston, South Carolina
San Antonio, Texas
Chicago, Illinois
St. Peterburg, Florida
Durham, North Carolina
St. Louis, Missouri
Chicago, Illinois
St. Louis, Missouri
Charlottesville, Virginia
Rochester, Minnesota
Dallas, Texas
Winston-Salem, North Carolina
Orlando, Florida
Atlanta, Georgia
Saint Petersburg, Florida
Baltimore, Maryland
Marietta, Georgia
Baltimore, Maryland
Rochester, Minnesota
KENT TRINKLE EDUCATION LECTURESHIP
The Kent Trinkle Educational Lecture is dedicated to J. Kent Trinkle, (STSA President, 1981-82) for his contributions to cardiothoracic surgery and STSA. Each year, in honor of Dr. Trinkle’s remarkable dedication to student education, an STSA member is selected to present on his/her training program. Presenters are selected by the STSA President.

1993–Benson R. Wilcox
1994–George C. Kaiser
1995–J. Kent Trinkle
1996–Irving L. Kron
1997–William A. Baumgartner
1998–Donald C. Watson, Jr.
1999–Fred A. Crawford, Jr.
2000–Robert A. Guyton
2001–Joel D. CooperSt.
2002–W. Steves Ring
2003–Walter G. Wolfe
2004–Joseph Coselli
2005–Neal Kon
2007–Walter H. Merrill
2008–Curt Tribble
2009–Irving L. Kron
2010–Michael R. Mill
2011–John H. Calhoon
2012–Bartley P. Griffith
2013–Michael Argenziano
2014–Mark S. Slaughter
2015–John S. Ikonomidis
Chapel Hill, North Carolina
St. Louis, Missouri
San Antonio, Texas
Charlottesville, Virginia
Baltimore, Maryland
Memphis, Tennessee
Charleston, South Carolina
Atlanta, Georgia
Louis, Missouri
Dallas, Texas
Durham, North Carolina
Houston, Texas
Winston-Salem, North Carolina
Nashville, Tennessee
Cincinnati, Ohio
Gainesville, Florida
Charlottesville, Virginia
Chapel Hill, North Carolina
San Antonio, Texas
Baltimore, Maryland
New York, New York
Louisville, Kentucky
Charleston, South Carolina

HAROLD URSCHEL HISTORY LECTURESHIP
The Harold Urschel History Lectureship is dedicated to long-time STSA member and contributor, Harold C. Urschel, Jr., MD, (STSA Historian, 2001-12). This lectureship was established in memory of Dr. Urschel in 2013. The lecturer will be selected annually by the Program Committee as the abstract author who submitted the most exemplary history abstract.

2013–Joseph S. Coselli
2014–Daniel L. Miller
2015–Erle H. Austin
Houston, Texas
Marietta, Georgia
Louisville, Kentucky

HAWLEY H. SEILER RESIDENTS COMPETITION AWARD
The Hawley H. Seiler Residents Competition Award is presented for an outstanding paper by a cardiothoracic or general surgery resident. It is bestowed upon the resident excelling in the following categories regarding their abstract submission: quality of abstract as well as manuscript and oral presentation. The award is named after STSA Past President and founding member, Hawley H. Seiler.

Dr. Seiler’s many contributions to STSA included serving as Secretary for 15 years and presenting on numerous topics at Annual Meetings.

1997–Elaine E. Tseng
1998–Stephen Langley
1999–Aron Goldberg
2000–Cullen D. Morris
2001–Sitaram M. Emani
2002–Thomas H. Maxey
2003–Brian T. Bethea
Baltimore, Maryland
Durham, North Carolina
Charleston, South Carolina
Atlanta, Georgia
Durham, North Carolina
Charlottesville, Virginia
Baltimore, Maryland

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<th>Year</th>
<th>Name</th>
<th>City, Country</th>
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<td>Tara Karamlou</td>
<td>Portland, Oregon</td>
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<td>Thomas K. Varghese</td>
<td>Seattle, Washington</td>
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<td>2007</td>
<td>Tara Karamlou</td>
<td>Portland, Oregon</td>
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<td>2008</td>
<td>David T. Cooke</td>
<td>Sacramento, California</td>
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<td>2009</td>
<td>Jeremiah Geoff Allen</td>
<td>Baltimore, Maryland</td>
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<td>2010</td>
<td>Castiglione M. Bhamidipati</td>
<td>Charlottesville, Virginia</td>
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<tr>
<td>2011</td>
<td>Sameh Said</td>
<td>Rochester, Minnesota</td>
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<td>2012</td>
<td>Timothy George</td>
<td>Baltimore, Maryland</td>
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<td>2013</td>
<td>Rachel L. Medbery</td>
<td>Atlanta, Georgia</td>
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<tr>
<td>2014</td>
<td>Damian J. LaPar</td>
<td>Charlottesville, Virginia</td>
</tr>
<tr>
<td>2015</td>
<td>Emily A. Downs</td>
<td>Charlottesville, Virginia</td>
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MAVROUDIS-URSCHEL AWARD
The Mavroudis-Urschel Award was established in 2006 to recognize and honor an STSA member who has not only made important contributions to the STSA scientific program, but who has also uniquely personified the social spirit, camaraderie, and fun for which STSA is famous. The award is named for STSA Past Presidents Constantine Mavroudis and Harold Urschel, who both contributed significantly not only to the scientific value of the STSA Annual Meeting but also, and just as importantly, to the organization’s high spirits (and high-jinx).

There is more to an organization than its bylaws, and there is more to its Annual Meeting than the slides and presentations. To many, STSA meetings are as much about social interactions as they are about new research findings in cardiothoracic surgery. Meeting highlights also happen at social events, such as the president’s mixer, receptions, sports events, and during the exhibit hall breaks. The Award goes to a member who has enhanced both aspects of the organization, scientific and social, and done so with a distinctive, even flamboyant, personal style—in the manner of its namesakes.

The Mavroudis-Urschel Award is made at the discretion of the President with input and recommendation from the double-secret Tiki and Osler-Abbot committee chairs. When given, the award is announced at the annual dinner/dance.

2007–Kit V. Arom Bangkok, Thailand
2009–John H. Calhoon San Antonio, Texas
2010–Keith S. Nauheim St. Louis, Missouri
2011–Francis Robicsek Charlotte, North Carolina
2012–Harold C. Urschel, Jr. Dallas, Texas
2013–Kevin D. Accola Orlando, Florida
2014–Andrea J. Carpenter San Antonio, Texas
2015–Kamal A. Mansour* Atlanta, Georgia

STSA INSPIRATION AWARD
The STSA Inspiration Award was established in 2007 to recognize the important contribution of mentorship to the specialty and the organization, and to encourage upcoming generations of CT surgeons by helping to cultivate mentors worthy of emulation.

The future of cardiothoracic surgery is in the hands and hearts of its medical students and residents. Inspiring a resident or medical student to become a CT surgeon—to become a great CT surgeon—is among the most far-reaching and important contributions one can make to the specialty and ultimately to the Southern Thoracic Surgical Association.

The residency program directors and faculty at teaching programs affiliated with the STSA are developing and inspiring future cardiothoracic surgeons every day—teaching them to become leaders in their future institutions, practices, and communities. And mentorship is not limited to program directors and faculty. Surgeons in private practice hire young graduates and become influential mentors providing career guidance and support often for years to come.

To acknowledge the crucial importance of mentorship in developing CT surgeons and to recognize and positively reinforce STSA members who have excelled in their mentorship roles, STSA established its Inspiration Award in 2007. The Inspiration Award is given to the STSA member who has demonstrated exceptional efforts in motivating, inspiring, and cultivating the clinical and research talents of medical students, residents and/or early career CT surgeons.

Nominations must be submitted in writing by September 1 to the sitting STSA President to be considered for possible presentation at the subsequent STSA Annual Meeting. Recommendation letters should outline the specific merits
of the nominee and his or her positive influences for the 'mentee(s).’ Recipient must be a member of STSA in good standing. The award is given at the discretion of the President in consultation with the Council.

2007–Robert J. Cerfolio  
Hooshang Bolooki  
Birmingham, Alabama  
Miami, Florida

2009–Irving L. Kron  
2010–Kamal A. Mansour  
Francis Robicsek  
2012–Harvey W. Bender, Jr.  
Ara A. Vaporsyan  
2013–James Robert Headrick  
2014–Curtis G. Tribble  
2015–L. Henry Edmunds  
Hooshang Bolooki  
Charlottesville, Virginia  
Atlanta, Georgia  
Charlotte, North Carolina  
Nashville, Tennessee  
Aurora, Colorado  
Houston, Texas  
Chattanooga, Tennessee  
Charlottesville, Virginia  
Bryn Mawr, Pennsylvania

JAMES W. BROOKS MEDICAL STUDENT SCHOLARSHIP
The STSA James W. Brooks Medical Student Scholarship was established in 2010 to pay tribute to Dr. Jim Brooks, past president of STSA and a great mentor to countless residents and students. The Brooks Scholarship seeks to identify 2nd, 3rd, and 4th year medical students in the STSA region who are interested in cardiothoracic surgery. The recipient(s), selected annually by a committee of STSA leaders, receives funding to attend the STSA Annual Meeting and the unique opportunity to benefit from the guidance of STSA members, thus extending Dr. Brooks’ legacy as a great mentor. It has become increasingly important to begin mentoring future CT surgeons at the medical student level. In establishing the Brooks Scholarship and providing first-rate mentorship, STSA hopes to annually inspire promising medical students to become great CT surgeons, thus making a far-reaching and important contribution to the future of the specialty and ultimately to the STSA.

2010–Elizabeth A. Spradlin  
2011–Carlo Bartoli  
2012–Vernissia Tam  
2013–Sahar Saddoughi  
2014–Mickey Ising  
Xiaoying Lou  
2015–Bogdan Kindzielski  
Graham Ungerleider  
2016–Caitlin Brown  
Andrew Percy  
Richmond, Virginia  
Louisville, Kentucky  
Baltimore, Maryland  
Charleston, South Carolina  
Louisville, Kentucky  
Chicago, Illinois  
Potomac, Maryland  
Winston-Salem, North Carolina  
Portland, Oregon  
Richmond, Virginia

STSA RESIDENT SCHOLARSHIP
The STSA Resident Scholarship was established in 2014 and seeks to identify a general surgery or thoracic surgery resident who is committed to CT surgery. Each year a scholarship recipient will be invited to attend the STSA Annual Meeting where they will be mentored by an STSA surgeon leader.

2014–Zachary Kon  
2015–Erin Schumer  
Mansi Shah  
2016–Sameer Hirji  
David Ranney  
Baltimore, Maryland  
Louisville, Kentucky  
Chapel Hill, North Carolina  
Alston, Massachusetts  
Durham, North Carolina
EXHIBITORS*
EXHIBIT HOURS AND FLOOR PLAN

THURSDAY, NOVEMBER 10
EXHIBITS OPEN 10:00 am – 3:30 pm

FRIDAY, NOVEMBER 11
EXHIBITS OPEN 7:45 am – 12:00 pm
12:45 pm – 4:00 pm

• Exhibit Hall is located in Orchid Foyer and Ballroom
• All coffee breaks scheduled during show hours are in the exhibit area
• Complimentary coffee and pastries will be served
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Santa Clara, CA 95054
Booth: F115
At Abbott, we’re committed to helping you live your best possible life through the power of health. For more than 125 years, we’ve brought new products and technologies to the world—in nutrition, diagnostics, medical devices and branded generic pharmaceuticals—that create more possibilities for more people at all stages of life. Today, 74,000 of us are working to help people live not just longer, but better, in more than 150 countries we serve.

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Karl Storz Booth: 207
El Segundo, CA 90245
KARL STORZ offers technology solutions for thoracic surgery and bronchoscopy, including our IMAGE1 S™ camera architecture system for rigid and flexible endoscopy. This modular system provides brilliant, natural color rendition, and offers innovative visualization technologies.

KLS-Martin Booth: 209
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KLS Martin is a company dedicated to providing innovative medical devices and power systems for craniomaxillofacial surgery. The company's rich history began with surgical instrument production in Tuttlingen, Germany in 1896 and continued with miniplate production in 1975. KLS Martin has advanced the capabilities of distraction osteogenesis, and revolutionized resorbable fixation with the SonicWeld Rx system.

LifeNet Health Booth: 109
Virginia Beach, VA 23453
LifeNet Health helps save lives, restore health, and give hope to thousands of patients each year. We are the world’s most trusted provider of transplant solutions, from organ procurement to new innovations in bio-implant technologies and cellular therapies—a leader in the field of regenerative medicine, while always honoring the donors and healthcare professionals that allow the healing process.

LivaNova Booth: F113
Arvoda, CO 80004
LivaNova’s comprehensive offering includes innovative sutureless, stentless and stented heart valves, mitral repair solutions, MICS cannulae and surgical instruments. When combined with LivaNova’s Goal-Directed Perfusion systems, the cardiopulmonary by-pass can also be optimized to minimize postoperative complications without compromising the quality of the surgical procedure.

LSI Solutions Booth: 109
Victor, NY 14564
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Medtronic, Inc. Booth: F105-107
Minneapolis, MN 55432
Through innovation and collaboration, Medtronic improves the lives and health of millions of people each year. Learn more about our technology, services and solutions at Medtronic.com.
Medtronic HeartWare  Booth: F109
HeartWare is focused on enhancing outcomes in treating end stage heart failure. The HVAD® System — VAD of choice — demonstrates high survival rates, low complication rates and improved quality of life.

Memorial Healthcare System  Booth: 200
Hollywood, FL 33312
Memorial Healthcare System is one of the largest public healthcare systems in the United States and a national leader in quality care and patient satisfaction.

Myriad Genetics  Booth: 206
Salt Lake City, UT 84108
Myriad myPlanTM Lung Cancer is a 46 gene expression assay that’s been clinically validated to predict 5-year lung cancer-specific mortality in over 2200 resected patients with Stage I or II NSCLC.

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St. Jude Medical is a leading global medical device manufacturer and is dedicated to transforming the treatment of some of the world’s most expensive epidemic diseases. Visit sjm.com.

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Transonic  Booth: 110
Ithaca, NY 14850
Transonic, the pioneer in CABG flow assessment, offers state-of-the-art technology for on-the-spot quantitative confirmation of bypass flow to guarantee early graft patency.

Veran Medical  Booth: 209
St. Louis, MO 63114
Veran is a privately held medical device company headquartered in St. Louis, MO. The company’s main focus is assisting physicians in the early diagnosis and treatment of lung cancer. In the United States, lung cancer kills more people each year than breast, prostate, and colon cancers combined.
Vitalcor, Inc./Applied Fiberoptics  Booth: 105
Westmont, IL 60559
Coronary Artery Perfusion Cannula Balloon. LED light source (20,000+ hours) & Gemini Plus headlight with camera. Axiom Wound Drains with specialized Clot Stop. Titanium and stainless steel specialty instruments & retractors.

Wexler Surgical  Booth: 101
Houston, TX 77035
MEMBERSHIP ROSTER*

If you have updates or corrections to your contact information, please e-mail stsa@stsa.org.

*MEMBERSHIP INFORMATION AS OF SEPTEMBER 8, 2016
NECROLOGY REPORT

Noble O. Correll, MD  
Stuart, FL

Thomas O. Gentsch, MD  
Issaquah, WA

Kamal A. Mansour, MD  
Atlanta, GA

Judson G. Randolph, MD  
Nashville, TN

John L. Sawyers, MD  
Nashville, TN

L. Newton Turk, MD  
St. Simons Island, GA
HONORARY MEMBERS

BOVE, Edward L. (Linda)
University of Michigan, F7830 Mott Hospital, Ann Arbor, MI 48109
Phone: (734) 936-4980 Fax: (734) 763-7353
E-mail: elbove@umich.edu

COOLEY, Denton (Louise Goldborough Thomas)
PO Box 20345, 1101 Bates Avenue, Houston, TX 77225
Phone: (832) 355-4932
E-mail: dcooley@heart.thi.tmc.edu

DAVID, Tirone E. (Jacqueline)
Toronto General Hospital, 200 Elizabeth St - 4N457, Toronto, ON M5G 2C4
Canada
Phone: (416) 340-5062 Fax: (416)-340-4020
E-mail: tirone.david@uhn.on.ca

EDMUNDS, L. Henry, Jr. (Martha Mel)
130 N. Roberts Road, Bryn Mawr, PA 19010
Phone: (215) 662-2092 Fax: (215) 614-0416
E-mail: edmunds1931@gmail.com

HAVERICH, Axel E.
Hannover Medical School, Carl-Neuberg-Str. 1, Hannover, D30625, Germany
Phone: 0049-511-532-6580 Fax: 0049-511-532-5404
E-mail: haverich.axel@mh-hannover.de

MOHR, Friedrich Wilhelm (Anita)
Klinik fur Herzchirurgie, Strumpellstrasse 39, Leipzig 04289, Germany
Phone: 49 341 865-1421
E-mail: mohrf@medizin.uni-leipzig.de

NAEF, Andreas P.
12 Avenue Villardin, Pully-Lausanne, CH1009, Switzerland
Phone: 41 21 729 52 08 Fax: 41 212 38596

TURINA, Marko I.
Clinic for Cardiovascular Surgery University Hospital
Ramistrasse 100, Zurich, 8091, Switzerland
Phone: 12553298 Fax: 12554446
E-mail: marko.turina@chi.usz.ch

URSCHEL, Betsey Bradley, MEd
4930 Manson Court, Dallas, TX 75229
Phone: (214) 363-6952 Fax: (214) 824-2503
E-mail: urschelbb@post.harvard.edu
MEMBERSHIP ROSTER

‡Abarbanell, Aaron
1858 Westminster Way NE, Atlanta, GA 30307
Phone: (317) 408-6008
Email: aabarba@emory.edu

**Abelson, Donald S. (Imogene)
2085 Canyon Lakes Drive, San Ramon, CA 94583

**Abraham, Ralph E. (Mary)
415 South 28th Avenue, Hattiesburg, MS 39401
Phone: (601) 268-5660 Fax: (601) 268-5759
Email: ralph.abraham@hattiesburgclinic.com

Abrishamchian, Ahmad Reza (Farnaz)
7859 Maple Lawn Boulevard, Fulton, MD 20759
Phone: (301) 725-4353
Email: arabri@yahoo.com

Accola, Kevin D. (Carolyn)
217 Hillcrest Street, Orlando, FL 32801
Phone: (407) 425-1566 Fax: (407) 422-0166
Email: kaccola@cvsorlando.com

+Adams, R. Douglas (Jennifer Adams)
1301 Pleasant Valley Road Suite 201, Owensboro, KY 42303
Phone: (270) 417-7500 Fax: (270) 417-7529
Email: rradams23@yahoo.com

Aftab, Muhammad (Hajra F. Khan)
2242 S. Poplar Street, Denver, CO 80224-2527
Phone: (303) 724-7428 Fax: (303) 724-2806
Email: draftab75@hotmail.com

Ahmad, Umraan Saeed (Homaa)
10015 Kennerly Road, Suite 403, St. Louis, MO 63128
Email: usahmad77@gmail.com

Ailawadi, Gorav (Aarti)
TCV Surgery P.O. Box 800679, Charlottesville, VA 22908
Phone: (434) 924-5052 Fax: (434) 982-3885
Email: gorav@virginia.edu

Akhter, Shahab A. (Pamela)
H4/340 Clinical Science Center 600 Highland Avenue, Madison, WI 53792-3236
Phone: (608) 263-6551 Fax: (608) 263-0547
Email: akhter@surgery.wisc.edu

**Alegre, Cesar A.
7707 North University Drive Suite 204, Fort Lauderdale, FL 33321
Phone: (954) 721-3399 Fax: (954) 721-8289
Email: calegre@aol.com

*Alejo, Jennifer L.
606F Cabell Avenue, Charlottesville, VA 22903
Phone: (410) 322-9303
Email: jalejo1@virginia.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 231
**Alessi, Francis J. M. (Pamela Jeanne)**
760 Marlene Dr, Gretna, LA 70056
Phone: (504) 340-5226 Fax: (504) 340-5227

**Alexander, James A. (Ann)**
6200 Southwest 36th Way, Gainesville, FL 32601
Phone: (352) 846-0341 Fax: (352) 846-0356

**Alexander, John C. (Carol)**
5 Wicker Sham Court W, Pinehurst, NC 28374
Phone: (201) 953-1452 Email: jalexan961@gmail.com

Alexander, L. George (Nancy)
17200 Due West Drive, Charlotte, NC 28278
Phone: (704)5821401 Fax: (919) 331-9959 Email: lgalexmd@bellsouth.net

Alexander, Pendleton
157 Beach Rd, Stevensville, MD 21666
Phone: (202) 2850001 Email: epalexandermd@gmail.com

**Alford, William C.**
402 Ellendale Ave., Nashville, TN 37205
Phone: (615) 385-1395 Fax: (615) 385-1396 Email: htawca@aol.com

Allen, Gary S. (Yvette)
3120 Waterman Way, Tavares, FL 32778
Phone: (352) 343-1216 Fax: (352) 343-1582 Email: Gary.Allen@flhosp.org

**Allums, James A. (Dee)**
2012 County Road 260, Nacogdoches, TX 75965

‡Alnajjar, Raed M. (Hanady Qrunfuleh)
2432 Heronwood Dr, Bloomfield Hills, MI 48302
Phone: (248) 686-4238 Email: raednajjar@yahoo.com

Alsoufi, Bahaaldin
2293 Greenglade Road, Atlanta, GA 30345
Phone: (404) 785-6330 Email: Balsoufi@hotmail.com

Alzeerah, Masoud A. (Jennifer)
1301 S. Coulter Drive,#103, Amarillo, TX 79106
Phone: (806) 463-1712 Email: malzeerah@hotmail.com

Ameika, James A. (Karin)
62-3600 Amaui Drive M 102, Kamuela, HI 96743
Phone: (808) 937-8042 Email: jallenusa@icloud.com

*Anciano, Carlos J. (Alejandra Delgado)*
115 Heart Drive, Mail Stop 651, Greenville, NC 27834
Phone: (252) 744-4400 Fax: (252) 744-4068 Email: ancianoc14@ecu.edu
Anderson, Richard C.
1001 Main Street 3rd Floor, Peoria, IL 61606
Phone: (309) 495-0200 Fax: (309) 676-6545
Email: RJA92@aol.com

**Anderson, Carl E. (Maryanne)
16 Woodland Way, Greenville, SC 29601
Phone: (864) 232-6200 Fax: (864) 232-7793

Anderson, Robert J. (Nancy Ann)
600 University Blvd., Suite 101, Jupiter, FL 33458
Phone: (561) 626-9801 Fax: (561) 626-9804
Email: DrA@randersonmd.com

**Anderson, Robert L.
14 Woodward Blvd., Tulsa, OK 74114-1160
Phone: (918) 584-7322

**Anderson, James N., Sr. (Jane)
1722 Pine Street, Suite 703, Montgomery, AL 36106
Phone: (334) 832-4161 Fax: (334) 832-4162
Email: JAJnanderson@aol.com

Andrews, David Scott (Julia)
301 Hawthorne Lane, Charlotte, NC 28204
Phone: 704-316-5100
Email: dsandrews@novanthealth.org

**Angel, Robert T. (Sue)
7301 Westover Road, Waco, TX 76710
Phone: (254) 772-2300 Fax: (254) 772-5514
Email:

Answini, Geoffrey A (Vanessa)
2123 Auburn Avenue Suite 238, Cincinnati, OH 45140
Phone: (513) 651-1180 Fax: (513) 651-2175
Email: answinig@ohioheart.org

*Antonoff, Mara B (Mike Antonoff)
1400 Pressler Unit 1489, Houston, TX 77030
Phone: (612) 964-6469 Fax: (713) 794-4901
Email: maraantonoff@me.com

Appleby, Douglas C. (Gayle)
329 Coatsland Drive, Jackson, TN 38303
Phone: (731) 424-5080
Email: douglasappleby3@gmail.com

**Aragon, Guillermo E. (Maria)
2 Polo Club Drive, Denver, CO 80209
Phone: (303) 778-6032 Fax: (303) 765-0776

Arcidi, Joseph M., Jr. (Janette)
9215 Village Woods Court, Grand Blanc, MI 48439
Phone: (810) 513-9232 Fax: (508) 519-0465
Email: arcidi@icloud.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 233
Armitage, John M. (Lee Ann)
4325 Spring Blvd, Eugene, OR 97405
Phone: (540) 847-0992 Fax: (541) 744-6102
Email: jmrmi5@msn.com

**Arnold, Homer S. (Helen)**
1010 West 40th, Austin, TX 78756
Phone: (512) 459-8753 Fax: (512) 483-6807

Arnold, W. Scott
2001 Crystal Spring Avenue, SW Suite 201, Roanoke, VA 24014
Phone: (540) 344-5781 Fax: (540) 342-9308
Email: wsarnold@carilionclinic.org

**Arrants, Jack E. (Lillian)**
311 John Anderson Dr., Ormond Beach, FL 32176
Phone: (386) 673-9327

Ascioti, Anthony J. (Tara)
8433 Harcourt Rd Suite 100, Indianapolis, IN 46260
Phone: (317) 583-7600 Fax: (317) 583-7628
Email: ajasciot@stvincent.org

**Ashe, William M.**
618 N. Magnolia Street, Rockport, TX 78382

Atkins, Broadus Zane
655 E. Hildebrand Ave #416, San Antonio, TX 78212
Phone: (916) 612-2408 Fax: (210) 615-1782
Email: zane.atkins@gmail.com

**Attar, Safuh (Vera)**
22 South Green Street, Baltimore, MD 21201
Phone: (410) 321-1281 Fax: (410) 828-4746
Email: att618@aol.com

**Austin, John C. (Michelle)**
2010 Church Street, Suite 736, Nashville, TN 37203
Phone: (615) 329-7878 Fax: (615) 284-3460
Email: ABAUSTIN@aol.COM

Austin, Erle H., III
201 Abraham Flexner Way Suite 1200, Louisville, KY 40202
Phone: (502) 583-8383 Fax: (502) 561-2190
Email: eaustinmd@gmail.com

**Avery, Joel E. (Nannette)**
15 Hidden Brook Lane, Signal Mountain, TN 37377
Phone: (423) 624-0862 Fax: (615) 624-5520

**Aves, Fred H. (Alice)**
6143 Willers Way, Decatur, GA 30030

**Aylward, Theodore D. (Kathleen)**
4900 Marlin Drive, New Port Richey, FL 34652
Phone: Fax: (727) 842-9605
Email: taylward@earthlink.net
Backer, Carl L. (Julia)
1106 Sunset Road, Winnetka, IL 60093
Phone: (312) 227-4240 Fax: (312) 227-9643
Email: cbacker@luriechildrens.org

Badhwar, Vinay
1 Medical Center Drive PO Box 8059, Morgantown, WV 26506-8059
Phone: (304) 598-4197
Email: vinay.badhwar@wvumedicine.org

•Bailey, Brian (Kathryn Bailey)
4700 Waters Ave, PO Box 23089, Savannah, GA 31403
Phone: (912) 350-8490
Email: bailebr1@memorialhealth.com

Baird, Christopher W.
416 Common Wealth Ave Unit 711, Boston, MA 2115
Phone: (617) 355-2765
Email: baird1c@gmail.com

**Baisden, Clinton E. (Rena)
11 Arnold Palmer, San Antonio, TX 78257
Phone: (210) 268-7522 Fax: (210) 567-2877
Email: baisden@uthscsa.edu

Bakaeen, Faisal G. (Lori)
26900 George Zeiger Dr. Apt #508, Beachwood, OH 44122
Phone: (216) 444-0355
Email: Bakaeef@ccf.org

Baker, Joseph W. (Tracy)
2001 Crystal Spring Avenue, SW Suite 201, Roanoke, VA 24014
Phone: (540) 345-4132 Fax: (540) 342-9308
Email: jwbtlb@cox.net

**Ballenger, James F. (Sandra)
206 Discovery Way, Mauldin, SC 29662
Phone: (864) 242-9915 Fax: (864) 233-3732

Banker, Michael C. (Gretchen)
11411 Chivarly Chase Lane, Spotsylvania, VA 22551
Phone: (540) 972-5802
Email: mcbanker@verizon.net

•Bansal, Aditya (Mona Bansal)
1514 Jefferson Highway, New Orleans, LA 70121
Phone: (504) 842-3966 Fax: (504) 842-2278
Email: abansal@ochsner.org

Baptiste, Reginald C. (Hope)
7000 N. Mopac Expwy, Suite 320, Austin, TX 78731
Phone: (512) 583-0146 Fax: (512) 583-0147
Email: cking@ctsurgeryaustin.com

**Barner, Hendrick B. (Mechthild)
Cardiothoracic Surgery 3635 Vista Avenue, Saint Louis, MO 63110
Phone: (314) 577-8359 Fax: (314) 577-8315
Email: hbarner@slu.edu

**Senior Member •New Member ‡Resident Member ⦁Home Address

STSA 63rd Annual Meeting 235
**Barnes, Robert P. (Jean)**  
333 North First, Suite 280, Boise, ID 83702  
Phone: (208) 345-6545 Fax: (208) 345-1213  
Email: rpbarnes@fiberpipe.net

**Barnett, Mark G. (Robin)**  
202 10th Street SE, Cedar Rapids, IA 52403  
Phone: (319) 362-5118 Fax: (319) 364-0574  
Email: mbarnett@pcofiowa.com

**Barton, Ben R. (Mary)**  
1215 21st Avenue South, Nashville, TN 37232  
Phone: (615) 343-9188 Fax: (615) 343-5234  
Email: ben.barton@vanderbilt.edu

**Bates, Michael John (Amanda)**  
Department of Surgery 1514 Jefferson Hwy, New Orleans, LA 70121  
Phone: (504) 842-4070  
Email: michael.bates@ochsner.org

**Baumgartner, William A. (Betsy)**  
Miller Research Building, Suite 115733 N. Broadway,  
Baltimore, MD 21205  
Phone: (410) 955-2411 Fax: (410) 502-5228  
Email: wbaumgar@jhmi.edu

**Baxter, Tammy M.**  
1615 Glen Echo Road, Nashville, TN 37215  
Phone: (615) 342-7345 Fax: (615) 342-7346  
Email: tammy.baxter@hcahealthcare.com

**Beasley, III, Walter E.**  
944 Timberlake Drive, Virginia Beach, VA 23464  
Phone: (740) 383-7950  
Email: silentblade. III@aol.com

**Beaver, Thomas M.**  
PO Box 100129, Gainesville, FL 32610  
Phone: (352) 273-5501 Fax: (352) 273-5513  
Email: thomas.beaver@surgery.ufl.edu

**Begelman, Kenneth M. (Helen)**  
PO Box 764, Jackson, WY 83001  
Phone: (561) 499-7707  
Email: KBegel@aol.com

**Bender, Harvey W., Jr. (Doris)**  
1801 Laurel Ridge Drive, Nashville, TN 37215  
Phone: (615) 322-0064 Fax: (615) 343-9194

**Bergen, Frederick D. (Margaret Ann)**  
11701 Johnson Road, Petersburg, VA 23803  
Phone: (804) 732-1011 Fax: (804) 861-2128

**Bergman, Donald R. (Carole)**  
PO Box 35185, Tulsa, OK 74153-0185  
Phone: (918) 494-3827
**Berry, B. Eugene (Jolie)**
7777 Hennessy Boulevard Suite 1008, Baton Rouge, LA 70808
Phone: (225) 766-0416 Fax: (225) 769-9212
Email: gene@berrysbox.com

Berry, Mark F. (Yuet)
2nd Floor, Falk Cardiovascular Research Center Department of Cardiothoracic Surgery, Stanford, CA 94305
Phone: (650) 721-6400 Fax: (650) 724-6259
Email: berry037@stanford.edu

**Bessone, Luis N. (Viviana)**
5137 San Jose, Tampa, FL 33629
Phone: (813) 875-8988 Fax: (813) 876-9827
Email: besstampa@aol.com

Bethea, Brian T. (Amber Bethea)
5210 Linton Blvd Suite 301, Delray Beach, FL 33484
Phone: (561) 638-9140
Email: brian.bethea@tenethealth.com

Bhama, Jay Kumar
200 Hawkins Drive SE 500 GH, Iowa City, IA 52242
Phone: (319) 356-8868 Fax: (319) 356-3891
Email: jay-bhama@uiowa.edu

Bhatia, Devinder S. (Gina)
8901 FM 1960 Bypass RdSuite 303, Humble, TX 77338
Phone: (281) 397-7000 Fax: (281) 397-7061
Email: dbhatiamd@aol.com

Bichell, David P. (Terry Jo)
5247 Doctor's Office Tower 2200 Children's Way, Nashville, TN 37232-9292
Phone: (615) 818-6323
Email: david.bichell@vanderbilt.edu

**Bilbrey, George M. (Diana)**
257 McDowell Street, Asheville, NC 28803
Phone: (704) 258-1121 Fax: (704) 252-6114
Email: georgebilbrey@charter.net

Binford, Robert S.
1135 116th Ave NE Suite 605, Bellevue, WA 98004
Phone: 425-836-398 Fax: (615) 376-9116
Email: robert@binfordmd.com

Blackmon, Shanda H. (Matt)
2498 Hawk Hill Lane SW, Rochester, MN 55902
Phone: (713) 494-9871
Email: blackmon.shanda@mayo.edu

Blackwell, Ray A. (Wanda)
4755 Ogletown-Stanton Rd Suite 1E50, Newark, DE 19718
Phone: (302) 733-1980 Fax: (302) 733-1986
Email: rblackwell@christianacare.org

**Senior Member  •New Member  ‡Resident Member  *Home Address**
**Bland, Ralph W.**
*Burlington, NC*

Blankenship, Robert C. (Mary Anne)
1919 S. Wheeling AvenueSuite 602, Tulsa, OK 74104-5635
Phone: (918) 771-23366 Fax: (918) 748-7505
Email: blankenshipg18@cox.net

Bleiweis, Mark S. (Jennifer)
UF Health Congenital Heart Center 1600 SW Archer Road,
Gainesville, FL 32610-0266
Phone: (352) 273-5422 Fax: (352) 273-5927
Email: bleiweis@ufl.edu

Block, Mark I. (Debora Lau)
1150 N 35th Ave Ste 660, Hollywood, FL 33021
Phone: (954) 265-1125
Email: mblock@mhs.net

**Bloodwell, Robert D.**
1907 South Dr #105, Natchitoches, LA 71457-2654
Phone: (318) 476-4020 Fax: (318) 476-4022

Blucher, Mark L. (Jodi)
625 S. New Ballas Road Suite R7040, Saint Louis, MO 63141
Phone: (314) 251-6970 Fax: (314) 251-1053
Email: Mark.Blucher@mercy.net

Bodenhamer, R. Mark (Judy)
4050 W. Memorial Rd., Oklahoma City, OK 73120
Phone: (405) 285-5211
Email: mbodenhamer@okheart.com

Boedefeld, William Michael, II (Robyn)
7777 Hennessy Blvd Suite 1008, Baton Rouge, LA 70808
Phone: (225) 324-2175
Email: boede11@hotmail.com

*Bolanos, Michael D.*
740 S. Limestone Street, Room A301, Lexington, KY 40536
Email: michael.bolanos@uky.edu

Bolling, Steven F. (Cheryl Huey)
1500 E. Medical Center Drive, SPC 5864 Cardiovascular Center 5144,
Ann Arbor, MI 48109-5864
Phone: (734) 936-4981 Fax: (734) 764-2255
Email: sbolling@umich.edu

Bolman, R. Morton, III (Ceeya Patton)
E Pavilion Level 5115 Colchester Avenue, Burlington, VT 5401
Phone: (802) 847-4152
Email: ralph.bolman@uvmhealth.org

Bolton, J.W. Randolph (Valerie)
1050 Flat Chimney Loop, Columbia, SC 29209
Phone: (803) 776-4000
Email: jwrbolton@hotmail.com
Bolton, William (Jennifer)
701 Grove Rd, Greenville, SC 29605
Phone: 864-884-1384 Fax: (864) 455-1485
Email: wdboltonmd@yahoo.com

Borchelt, Bret D. (Ann)
4622 Country Club Rd Suite 180, Winston Salem, NC 27104
Phone: (336) 768-9535 Fax: (336) 768-4155
Email: bborchelt@triad.rr.com

Borders, Blaine M. (Carla)
102 Thomas Rd Ste 205, West Monroe, LA 71291
Phone: 318-329-1900 Fax: 318-396-6163
Email: blaine@borders.cc

Borkon, A. Michael (Margaret)
Medical Plaza II - Suite 50, 4320 Wornall Road, Kansas City, MO 64111
Phone: (816) 931-3312 Fax: (816) 531-9862
Email: mborkon@aol.com

Borsody, Karl J. (Jaleh)
3533 Southern Blvd Suite 5650, Kettering, OH 45429
Phone: 937-789-8280 Fax: (937) 294-3611
Email: karl_borsody@hotmail.com

Boston, Umar Sekou-Toure
Le Bonheur Children’s Hospital 49 N Dunlap St, 3rd Flr.
Memphis, TN 38103
Phone: (901) 287-5995 Fax: (901) 287-5970
Email: uboston@uthsc.edu

Bott, Jeffrey N. (Kelly Michelle)
1222 South Orange Ave MP #25, Orlando, FL 32806
Phone: (321) 841-7700 Fax: (321) 841-7799
Email: jnbott@cfl.rr.com

‡Bott, Matthew (Lucia)
1161 York Avenue, Apt. 11J, New York, NY 10065
Phone: (917) 882-5369
Email: bottm@mskcc.org

Bove, Edward L.
Univ. of MI, Section of Cardiac Surgery, Ann Arbor, MI 48109
Phone: (734) 936-4980 Fax: (734) 763-7353
Email: elbove@umich.edu

**Bowlin, John W. (Linda)
2661 Columbine Place, Tupelo, MS 38801
Phone: (662) 842-8193
Email: HDDoc33@aol.com

*Bowling, Roy G. (Ann)
201 Abraham Flexner Way Suite 1200, Louisville, KY 40202
Phone: 502-588-7600 Fax: (502) 589-6751
Email: rgbowlingmd@bellsouth.net

Boyce, Steven W. (Amy)
106 Irving St NW Suite 2200 North, Washington, DC 20010
Phone: (202) 877-7464 Fax: (202) 877-3503
Email: steven.w.boyce@medstar.net

**Senior Member  *New Member  ‡Resident Member  *Home Address
Bradford, Darien W.  
515 West Mayfield Suite 404, Arlington, TX 76014  
Phone: (817) 465-5311 Fax: (817) 465-8569  
Email: darienwbradfordmd@sbcglobal.net  

**Bradham, R. Randolph (Helen)**  
18 1/2 Chalmers Street, Charleston, SC 29401

Bradley, Scott M. (Robyn)  
96 Jonathan Lucas Street 424 CSB, Charleston, SC 29425  
Phone: (843) 792-3361 Fax: (843) 792-9783  
Email: bradlesm@musc.edu

**Brea, Cesar A., Jr. (Greggie)**  
6460 SW 94th Street, Miami, FL 33156  
Phone: (305) 665-6993 Fax: (305) 665-6994

Breitkreutz, Lawrence R. (Sanda)  
5012 Rebecca Blvd., Kenner, LA 70065  
Phone: 325-660-7887  
Email: drlarry45@sbcglobal.net

Brescia, Alexander  
5661 Bischoff Ave, St. Louis, MO 63110  
Phone: (314) 378-3626  
Email: alexander.brescia@gmail.com

Broussard, Brett L.  
3509 Woodruff Circle, Birmingham, AL 35216  
Phone: (337) 298-0858  
Email: brettbroussard@gmail.com

**Brown, J. Brooks (Helen)**  
3599 University Blvd. South Suite C, Jacksonville, FL 32216  
Phone: (904) 858-7471 Fax: (904) 858-7480

Brown, Randy G.  
117 North 2nd Street Suite 310, Paducah, KY 42001  
Phone: (573) 587-9208 Fax: (270) 443-5549  
Email: rgbrown134mu@gmail.com

Brown, Lyle L.  
4848 NE Stallings Drive Suite 103, Nacogdoches, TX 75965  
Phone: (936) 559-0800 Fax: (936) 559-0803  
Email: dubllb@yahoo.com

Brown, Paul S., Jr.  
625 Northfield Road, Lititz, PA 17543  
Phone: 717-735-3920 Fax: 717-735-3923  
Email: psbjrmd@me.com

Brown, John W. (Carol)  
545 Barnhill Drive Emerson Hall #215, Indianapolis, IN 46202  
Phone: (317) 274-7150 Fax: (317) 274-2940  
Email: jobrown@iupui.edu

**Brown, John W. (Susandale)**  
121 Headwater Circle, Irmo, SC 29063  
Phone: (803) 276-7172 Fax: (803) 276-7175
Brunsting, Louis A., III (Kim)
2375 Champions Blvd, Auburn, AL 36830
Phone: 615-429-4708 Fax: (334) 528-5899
Email: treybrunsting@att.net

Bryan, F. Curtis, II (Lynda Denney)
6006 49th Street North Suite 310, St. Petersburg, FL 33709
Phone: (727) 527-9779
Email: fcb2md.csa@gmail.com

Buchanan, Scott A.
818 Congress Street Suite 300, Portland, ME 04102
Phone: (207) 773-8161 Fax: (207) 878-8472
Email: sbuchanan1@gmail.com

Budde, Jason M. (Laura Yount)
162 Blount Memorial POB, Maryville, TN 37804
Phone: (865) 238-6181 Fax: (865) 681-3387
Email: jasonbudde@gmail.com

Bufkin, Bradley Lance
270 S. Moon Avenue, Brandon, FL 33511
Phone: 8135719988
Email: blbufkin@gmail.com

**Buker, Robert H. (Ethel)
11706 Oakmont Court, Fort Myers, FL 33908
Phone: (404) 365-4152

Burch, Phillip Todd (Tamara)
100 North Mario Capecchi Dr. Suite 2800, Salt Lake City, UT 84113
Phone: (801) 662-5566 Fax: 801-662-551
Email: phillip.burch@imail.org

Burfeind, William R., Jr. (Julia)
701 Ostrum Street Suite 603, Bethlehem, PA 18015
Phone: (610) 954-3990
Email: burfeiw@slhn.org

Burke, James Ryan (Jenna)
8 Richland Medical Park #400, Columbia, SC 29203
Phone: (803) 765-0871 Fax: (803) 765-9215
Email: james.burke@palmettohealth.org

*Burkhart, Harold M (Jennifer Burkhart)
920 Stanton L Young Blvd WP2230, Oklahoma City, OK 73104
Phone: 405 681 1800 Fax: (405) 271-3288
Email: harold-burkhart@ouhsc.edu

Burnett, Clay M. (Angela)
217 Hillcrest Street, Orlando, FL 32801
Phone: (407) 425-1566
Email: cburnett@cvsorlando.com

**Burney, D. Patrick (Charlotte)
1805 Tiffany Place, Greensboro, NC 27408
Phone: (336) 288-0184 Fax: (336) 8323201
Email: dpbcewb@msn.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

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<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Burton, Nelson A.</td>
<td>2907 Hunting Hills Court, Oakton, VA 22124</td>
<td>(703) 280-5858</td>
<td>(703) 849-0874</td>
<td><a href="mailto:nelsonaburton@gmail.com">nelsonaburton@gmail.com</a></td>
</tr>
<tr>
<td>Byers, Frank M.</td>
<td>4940 60 Ave. So., St. Petersburg, FL 33715</td>
<td>(727) 867-3451</td>
<td>(727) 866-0346</td>
<td><a href="mailto:ByersF@aol.com">ByersF@aol.com</a></td>
</tr>
<tr>
<td>Cable, David G.</td>
<td>6333 Brigantine Lane, Rockford, IL 61114</td>
<td>(815) 639-1353</td>
<td></td>
<td><a href="mailto:cable.david@comcast.net">cable.david@comcast.net</a></td>
</tr>
<tr>
<td>Cai, Tung H.</td>
<td>3341 Unicorn Lake Boulevard, Denton, TX 76210</td>
<td>(940) 381-2003</td>
<td>(940) 483-1221</td>
<td><a href="mailto:caifamilytx@aol.com">caifamilytx@aol.com</a></td>
</tr>
<tr>
<td>Calhoon, John H.</td>
<td>Dept of Cardiothoracic Surgery, MC 78417703 Floyd Curl Drive, San Antonio, TX 78229-3900</td>
<td>(210) 567-2878</td>
<td>(210) 567-2877</td>
<td><a href="mailto:calhoon@uthscsa.edu">calhoon@uthscsa.edu</a></td>
</tr>
<tr>
<td>Callard, George M.</td>
<td>2345 Bedford Avenue, Cincinnati, OH 45208</td>
<td>(513) 871-9452</td>
<td>(513) 871-8321</td>
<td><a href="mailto:gcallard@fuse.net">gcallard@fuse.net</a></td>
</tr>
<tr>
<td>Cameron, Duke E.</td>
<td>Zayed 71071800 Orleans Street, Baltimore, MD 21287</td>
<td>(410) 542-9047</td>
<td>(410) 955-3809</td>
<td><a href="mailto:dcameron@jhmi.edu">dcameron@jhmi.edu</a></td>
</tr>
<tr>
<td>Camp, Phillip C.</td>
<td>Division of Thoracic Surgery 75 Francis Street, Boston, MA 2115</td>
<td>(617) 732-8148</td>
<td></td>
<td><a href="mailto:pcamp@partners.org">pcamp@partners.org</a></td>
</tr>
<tr>
<td>Campbell, Daniel C.,</td>
<td>690 Springcreek Drive, Ashland, OR 97520-1455</td>
<td>(541) 582-3424</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campbell, Gilbert S.</td>
<td>66 River Ridge Rd, Little Rock, AR 72207</td>
<td>(501) 225-8116</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capallo, David V.</td>
<td>11805 Mercy Blvd, Savannah, GA 31419-1714</td>
<td>(912) 354-4179</td>
<td>(912) 351-9748</td>
<td><a href="mailto:DavidC4257@AOL.com">DavidC4257@AOL.com</a></td>
</tr>
<tr>
<td>Carlson, David E.</td>
<td>1150 North 18th Street Suite 401, Abilene, TX 79601</td>
<td>(325) 670-4561</td>
<td>(915) 670-4559</td>
<td><a href="mailto:David1111@msn.com">David1111@msn.com</a></td>
</tr>
</tbody>
</table>
**Carlson, Robert Gerald (Lois Marie)**
*Coral Cay Condo 207 1419 11th Street, Port Aransas, TX 78373*
Phone: (361) 749-3188 Fax: (763) 427-1370

**Carlton, Richard A. (Lynn)**
*420 North Center Street, Hickory, NC 28601*
Phone: (704) 323-1100 Fax: (704) 324-9189
Email: drcarlton@mac.com

**Carmichael, Michael J. (Becki)**
*101 S. Ravenel Street Suite 270, Florence, SC 29506*
Phone: (352) 572-0457
Email: mjbecar@aol.com

**Carney, Edward K. (Charlene)**
*10 Edinborough Court, Salisbury, MD 21801*
Phone: (410) 749-1561 Fax: (410) 749-3941

**Carpenter, Andrea J.**
*29030 Cloud Croft Lane, Fair Oaks Ranch, TX 78015*
Phone: (210) 567-2878 Fax: (210) 567-2877
Email: carpentera2@uthscsa.edu

**Carrillo, Roger G. (Migdalia)**
*1295 NW 14th Street Suite H, Miami, FL 33125*
Phone: (305) 674-2780 Fax: (305) 674-2865
Email: rogercar@aol.com

**Carrott, Philip W., Jr.**
*2120 Taubman Center/53441500 E. Medical Center Dr., Ann Arbor, MI 48109-5344*
Phone: (734) 936-6878 Fax: (734) 615-2656
Email: pcarrott@med.umich.edu

**Carter, Robert L. (Mary Loy)**
*1111 Avenue D - Suite 713, Marrero, LA 70072*
Phone: (504) 349-6713 Fax: (504) 349-6733

**Carter, Richard Neal (Kate)**
*2050 Meadowview Parkway, Kingsport, TN 37660*
Phone: (423) 230-5126
Email: neal.carter@wellmont.org

**Carter, James S. (Sharon)**
*6053 West Victoria Place, Chandler, AZ 85226*
Phone: (480) 545-6097

**Carver, Gordon M., Jr.**
*32 Denada Path, Roxboro, NC 27573-6303*

**Caspi, Joseph (Tali)**
*200 Henry Clay Avenue, New Orleans, LA 70118*
Phone: (504) 896-3928 Fax: (504) 896-3952
Email: caspij@aol.com

**Cassano, Anthony D. (Angela)**
*1200 East Broad St West Hospital, Richmond, VA 23298-0068*
Phone: (804) 828-4620 Fax: 804-628-0537
Email: anthony.cassano@vcuhealth.org

**Senior Member  +New Member  ‡Resident Member  *Home Address
MEMBERSHIP ROSTER

Cassivi, Stephen D. (Kathy McLellan)
Mayo Clinic 200 First Street SW, Rochester, MN 55905
Phone: (507) 266-0911 Fax: (507) 284-0058
Email: cassivi.stephen@mayo.edu

Castillo-Sang, Mario (Natalie Singer)
2123 Auburn Avenue, Suite 139, Cincinnati, OH 45219
Phone: (513) 206-1170 Fax: (513) 206-1172
Email: mcastillosang@gmail.com

Catinella, Frank P.
5601 North Dixie Highway Suite 209, Fort Lauderdale, FL 33334
Phone: (954) 946-8289 Fax: (954) 491-2628
Email: fcat@bellsouth.net

Ceithaml, Eric L. (Susan)
820 Prudential Dr Suite 202, Jacksonville, FL 32207
Phone: (904) 244-3418 Fax: (904) 244-6347
Email: eric.ceithaml@JAX.UFL.edu

Ceppa, DuyKhanh P. (Eugene P. Ceppa)
545 Barnhill Drive, EH215, Indianapolis, IN 46204
Phone: (317) 280-7416 Fax: (317) 274-2940
Email: dpceppa@iupui.edu

Cerfolio, Robert J.
703 19th Street SZRB 739, Birmingham, AL 35294-0016
Phone: (205) 934-5937 Fax: (205) 934-6218
Email: rcerfolio@uab.edu

Chai, Paul Jubeong (Suzanne)
3959 Broadway, CHN 275, New York, NY 10032
Phone: 201-444-5928
Email: pjc2164@cumc.columbia.edu

Chang, Andrew C. (Louise Chang)
1500 East Med Center Drive 2120K Taubman Center, Ann Arbor, MI 48109
Phone: (734) 763-7418 Fax: (734) 615-2656
Email: andrwchg@umich.edu

Chang, Albert S.Y. (Catherine)
11300 April Moon Lane, Raleigh, NC 27614
Email: aschang2003@yahoo.com

Chapman, Gerald Todd
1371 Frisbie Lane, Cookeville, TN 38501
Phone: (931) 526-4349 Fax: (931) 372-0401
Email: gtoddchapman@gmail.com

Chatterjee, Subhasis (Archana)
One Baylor Plaza Mailstop: BCM 390, Houston, TX 77030
Phone: (713) 798-8051 Fax: (713) 798-2744
Email: chatterjee.subhasis@mayo.edu

“Chavez, Carlos M. (Carmen)
P. O. Box 3847, Brownsville, TX 78523
Phone: (956) 350-6121 Fax: (956) 350-6125
Email: cchavez450@aol.com
Chen, Edward Po-Chung (Suephy)  
1365 Clifton Road, Suite A2236, Atlanta, GA 30302  
Phone: (404) 778-3484 Fax: (404) 778-4346  
Email: edward.p.chen@emory.edu

Cheung, Edson HK (Anita)  
6613 Callejo Road, Garland, TX 75044  
Phone: (214) 288-9300 Fax: (214) 823-1317  
Email: ehcheung@aol.com

Chiscano, Alfonso (Mary-Alice)  
15243 Pebble Cove, San Antonio, TX 78232  
Phone: (210) 260-3132 Fax: (210) 494-6629  
Email: chiscano@uthscsa.edu

Chitwood, W. Randolph (Tamara)  
146 East Longmeadow Road, Greenville, NC 27858  
Phone: (252) 754-2629  
Email: chitwoodw@ecu.edu

Choong, Cliff (Vivien)  
3 Lydia Court, Deepdene, Victoria 3103, Australia  
Phone: 61498787876  
Email: cliffchoong@hotmail.com

Christian, Karla G.  
2200 Children’s Way 5247 Doctor’s Office Tower, Nashville, TN 37232-9292  
Phone: (615) 936-5500 Fax: (615) 343-0042  
Email: karla.christian@vanderbilt.edu

Christopher, Thomas D. (Mary)  
7107 Jahnke Road, Suite 500 PO Box 13110, Richmond, VA 23225  
Phone: (804) 320-2751 Fax: (804) 330-3831  
Email: TChris7073@aol.com

Chu, Danny (Kim Conley)  
UPMC Presbyterian Hospital 200 Lothrop Street, Pittsburgh, PA 15213  
Phone: (412) 647-6636 Fax: (412) 692-2184  
Email: dchumd@gmail.com

Chung, Byung H.  
505 Dahola Drive, Temple, TX 76504  
Email: djmed99@yahoo.com

Ciaravella, James M., Jr.  
7717 Creswell Rd #31, Shreveport, LA 71106  
Phone: (318) 469-6298 Fax: (318) 222-8855

Clark, Joseph Brian (Carol)  
500 University Drive, H085, Hershey, PA 17033  
Phone: (717) 533-5847 Fax: (737) 531-2052  
Email: jclark7@hmc.psu.edu

Clarke, John P. (Joyce)  
Virginia Beach Surgery 1020 First Colonial Road, Virginia Beach, VA 23454  
Phone: (757) 481-4879  
Email: SeaDoc@aol.com

**Senior Member  +New Member  ‡Resident Member  *Home Address
**Clause, Jr., Harry P. (Mary Anne)**
1709 Kingston Circle, Bedford, VA 24523-1607
Phone: (434) 245-4080

**Claxton, Calvin P., Jr. (Martha Ann)**
240 Upper Flat Creek, Weaverville, NC 28787
Phone: (828) 645-9127 Fax: (828) 658-1147
Email: cpcfarm@msn.com

Clay, Richard L. (Susan)
201 Sivley Road Suite 300, Huntsville, AL 35801
Phone: (256) 533-1077 Fax: (256) 533-3379
Email: rclay@theheartcenter.md

**Clayton, Orville W. (Dorothy)**
3133 Ryecraft Road, Birmingham, AL 35223
Phone: (205) 599-3700

**Cline, Robert E. (Kathy)**
5601 North Dixie Highway, Fort Lauderdale, FL 33334
Phone: (954) 491-7523 Fax: (954) 491-2620
Email: BCLine7975@aol.com

**Codd, John E. (Dorothy)**
126 Southarm Dr., Saint Louis, MO 63122
Phone: (314) 355-3003 Fax: (314) 355-0515
Email: jec1013@sbcglobal.net

Coffey, Arthur C.
1801 N. Senate Boulevard Suite 3300, Indianapolis, IN 46202
Phone: (317) 923-1787 Fax: (317) 923-1787
Email: acoffey@earthlink.net

Cohen, Neri M. (Ilene)
GBMC Healthcare 6569 North Charles Street, Suite 400,
Baltimore, MD 21204
Phone: (443) 849-3470 Fax: (443) 849-3435
Email: nmcohen@comcast.net

Cohen, Daniel M. (Marcia)
Brigham & Women’s Hospital, CT Surgery 75 Francis Street, CA 273,
Boston, MA 2115
Phone: (617) 763-6290 Fax: (617) 879-2658
Email: dmcohen1950@yahoo.com

Cohen, Evan S. (Ellen)
201 Sivley Road Suite 300, Huntsville, AL 35801
Phone: (256) 533-1077 Fax: (256) 533-3379
Email: ecohen27@knology.net

Cohn, William E. (Mishaun)
Texas Heart Institute P.O. Box 20345, MC 2-114A, Houston, TX 77225
Phone: (832) 355-3000 Fax: (832) 355-6798
Email: wcohn@texasheart.org

**Cole, F. Hammond (Kay)**
6195 Boskey Drive, Millington, TN 38053-6901
Phone: (901) 489-0262 Fax: (901) 448-7588
Email: fhcole@uthsc.edu
**Cole, Fred N., Jr. (Nancy)**
7322 Brightside Road, Baltimore, MD 21212
Phone: (410) 377-4344

Collazo, Lucas R. (Karen)
2921 Telesstar Court Ste 140, Falls Church, VA 22042
Phone: (703) 280-5858 Fax: (703) 849-0874
Email: lrcollazo@aol.com

**Conkle, David M. (Babs)**
3080 Blackshear Ave, Pensacola, FL 32503
Phone: (904) 474-8344

Connors, Rafe C. (Jennifer)
4403 Harrison Blvd Suite 3835, Ogden, UT 84403
Phone: (801) 387-3475 Fax: (801) 387-3480
Email: rafe.connors@mail.org

**Connors, John P. (Ruth Anne)**
Missouri Baptist Hospital 3015 North Dallas Road, Saint Louis, MO 63111
Phone: (314) 996-5287 Fax: (314) 432-6068

Conte, John V.
600 N. Wolfe Street Blalock 618, Baltimore, MD 21287
Phone: (410) 955-1753 Fax: (410) 328-2750
Email: jconte@jhmi.edu

**Conti, Vincent R. (Andrea)**
6.120 John Sealy Annex, Galveston, TX 77555-0528
Phone: (409) 772-1203 Fax: (409) 772-1421
Email: vconti@utmb.edu

**Cook, William A. (Cynthia)**
198 Massachusetts Avenue Suite 102, North Andover, MA 1845
Phone: (978) 686-1311 Fax: (978) 682-4756
Email: captcook@massmed.org

Cook, William H. (Shelley)
4030 Smith Road Suite 300, Cincinnati, OH 45209
Phone: (513) 984-0904 Fax: (513) 345-2606
Email: whcook@mercy.com

**Cook, Joseph W. (Kathryn)**
2071 Hopedale Ave, Charlotte, NC 28207
Phone: (704) 373-0212 Fax: (704) 372-1249

Cooley, Denton A.
1101 Bates Avenue, Houston, TX 77225-0345
Phone: (832) 355-4932 Fax: (832) 355-3424
Email: dcooley@heart.thi.tmc.edu

**Cooper, Joel D.**
3400 Spruce St. 6 Silverstein, Philadelphia, PA 19104
Phone: (215) 662-2022 Fax: (215) 349-5798
Email: joel.cooper@uphs.upenn.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address**

STSA 63rd Annual Meeting 247
Cooper, William A.  
61 Whitcher St Suite 4100, Marietta, GA 30060  
Phone: (404) 778-8340 Fax: 404-778-5358  
Email: william.cooper@wellstar.org

Cordes, Cordie C. (Kathleen)  
222 South Woods Mill Road #550, Chesterfield, MO 63017-3425  
Phone: (314) 434-3049 Fax: (314) 205-6916

Cope, Jeffrey Todd (Beth)  
540 North Duke St. Ste 110, Lancaster, PA 17602-2374  
Phone: (717) 544-4995 Fax: (717) 299-6577  
Email: jtcope66@yahoo.com

Corvera, Joel S. (Mary Lester)  
1801 N. Senate Blvd., Suite 3300, Indianapolis, IN 46202  
Phone: (317) 923-1787 Fax: (317) 962-6259  
Email: jcorvera@iuhealth.org

Coselli, Joseph Stapleton (Kelly)  
Baylor College of Medicine One Baylor Plaza, BCM 390, Houston, TX 77030  
Phone: (832) 355-9929 Fax: (832) 355-9920  
Email: jcoselli@bcm.edu

**Cox, Clyde B. (Carolyn)**  
101 Landline Road, Selma, AL 36701  
Phone: (205) 872-2306 Fax: (205) 872-2308

Crabtree, Traves D. (Felicia)  
701 N 1st St, D252 P.O. Box 19679, Springfield, IL 62794-9679  
Phone: (217) 545-8875 Fax: (217) 545-7053  
Email: tcrabtree53@siu.edu

**Craver, Joseph M. (Missy)**  
3456 Knollwood Drive, Atlanta, GA 30305  
Phone: Fax: (404) 261-6250  
Email: josephcraver@comcast.net

Crawford, Fred A., Jr. (Mary Jane)  
25 Courtenay Dr. Suite 7018, MSC 295, Charleston, SC 29425  
Phone: (843) 876-4840 Fax: (843) 876-4866  
Email: crawfrdf@musc.edu

Creswell, Lawrence L.  
2500 North State Street Division of CT Surgery, Jackson, MS 39216-4505  
Phone: (601) 984-5171 Fax: (601) 984-5198  
Email: lcreswell@umc.edu

Crocker, Edward F. (Trudy)  
255 Baptist Blvd Suite 401. Columbus, MS 39705  
Phone: (662) 244-2288 Fax: (662) 244-2289  
Email: drbypass@aol.com

**Cromartie, R. Samuel, III (Elaine)**  
588 Sterthaus Avenue, Ormond Beach, FL 32174  
Phone: (386) 672-9501 Fax: (386) 673-0308
Crouch, F. Michael (Karen)
524 SE Osceola St. Suite 100, Stuart, FL 34996
Phone: (772) 419-2379
Email: fmcrouch@gmail.com

Crouch, John David
2901 W. Kinnickinnic River Phwy Suite 511, Milwaukee, WI 53215
Phone: (414) 649-3990 Fax: (414) 649-3969
Email: jcrouch1@wi.rr.com

Croyle, Philip H. (Edana)
3706 Windmill Hill St., Waco, TX 76710
Phone: (254) 722-0929 Fax: (254) 732-3507
Email: phcroyle@hotmail.com

**Cruze, Kenneth (Jean)**
919 Brick Manor Circle, Silver Spring, MD 20905-3818
Phone: (301) 774-3999

**Cummings, Robin G. (Rebecca)**
360 Tall Timber Drive, Pinehurst, NC 28374
Phone: (910) 315-4242

Cummings, Steven Paul (Reann)
6326 Westchase Rd, Fort Collins, CO 80528
Phone: 970-286-2895
Email: stevencummingss23@gmail.com

**Curtis, Jack J. (Thi Van Curtis)**
3702 Woodrail On The Green, Columbia, MO 65203
Phone: (573) 268-1412
Email: jackiecue@gmail.com

**Cyrus, Richard J. (June)**
2730 Fernway Dr., Montgomery, AL 36111
Phone: (334) 263-6876
Email: junebug71050@aol.com

Dabal, Robert J. (Jamie)
176F STE 9100 619 19TH ST S, Birmingham, AL 35294
Phone: (205) 934-2419 Fax: (205) 996-6551
Email: rdabal@uab.edu

D’Agostino, Harry J., Jr. (Carman)
Jacksonville, FL 32209
Phone: (904) 993-6127 Fax: (330) 363-1361
Email: hdagostinojr@gmail.com

**Daicoff, George R. (Mary)**
939 Beach Drive NE, Saint Petersburg, FL 33701
Phone: (727) 424-2276 Fax: (727) 322-1332
Email: gdaicoff@earthlink.net

Damiano, Ralph J. (Marci Damiano)
660 South Euclid Campus Box 8234, Saint Louis, MO 63110
Phone: (314) 362-7327 Fax: (314) 367-8459
Email: damianor@wustl.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 249
D’Amico, Thomas A. (Lisa)
DUMC Box 3496. Durham, NC 27710
Phone: (919) 684-4891 Fax: (919) 684-8508
Email: thomas.damico@duke.edu

Daneshmand, Mani A.
DUMC 3867. Durham, NC 27710
Phone: (919) 681-5925 Fax: (919) 684-8663
Email: mani.daneshmand@dm.duke.edu

Daniel, Thomas M. (Margery)
826 Colridge Drive, Charlottesville, VA 22903
Phone: (434) 295-1875 Fax: (434) 295-9104
Email: tmd5m@virginia.edu

Daniels, Larkin J. (Kimberly)
1855 Springhill Avenue, Mobile, AL 36607
Phone: (251) 471-3544 Fax: (251) 476-7254
Email: kimcdaniels@comcast.net

Danish, Timothy F.
220 25th Avenue N. #702. Nashville, TN 37203
Phone: (615) 343-2951 Fax:
Email: timothy.f.danish@vanderbilt.edu

Dans, Nestor F. (Beverly)
6306 Baypoint Drive. Washington Township, MI 48094
Phone: (304) 941-4541 Fax: (248) 964-2990
Email: ndccvs@yahoo.com

Daon, Emmanuel (Kate)
University of Kansas Medical Center 3901 Rainbow Blvd. Mailstop 4035.
Kansas City, MO 66160
Phone: (913) 588-7743
Email: edaon@kumc.edu

Daugherty, Harry K. (Marjorie)
Emeritus, Sanger Clinic 1245 Wareham Court. Charlotte, NC 28207
Phone: (704) 930-7220
Email: hdaugherty@carolina.rr.com

David, Tirone E.
Toronto General Hospital 200 Elizabeth St - 4N457.
Toronto, ON M5G 2C4
Phone: (416) 340-5062 Fax: (416) 340-4020
Email: Tirone.David@uhn.ca

David, Elizabeth

Davies, James Edward (Susan)
1530 3rd Ave South ZRB 712. Birmingham, AL 35294-0007
Phone: (205) 996-9256 Fax: (205) 996-9385
Email: jdavies@uabmc.edu

Davis, Trevor A.
2031 Clipper Park Road Apt. 212. Baltimore, MD 21211
Phone: (515) 450-3753
Email: tdavis76@jhmi.edu
**Davis, David J. (Wilda)**
7777 Hennessy Boulevard Suite 108, Baton Rouge, LA 70806
Phone: (504) 766-0416 Fax: (504) 769-9212

**Davis, Jesse T., Jr. (Barbara)**
6027 Walnut Grove Road #114, Memphis, TN 38120
Phone: (901) 683-4471 Fax: (901) 683-7998
Email: JTD@AOL.COM

**Davis, Barry R.**
890 W. Faris Road Suite 550, Greenville, SC 29605
Phone: (864) 455-4921 Fax: (864) 455-1320
Email: bdavis@ghs.org

**Davis, Robert D.**
Florida Hospital Orlando Executive Offices - 11th Floor, Orlando, FL 32803
Phone: (919) 681-4760 Fax: (919) 681-4797
Email: davis053@mc.duke.edu

**Dawson, Royce E. (Lucy)**
1929 Sussex Place, Owensboro, KY 42301
Phone: (270) 685-1135 Fax: (270) 683-8902

De Delva, Pierre (Heather)
2500 N. State Street Division of Cardiothoracic Surgery, Jackson, MS 39157
Phone: (601) 984-5176 Fax: (601) 984-5198
Email: pdedelva@umc.edu

*de la Cruz, Kim Insua (Maxine J. de la Cruz)*
5203 Willow Street, Bellaire, TX 77401
Phone: (832) 247-5403 Fax: (832) 355-9948
Email: kimdlc@yahoo.com

De Oliveira, Nilto C. (Fernanda)
H4/348 Clinical Science Center 600 Highland Avenue, Madison, WI 53792
Phone: 608-354-4987 Fax: (608) 262-3858
Email: deoliveira@surgery.wisc.edu

**Deal, Thomas E. (Pauline)**
800 Eldorado Ave, Clearwater, FL 33767
Phone: (727) 461-0670 Fax: (727) 461-0670
Email: tdealmd@aol.com

De Anda, Abe, Jr.
UTMB-Galveston Division of Cardiothoracic Surgery, Galveston, TX 77555
Phone: (409) 772-1203
Email: abdeanda@utmb.edu

Dearani, Joseph A. (Ann)
Mayo Clinic, Dept. of Surgery 200 First Street, S.W., Rochester, MN 55905
Phone: (507) 281-8976 Fax: (507) 255-7378
Email: jdearani@mayo.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address**
**Deaton, Hugo L. (Ruth)**
415 North Center Street Suite 102, Hickory, NC 28601
Phone: (828) 327-9178 Fax: (828) 327-4258
Email: hdeaton@charter.net

+Deb, Subrato J.
920 Stanton L. Young Boulevard, WP2230, Oklahoma City, OK 73104
Phone: (405) 271-5789 Fax: (405) 271-3288
Email: subrato-deb@ouhsc.edu

Deel, Kristine
177 Dewey Drive, Elkhviev, WV 25071
Phone: (304) 388-4250 Fax: (304) 388-4269
Email: k.lipchik@yahoo.com

Deel, John
500 Poplar Street Suite 304, So Charleston, WV 25309
Phone: (304) 5421156 Fax: (304) 767-7779
Email: hearts.73@hotmail.com

DeFrain, Michael P. (Stephanie)
6006 49th Street North Suite 310, St. Petersburg, FL 33706
Phone: (727) 527-9779
Email: mdefrain@hotmail.com

DeLarosa, Jacob (Rosabeth)
3500 Mccealb Drive, Pocatello, ID 83201
Phone: (404) 734-8255 Fax: (208) 239-2589
Email: Delarosa1@aol.com

Demmy, Todd L. (Bridget)
195 Little Albany Street Room 5545, New Brunswick, NJ 08903
Phone: (732) 235-7876 Fax: (732) 235-6797
Email: td331@cinj.rutgers.edu

Denlinger, Chadrick E. (Jeannine)
25 Courtenay Dr. Suite 7018 MSC 295, Charleston, SC 29425
Phone: (843) 884-1735 Fax: (843) 876-4866
Email: denlinge@musc.edu

Dennis, Hugh M.
317 St. Francis Drive Suite 120, Greenville, SC 29601
Phone: (305) 942-7083 Fax: (305) 491-2628
Email: hmdenn10@aol.com

DeRosimo, John F.
13800 SW 78th Court, Palmetto Bay, FL 33158
Phone: (786) 662-8928 Fax: (305) 792-8286
Email: jderosimo@gmail.com

Detterbeck, Frank C.
Yale University School of Medicine 330 Cedar St., BB 205, New Haven, CT 06520-8062
Phone: (203) 785-4931 Fax: (203) 737-2163
Email: frank.detterbeck@yale.edu

**DeVries, William C. (Linda)**
7 Snowmound Court, Rockville, MD 20850
Fax: (240) 453-0062
Dewan, Stephen J. (Diane)  
1010 West 40th Street, Austin, TX 78756  
Phone: (512) 459-8753 Fax: (512) 459-0586

Dewey, Todd M. (Kim)  
7777 Forest Lane Suite A307, Dallas, TX 75230  
Phone: (972) 566-4866 Fax: (972) 566-2469  
Email: todd.dewey@hcahealthcare.com

**DeWitt, Paul L. (Patricia)**  
7894 Lantana Creek Road, Largo, FL 33777-3043  
Phone: (727) 393-5141 Fax: (727) 392-4149  
Email: pdewitt1@tampabay.rr.com

DeWitt, Robert C. (Lori)  
3311 Prescott Road Suite 202, Alexandria, LA 71301  
Phone: (318) 442-0106 Fax: (318) 442-8151  
Email: rdewitt@lacvt.com

Dhudshia, Neel V.  
5320 S. Rainbow Blvd Suite 282, Las Vegas, NV 89118  
Phone: (702) 737-3808  
Email: NDhudshia@msn.com

DiBardino, Daniel Jude (Ashley M. DiBardino)  
MHI Cardiothoracic Surgery 920 E 28th Street, Minneapolis, MN 55407  
Phone: 832-465-1401  
Email: daniel.dibardino@gmail.com

DiCorte, Charles J. (Helene)  
1000 Ochsner Boulevard, Covington, LA 70433  
Phone: (985) 875-2825 Fax: (985) 875-2725  
Email: cdicorte@ochsner.org

DiMaio, J. Michael  
6125 Luther Lane #577, Dallas, TX 75225  
Phone: 214-957-1242  
Email: jmpmaio@yahoo.com

**Dixon, Sewell H., Jr. (Elizabeth)**  
229 Beauty Berry Court Cassique, Kiawah Island, SC 29455  
Phone: (910) 282-9112 Fax: (910) 282-5121

**Dobbie, Robert P. (Barbara)**  
128 Rivershore Lane, Lincolnshire, IL 60069-3803  
Phone: (847) 634-1756

Dobrilovic, Nikola  
1725 West Harrison St Suite 1156, Chicago, IL 60612  
Email: dobrilovicnick@yahoo.com

Dodd, David J. (Amy)  
6955 Tiffany Oaks Drive, Lakeland, FL 33813-5631  
Phone: (863) 646-7861 Fax: (863) 294-8536  
Email: ddodd1104@gmail.com

**Senior Member  +New Member  indicator Resident Member  *Home Address
• Dodge-Khatami, Ali (Jannika Dodge-Khatami)
  2500 North State Street, Room S345, Jackson, MS 39216
  Phone: (601) 984-4693 Fax: (601) 984-5872
  Email: adodgekhatami@umc.edu

  **Domm, Sheldon E. (Vivian)
  5611 Central Avenue Pike #D-16, Knoxville, TN 37912**

  **Donahoo, James S. (Carol)
  Department of Surgery - Rm. G 595 185 South Orange Avenue,
  Newark, NJ 7103
  Phone: (973) 972-5678 Fax: (973) 972-2925
  Email: JamDonahoo@netscape.net

  **Donato, Antonio T. (Marilyn)
  1125 South Jefferson Street, Roanoke, VA 24016
  Phone: (540) 982-1141 Fax: (540) 982-5802

  Downey, Richard S. (Virginia)
  1560 E Sherman Blvd Suite 309, Muskegon, MI 49444
  Phone: (231) 672-8643 Fax: (231) 672-8651
  Email: rsdowney1@aol.com

  Downing, Stephen W. (Amy Schlott)
  515 Abbott Road, Suite 310, Buffalo, NY 14220
  Phone: (716) 923-9650 Fax: (716) 961-4440
  Email: sdowning@ecmc.edu

  Drake, Daniel H. (Kristine Olsen Drake)
  1221 Sixth Street, Suite 202, Traverse City, MI 49684
  Phone: (231) 935-5731 Fax: (231) 935-5736
  Email: daniel.h.drake@gmail.com

  Drinkwater, Davis C. (Donna)
  2400 Patterson Street Suite 400, Nashville, TN 37203
  Phone: (615) 342-5812 Fax: (615) 342-5813
  Email: Davis.Drinkwater@hcahealthcare.com

  **Drucker, Morris H. (Louise)
  48 Wilers Creek Way, Hilton Head Island, SC 29926-2363
  Phone: (843) 686-4316
  Email: loudrucker@gmail.com

  Duarte, Ignacio G. (Michelle Diane)
  270 S. Moon Avenue, Brandon, FL 33511
  Phone: (813) 289-3950 Fax: (813) 571-9922
  Email: igduarte67@gmail.com

  Duncan, J. Michael (Patsy)
  Texas Heart Institute P.O. Box 20345, Houston, TX 77225
  Phone: (832) 355-4914 Fax: (832) 355-3770
  Email: mduncan@heart.thi.tmc.edu

  **Dunn, Jr., J. Ralph (Gail)
  109 Miss Georgia Court, Cary, NC 27511
  Phone: (919) 460-9774 Fax: (919) 460-0560
  Email: dunndell@aol.com
Dylewski, Mark R.
PO Box 431341, South Miami, FL 33243
Phone: (305) 663-5864 Fax: (305) 663-9778
Email: surgeryi@bellsouth.net

Earle, Gary F.
1720 Nicholasville Road Suite 502, Lexington, KY 40503
Phone: (859) 277-7129 Fax: (859) 277-9613
Email: earlegary@hotmail.com

Edgerton, James R.

Edgerton, T. Arthur (Ann)
155 Memorial Drive, Pinehurst, NC 28374
Phone: (910) 986-4229 Fax: (910) 715-4101
Email: tedgerton@firsthealth.org

Edmunds, L. Henry
130 N. Roberts Road, Bryn Mawr, PA 19010
Phone: 610-527-4721 Fax: (215) 614-0416
Email: edmunds1931@gmail.com

**Edwards, Fred H. (Linda)
Division of Cardiothoracic Surgery 655 West 8th Street.
Jacksonville, FL 32209
Phone: (904) 244-3418 Fax: (904) 244-6347
Email: fhe@comcast.net

**Edwards, William H. (Frances)
50 Concord Park East, Nashville, TN 37205-4705
Phone: (615) 383-9085 Fax: (615) 383-9116
Email: wedwards1927@comcast.net

Edwards, Melanie
Saint Louis University Cardiothoracic Surgery, Saint Louis, MO 63110
Phone: 3145778360 Fax: (314) 577-8315
Email: medwar13@slu.edu

**Edwards, Michael L. (Kathy)
9213 University Blvd Suite C, Charleston, SC 29406
Phone: (843) 572-2100 Fax: (843) 572-2163
Email: mle333@aol.com

**Egan, Thomas M.
Div. of Cardiothoracic Surgery 123 Burnett-Womack Bldg CB7065,
Chapel Hill, NC 27599-7065
Phone: (919) 966-3381 Fax: (919) 966-3475
Email: ttxtme@med.unc.edu

Eggerstedt, Jane M.
1501 Kings Hwy. P.O. Box 33932, Shreveport, LA 71130-3932
Phone: (318) 675-6108 Fax: (318) 675-4689
Email: jegger@lsuhsc.edu

Eghtesady, Pirooz (Kimberly)
St. Louis Children’s Hospital Suite 5 S 50, St. Louis, MO 63110
Phone: (314) 454-6165 Fax: (314) 454-2381
Email: eghtesadyp@wudosis.wustl.edu

**Senior Member +New Member ‡Resident Member *Home Address
MEMBERSHIP ROSTER

**Ehrenstein, Fred I. (Meral)**
1110 South Southlake Drive, Hollywood, FL 33019
Phone: (954) 922-5226 Fax: (954) 961-2728
Email: fredehrenstein@bellsouth.net

‡Eilers, Amanda L.
7703 Floyd Curl Drive MSC# 7841, San Antonio, TX 78229
Phone: 515-537-9645
Email: eilersa@uthscsa.edu

**Elbeery, Joseph R. (Elaine)**
Division of Cardiothoracic Surgery 600 Moye Boulevard,
Greenville, NC 27858-4354
Phone: (252) 816-7452 Fax: (252) 816-3010
Email: elbeeryj@ecu.edu

**Elkins, Ronald C. (Lida)**
920 Stanton L. Young Blvd. WP 2230, Oklahoma City, OK 73104
Phone: (405) 271-5789 Fax: (405) 271-3288
Email: ronald-elkins@ouhsc.edu

Elkins, Charles Craig
3433 NW 56th Bldg B. Suite 670, Oklahoma City, OK 73112
Phone: (405) 951-4345 Fax: (405) 951-4392
Email: craigelkins@sbcglobal.net

Elkins, Louis W. (Terrie)
628 Hospital Drive, Suite 3E, Mountain Home, AR 72653
Phone: (870) 425-3291 Fax: (870) 425-3490
Email: scoutsheart@aol.com

Ellman, Peter I. (Sarah)
155 Medical Drive, Pinehurst, NC 28374
Phone: (910) 986-3070 Fax: (910) 715-4101
Email: peter.ellman73@gmail.com

Enlow, Jonathan M. (Kara)
Riverside Methodist Hospital 3525 Olentangy River Road, Suite 5300,
Columbus, OH 43214
Phone: (614) 735-9888 Fax: (614) 533-0150
Email: Jonathan.Enlow@ohiohealth.com

+Entwistle, John W. C., III (Marielle Entwistle)
Division of Cardiothoracic Surgery 1025 Walnut St, 605 College Building,
Philadelphia, PA 19107
Phone: (215) 955-6996
Email: john.entwistle@jefferson.edu

Estrera, Anthony L. (Vicky)
6400 Fannin St, Memorial Hermann Plaza Suite 2850,
Houston, TX 77030
Phone: (713) 486-5100 Fax: (713) 512-7200
Email: Anthony.L.estrera@uth.tmc.edu

**Evangelist, Felix A. (Paula)**
3601 East Independence Blvd. Suite 204, Charlotte, NC 28205
Phone: (704) 563-7788 Fax: (704) 532-1984
Facktor, Matthew A. (Marti L. Harris)
Department of Thoracic Surgery 100 North Academy Avenue, Danville, PA 17822-2775
Phone: (570) 275-5275 Fax: (570) 214-1480
Email: mafacktor@geisinger.edu

Farkas, Emily A.
3116 Manhattan Avenue, Manhattan Beach, CA 90266
Phone: (314) 803-0331
Email: emily.farkas@icloud.com

Faro, Richard S. (Eileen)
3370 Burns Road-Suite 206, Palm Beach Gardens, FL 33410
Phone: (561) 626-9801
Email: hartsareus@aol.com

**Faulkner, Scott L. (Katie)**
600 Aylesford Ln, Franklin, TN 37069-4108
Phone: (334) 264-3746 Fax: (334) 264-3748
Email: scottfaulkner@comcast.net

Feins, Richard H. (Ceil)
10424 Stone, Chapel Hill, NC 27517
Phone: (919) 966-3383 Fax: (919) 966-3475
Email: rfeins@med.unc.edu

Felger, Jason E. (Suzanne)
120 North Magdalen Suite 320, San Angelo, TX 76903
Phone: (325) 315-8655 Fax: (325) 658-8645
Email: jasonfelger@shannonhealth.org

Felger, Mark C.
1010 W. 40th Street, Austin, TX 78756
Phone: (512) 459-8753 Fax: (512) 483-6807
Email: mfelger@austin.rr.com

Fenton, Kathleen N.
14805 Maydale Court, Silver Spring, MD 20905
Phone: 301-576-4094
Email: Kathleennf@gmail.com

Ferguson, Robert T
7726 Rock Cress Pl, Moseley, VA 23120
Phone: (804) 868-8236
Email: robert.ferguson2@va.gov

Ferguson, T. Bruce (Candice)
115 Heart Drive East Carolina Heart Institute, Greenville, NC 27834
Phone: (252) 744-2687 Fax: (252) 744-5233
Email: fergusont@ecu.edu

Fernandez, Felix G. (Christine Yadao)
The Emory Clinic 1365 Clifton Ave, Atlanta, GA 30322
Phone: (404) 683-3596
Email: fferna3@emory.edu

†Fernandez Sada, Evaristo
7703 Floyd Curl Drive MSC7841, San Antonio, TX 78229
Phone: (210) 567-2878
Email: fernandeze3@uthscsa.edu

**Senior Member  •New Member  ‡Resident Member  *Home Address

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<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
<th>Phone</th>
<th>Fax</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ferraris, Victor A.</td>
<td>740 S. Limestone Suite A301, Lexington, KY 40536</td>
<td>(859) 699-3065</td>
<td>(859) 257-4682</td>
<td><a href="mailto:ferraris@uky.edu">ferraris@uky.edu</a></td>
</tr>
<tr>
<td>Fiore, Andrew C.</td>
<td>1465 South Grand Glennon Hall A432, Saint Louis, MO 63104</td>
<td>(314) 268-4180</td>
<td>(314) 577-5313</td>
<td><a href="mailto:fiorem2@slu.edu">fiorem2@slu.edu</a></td>
</tr>
<tr>
<td>Fisher, R. Darryl</td>
<td>7210 Waverly Avenue, Nichols Hills, OK 73120</td>
<td>(405) 751-8665</td>
<td>(405) 755-8341</td>
<td><a href="mailto:fisherok@cox.net">fisherok@cox.net</a></td>
</tr>
<tr>
<td>Fleming, William H.</td>
<td>17850 South Reflection Avenue, Bennington, NE 68007</td>
<td>(402) 315-9087</td>
<td></td>
<td><a href="mailto:stowaways@cox.net">stowaways@cox.net</a></td>
</tr>
<tr>
<td>Floyd, Richard D. IV</td>
<td>4409 Brookridge Dr., Lexington, KY 40515</td>
<td>(859) 913-2802</td>
<td></td>
<td><a href="mailto:zygonRF@aol.com">zygonRF@aol.com</a></td>
</tr>
<tr>
<td>Floyd, Richard D.</td>
<td>913 The Curtilage, Lexington, KY 40502</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forbess, Joseph M.</td>
<td>1935 Medical District Drive Mail Stop C3 02, Dallas, TX 75235</td>
<td>(214) 456-9294</td>
<td>(214) 456-5015</td>
<td><a href="mailto:joseph.forbess@utsouthwestern.edu">joseph.forbess@utsouthwestern.edu</a></td>
</tr>
<tr>
<td>Force, Seth D.</td>
<td>1365 Clifton Road, Atlanta, GA 30322</td>
<td>(404) 456-7810</td>
<td>(404) 778-4346</td>
<td><a href="mailto:sforce@emory.edu">sforce@emory.edu</a></td>
</tr>
<tr>
<td>Ford, Renata B.</td>
<td>5441 Babcock #301, San Antonio, TX 78240</td>
<td>(210) 519-5797</td>
<td>(210) 579-7027</td>
<td><a href="mailto:bastosford@gmail.com">bastosford@gmail.com</a></td>
</tr>
<tr>
<td>Fore, Frank N.</td>
<td>1919 S. Wheeling Ave STE 602, Tulsa, OK 74104-5635</td>
<td>(918) 749-6400</td>
<td>(918) 748-7505</td>
<td><a href="mailto:drfore@sjmc.org">drfore@sjmc.org</a></td>
</tr>
<tr>
<td>Frantz, Paul T.</td>
<td>2001 Crystal Spring Avenue, SW Suite 201, Roanoke, VA 24014</td>
<td>(540) 344-5781</td>
<td>(540) 342-9308</td>
<td><a href="mailto:pfrantz@carilion.com">pfrantz@carilion.com</a></td>
</tr>
<tr>
<td>Fraser, Charles D.</td>
<td>6621 Fannin Street Suite 19345H, Houston, TX 77030</td>
<td>(832) 826-1929</td>
<td>(832) 825-1905</td>
<td><a href="mailto:cdfraser@texaschildrens.org">cdfraser@texaschildrens.org</a></td>
</tr>
</tbody>
</table>
Frantz, David W. (Judith)
2410 Atherholt Road, Lynchburg, VA 24506
Phone: (434) 200-2212 Fax: (434) 200-1506
Email: david.frantz@centrahealth.com

Frazier, Oscar H. (Rachel)
Texas Heart Institute P.O. Box 20345 MC-2114A, Houston, TX 77225-3000
Phone: (832) 355-3000
Email: lschwenke@heart.thi.tmc.edu

Freeland, Kristofer T.
307 Crest Drive, Birmingham, AL 35209
Phone: (205) 934-2536 Fax: (205) 975-2553
Email: ktfreeland1@gmail.com

Freeman, James M. (Shannon)
4521 Lacosta Drive, Albany, GA 31721-9483
Phone: (229) 698-5714 Fax: (912) 888-7543

Freeman, Richard K. (Kelly)
Corvasc MD's, PC 8433 Harcourt Road, Indianapolis, IN 46260
Phone: (317) 583-7602 Fax: (317) 583-7628
Email: Richard.Freeman@stvincent.org

Fudge, Tommy L.
604 North Acadia Road Suite 409, Thibodaux, LA 70301
Phone: (504) 873-7212 Fax: (504) 868-9569
Email: tommy.fudge@thibodaux.com

Fulcher, Thomas M. (Joann)
13792 Charismatic Way, Gainesville, VA 20155
Phone: (703) 743-1013 Fax: (703) 743-1014

Furst, Alex J. (Elayne)
1201 NW 16th Street, Miami, FL 33125
Phone: (305) 662-2494 Fax: (305) 575-3384
Email: afurst@med.miami.edu

Gaca, Jeffrey (Ana Maria)
DUMC 2816, Durham, NC 27710
Phone: (919) 613-5672 Fax: (919) 613-5674
Email: jeffrey.gaca@duke.edu

Gammie, James S. (Ann Fraker)
110 S. Paca Street 7th floor , Baltimore, MD 21201
Phone: 410-790-8889 Fax: (410) 328-2750
Email: jsgammiemd@gmail.com

Gandhi, Sanjiv K. (Elizabeth Ann)
Suite AB207BC Children’s Hospital, Vancouver, BC V6H 3V4
Phone: (778) 279-2696 Fax: (604) 875-3159
Email: gandhis@shaw.ca

Gangemi, James J. (Bonnie LePold)
PO Box 800679, 1215 Lee Street Room 4067, Charlottesville, VA 22908
Phone: (434) 243-6828 Fax: (434) 244-7588
Email: jgangemi@virginia.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 259
**Garcia, Gustavo (Mary)**  
Poba International P.O. Box 52-1308, Miami, FL 33152-1308

Garcia-Covarrubias, Lisardo (Diana)  
8950 N Kendell Dr. Suite 607 West Tower, Miami, FL 33176  
Phone: (786) 596-1230 Fax: (786) 596-1239  
Email: lisardogarcia@msn.com

**Garcia-Rinaldi, Raul F. (Debra Fuentes)**  
PO Box 6684 Marina Station, Mayaguez, PR 00710  
Phone: (787) 265-3712 Fax: (787) 265-3711  
Email: garciarinaldi@gmail.com

**Gardner, Timothy J. (Nina)**  
Suite 1003 4755 Ogletown-Stanton Rd., Newark, DE 19718  
Phone: (302) 733-1241 Fax: (302) 733-1429  
Email: tgardner@christianacare.org

**Gaur, Puja**  
6550 Fannin Street Smith Tower, Suite 1661, Houston, TX 77030  
Phone: (713) 441-5177 Fax: (713) 790-5030  
Email: pgaur@houstonmethodist.org

**Gay, William A., Jr. (Frances)**  
One Barnes - Jewish Hospital Plaza Suite 3108- Queeny Tower, Saint Louis, MO 63110  
Phone: (314) 747-1315 Fax: (314) 367-8459  
Email: gayw@wustl.edu

Gaynor, J. William  
34th Street & Civic Center Boulevard Suite 8527, Philadelphia, PA 19104  
Phone: (215) 590-2708  
Email: gaynor@email.chop.edu

**Geisler, Gerald F. (Mary)**  
4706 N. Lindhurst, Dallas, TX 75229  
Phone: (214) 691-0758 Fax: (214) 691-0394  
Email: g_geisler@sbcglobal.net

George, Kristopher M. (Sarah)  
2335 Kashian Lane Suite 230, Fresno, CA 93701  
Phone: (559) 499-0830 Fax: (559) 499-0846  
Email: kgeorge@santehealth.net

Gerhardt, Edward B.  
301 E. Wendover Avenue Suite 411, Greensboro, NC 27401  
Phone: (336) 832-3200 Fax: (336) 621-8374  
Email: edward.gerhardt@conehealth.com

Ghanta, Ravi (Sharmila Ghanta)  
Thoracic & Cardiovascular Surgery PO Box 800679 - 1215 Lee Street, Charlottesville, VA 22908-0679  
Phone: (434) 924-5052 Fax: (434) 244-7588  
Email: rghanta@virginia.edu

Gharagozloo, Farid (Mary)  
5092 Iseworth Country Club Drive, Windermere, FL 34786  
Phone: (407) 303-3827  
Email: gharagozloof@aol.com
Gilbert, Christian L. (Linda)  
60 Begonia Court, Womelsdorf, PA 19607  
Phone: (757) 705-0492 Fax: (901) 754-3176  
Email: clgilber55@gmail.com

**Gilbert, Joseph W. Jr. (Estelle)  
1000 Vicars Landing Way, Apt. D-103, Ponte Vedra Beach, FL 32082

**Gill, Sarjit S. (Primaljit)  
LSU Medical Center Surgery Dep 1501 Kings Highway, Shreveport, LA 71130-3332  
Phone: (318) 675-6108 Fax: (318) 675-6141

‡Gilmore, Denis M.  
1313 21st Avenue South 609 Oxford House, Nashville, TN 37232  
Phone: (615) 343-2951 Fax: (615) 936-7003  
Email: denis.m.gilmore@vanderbilt.edu

Glower, Donald D. (Sue Ann)  
Department of Surgery P.O. Box 3851, Durham, NC 27710  
Phone: (919) 681-5789 Fax: (919) 681-8912  
Email: glowe001@mc.duke.edu

**Goff, R. Daley, Jr. (Kathleen)  
717 Treys Drive, Winchester, VA 22601  
Phone: (540) 665-1868 Fax: (540) 665-1868  
Email: kpgrdg17@aol.com

**Goldberg, Lawrence G. (Carole)  
1850 Bluegrass Avenue, Louisville, KY 40215  
Phone: (502) 367-3321 Fax: (502) 367-3322  
Email: lgoldb@bellsouth.net

Golino, Alessandro  
910 Maritime Crt, Bradenton, FL 34212  
Phone: (941) 744-2640 Fax: (941) 744-2650  
Email: agheartsurgery@aol.com

**Gomes, Mario N. (Belinda)  
374 R Helena Vieira Da Silva E4-5DN, Leca Da Palmeira,  
Phone: (302) 623-4530 Fax: (302) 623-4522  
Email: bhgomes@aol.com

**Gonzalez, Ivan F.  
CMMS 476 PO Box 70344, San Juan, PR 00936-8344  
Phone: (787) 281-0451 Fax: (787) 281-0450  
Email: ifgc@prtc.net

•Gonzalez-Stawinski, Gonzalo V. (Natalie Vallecio)  
3900 Junius Street Suite 415, Dallas, TX 75246  
Phone: (214) 820-7100 Fax: (214) 820-6863  
Email: gonz.gonzalez@baylorhealth.edu

**Gott, Vincent L. (Iveagh)  
600 N. Wolfe St. Blalock 618, Baltimore, MD 21287 4618  
Phone: (410) 955-3297 Fax: (410) 955-3809  
Email: vgott@csurg.jhmi.jhu.edu

**Senior Member  •New Member  ‡Resident Member  *Home Address

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MEMBERSHIP ROSTER

**Gottsegen, Warren L. (Becky)**
4320 Houma Boulevard Suite 300, Metairie, LA 70006
Fax: (504) 598-9934
Email: wgottsegen@mindspring.com

Graeber, Geoffrey M. (Janet)
UMASS Memoria Health Care 55 Lake Avenue, North, Worcester, MA 1605
Phone: (508) 334-8996 Fax: (508) 334-7284
Email: geoffrey.graeber@umassmemorial.org

‡Graham, David Bennet (Danielle)
7 Kapp Canyon, San Antonio, TX 78258
Phone: (214) 883-4975
Email: david.b.graham@gmail.com

**Graham, Walter H. (Sylvia)**
501 Piney Point Road, Yorktown, VA 23692
Phone: (757) 890-9580
Email: whopkinsgraham@aol.com

Graper, W. Peter (Rhonda)
1569 Oak Way, Sarasota, FL 34232
Phone: (941) 371-9710 Fax: (914) 371-9713
Email: peter-graper@smh.com

**Gray, Laman Jr.**
201 Abraham Flexner Way Suite 1200, Louisville, KY 40202
Phone: (502) 561-2180 Fax: (502) 561-2190
Email: lgray@ucsamd.com

Green, Gary R. (Meg)
104 Union Ave and Townsend St Ste 1001, Syracuse, NY 13203
Phone: (315) 423-7192 Fax: (315) 423-7192
Email: grandallgreen@yahoo.com

Greenfield, D. Tyler (Anne)
The Heart Center 2050 Meadowview Parkway, Kingsport, TN 37660
Phone: (423) 230-5000 Fax: (423) 230-5160
Email: tgreenfield@mycva.com

‡Greenleaf, Christopher
440 Cross Park Drive, Apt. W805, Pearl, MS 39208
Phone: (215) 370-0470
Email: cgreenleaf@umc.edu

Greenlee, Joseph Alan, III (Joan Greenlee)
11108 Parkview Circle Suite 5100, Fort Wayne, IN 46845
Phone: (260) 266-2800 Fax: (260) 266-2805
Email: jgreenlee2@me.com

Griffith, Bartley P.
110 S. Paca Street 7th Floor, Baltimore, MD 21201
Phone: (410) 328-3822 Fax: (410) 328-2750
Email: Bgriffith@smail.umaryland.edu

Grimball, Arthur (Rosanne)
329 Coatsland Drive, Jackson, TN 38301
Phone: 731-668-0969 Fax: (901) 424-4109
Email: grimballa@bellsouth.net
**Grinnan, George L. B. (Karon)**
106 Quail Way, Duck, NC 27949
Phone: (757) 460-5400 Fax: (757) 460-5400

**Grishkin, Brent A. (Betty)**
8918 Hemingway Grove Circle, Knoxville, TN 37922
Phone: (865) 670-9880 Fax: (865) 373-0821
Email: drgrish@hotmail.com

Grogan, Eric L. (Melanie)
VUMC Thoracic Surgery Dept 1313 21st Avenue South, Nashville, TN 37232-4682
Phone: (615) 322-0248 Fax: (615) 936-7003
Email: eric.grogan@vanderbilt.edu

Groh, Mark (Sumandeep)
257 McDowell Street, Asheville, NC 28803
Phone: (828) 628-0425 Fax: (828) 252-6114
Email: mgroh@AshevilleHeart.com

Grover, Frederick L. (Carol)
Academic Office 1, Room 6602 12631 E. 17th Avenue, C-310, Aurora, CO 80045
Phone: 303-724-2798 Fax: (303) 724-2806
Email: frederick.grover@ucdenver.edu

Gruber, Peter J. (Diana Duque)
University of Iowa 200 Hawkins Drive, SE 515 GH, Iowa City, IA 52242
Phone: (319) 356-0825 Fax: (319) 356-3891
Email: peter-gruber@uiowa.edu

Guareschi, Claudio (Helene)
303 West Alexander Avenue Suite E, Greenwood, SC 29646
Phone: (864) 725-7900 Fax: (864) 330-7910
Email: cts.rec@gmail.com

Guleserian, Kristine J.
1935 Medical District Drive Suite B3625, Dallas, TX 75235-8835
Phone: (214) 456-5010
Email: krisgul@gmail.com

‡Gunn, Tyler M.
740 S. Limestone, Suite A301, Lexington, KY 40536
Phone: (859) 257-8901 Fax: (859) 257-4682
Email: tyler.gunn@uky.edu

Gustafson, Robert A. (Kelly Calvert)
West Virginia University School of Medicine Health Sciences Center North, Box 9238, Morgantown, WV 26506
Phone: (304) 293-2340 Fax: (304) 293-5845
Email: gustafsonr@cbhs.wvu.edu

**Guynes, W. Allison (Catherine)**
#6 Medical Drive, Amarillo, TX 79106
Phone: (806) 353-6604 Fax: (806) 353-3977

**Guyton, Robert A. (Beth)**
1365 Clifton Road NE Suite 2223, Atlanta, GA 30322
Phone: (404) 778-3836 Fax: (404) 778-5039
Email: robert.guyton@emoryhealthcare.org

**Senior Member  +New Member  ‡Resident Member  *Home Address
**Habal, Salem M. (Sandra)**
1940 N.E. 47th Street Suite 1, Fort Lauderdale, FL 33308-7711
Phone: (954) 771-3220 Fax: (954) 771-8369
Email: habalsmd@bellsouth.net

**Haithcock, Benjamin (Carmen)**
3040 Burnett Womack Bldg; CB 7065, Chapel Hill, NC 27599-7065
Phone: (919) 966-3381 Fax: (919) 966-3475
Email: benjamin_haithcock@med.unc.edu

**Halkos, Michael E. (Danielle)**
550 Peachtree Street NE Division of Cardiothoracic Surgery, 6th Floor, Atlanta, GA 30308
Phone: (404) 312-4114
Email: mhalkos@emory.edu

**Hall, David P.**
638 Tom Hunt Road, Chickamauga, GA 30707-6013
Phone: (706) 375-5714 Fax: (706) 375-9523

**Hall, Timothy S. (Kathryn)**
POB 9317 Department of Surgery Stamford Hospital, Stamford, CT 6904
Phone: (203) 276-7470 Fax: (203) 276-7089
Email: tshall@tshsurgery.com

**Hall, William C. (Stacy Leann)**
Suite 380 Physicians Plaza 988 Oak Ridge Turnpike, Oak Ridge, TN 37830
Phone: (865) 481-0183 Fax: (865) 481-0186
Email: hrtfixer@comcast.net

**Haller, J. Alex, Jr. (Emily)**
1314 Glencoe Road, Sparks Glencoe, MD 21152
Phone: (410) 472-4241 Fax: (410) 472-3477
Email: amancalled@netzero.com

**Hallman, Grady L. (Martha)**
Texas Heart Institute P.O. Box 20345, Houston, TX 77025
Phone: (832) 355-4129 Fax: (832) 355-3770
Email: ghallman@heart.thi.tmc.edu

**Hamilton, Timothy (Lauren C Kane, MD, FACS)**
7737 Southwest Freeway Suite 201, Houston, TX 77074
Phone: 832-942-9062 Fax: (832) 804-8034
Email: thamilton@texassurgical.com

**Hammon, John W. (Mary Lisa)**
pt. of Cardiothoracic Surg. Wake Forest University School of Medicine, Winston Salem, NC 27157-1096
Phone: (336) 945-0745 Fax: (336) 716-3348
Email: jhammon@wfubmc.edu

**Hansen, H. Andrew II (Kathy)**
26400 Kuykendahl Road Building A, Suite 250, The Woodlands, TX 77375
Phone: (979) 696-8346 Fax: (979) 764-4013
Email: centraltexasveincenter@gmail.com
**Hardin, Robert A. (Jo Ann)**  
2000 Church Street, Nashville, TN 37236  
Phone: (615) 329-5915 Fax: (615) 284-3571

**Harpole, David H. Jr. (Karen)**  
DUMC 3627, Durham, NC 27710  
Phone: (919) 668-8413 Fax: (919) 668-7122  
Email: david.harpole@dm.duke.edu

**Harpole, David H. (Ann)**  
9704 Old Dell Trace, Richmond, VA 23233  
Phone: (804) 741-5899  
Email: harpo002@mc.duke.edu

Harr, Charles Dulaney (Debra Bass)  
3000 New Bern Avenue Administration, Raleigh, NC 27610  
Phone: (919) 350-8388 Fax: 704-598-1454  
Email: cdharr@aol.com

**Harrah, John D. (Phyllis)**  
1975 Wiltshire Blvd., Huntington, WV 25701  
Fax: (304) 529-7478  
Email: harrahjd@aol.com

#Harrington, Phillips B.  
1295 Lindenwood Lane NE, Atlanta, GA 30319  
Phone: (404) 778-3836  
Email: pbharri@emory.edu

**Harris, Jackson (Gene)**  
211 Burlington Place, Nashville, TN 37215-1859  
Phone: (615) 297-2345  
Email: jacksonharris@email.msn.com

**Harris, Stuart H., Jr. (Marie)**  
1911 Thomson Drive, Lynchburg, VA 24501  
Phone: (804) 947-3901 Fax: (804) 947-3907

Harris, William J. III (Cindy)  
501 Marshall Street Suite 302, Jackson, MS 39202  
Phone: (601) 969-7047  
Email: wjharris3@me.com

**Harrison, Lynn H. (Lura)**  
8900 N. Kendall Drive-South Tower, Miami, FL 33176  
Phone: (786) 596-3436  
Email: LynnH@baptisthealth.net

Hart, David (Rochelle)  
1575 South Andrew Circle, Bloomington, IN 47401  
Phone: (812) 361-6930  
Email: dhart1@iuhealth.org

**Hartsuck, James M. (Jean)**  
6909 NW Grand Boulevard, Oklahoma City, OK 73116-5001  
Phone: (405) 659-9802 Fax: (405) 843-7314  
Email: jhartsuck@cox.net

**Senior Member  +New Member  ‡Resident Member  *Home Address**

STSA 63rd Annual Meeting 265
Hartwig, Matthew Galen (Laurie)

**Harville, Lacy E., III (Nena)
1005 Golf View LN, Knoxville, TN 37922
Phone: (865) 310-8149 Fax: (865) 637-2114
Email: harville.ill@me.com

**Hatcher, Charles R., Jr. (Phyllis)
The Emory Clinic Inc. 1365B Clifton Rd. NE, Ste. 6205, Atlanta, GA 30322
Phone: (404) 778-3838 Fax: (404) 778-5130
Email: charles_hatcher@emoryhealthcare.org

Havens, Dennis L. (Audria)
1720 Nicholasville Road Suite # 502, Lexington, KY 40503
Phone: 859-221-8186 Fax: (859) 277-9613
Email: dlh301@gmail.com

Haverich, Axel E.
Carl-Neuberg-Str. 1, Hannover, D30625
Phone: 0049-511-532-6580 Fax: 0049-511-532-5404
Email: haverich.axel@mh-hannover.de

‡Hawkins, Robert Bruce, II (Lauren Clinton)
515 Avon Street, Charlottesville, VA 22902
Phone: (303) 990-2192 Fax:
Email: rbh6x@virginia.edu

**Hawley, William D. (Carol)
6900 N.W. Grand Blvd., Oklahoma City, OK 73116-5004
Phone: (405) 946-0900

Hazelrigg, Stephen R.
PO Box 19638, Springfield, IL 62794-9638
Phone: (217) 545-8875 Fax: (217) 545-7053
Email: shazelrigg@siumed.edu

Headrick, James Robert
2108 East Third Suite 300, Chattanooga, TN 37404
Phone: (423) 624-5200 Fax: (423) 624-4440
Email: headrick@actvsurgeons.com

**Heck, Herman A., Jr. (Joanie)
25 Carland Drive, Arden, NC 28704
Phone: (504) 433 4373 Fax: (504) 433 4373
Email: haheck1@att.net

Heidary, Dariush H. (Farideh)
2 Silver Bluff Way, Savannah, GA 31411
Phone: (912) 598-1473
Email: dariushheidary@gmail.com

Heinle, Jeffrey S. (Sheila)
6621 Fannin WT19345H, Houston, TX 77030
Phone: (832) 826-1929 Fax: (832) 825-1905
Email: jsheinle@texaschildrens.org

Helsel, Bryan Scott (Shasta Brewer Helsel)
2034 Sauvignon, San Antonio, TX 78258
Phone: (210) 362-1162
Email: deltaguns@aol.com

266 STSA 63rd Annual Meeting
Hennington, Mark H. (Deborah)
420 North Center Street, Hickory, NC 28601
Phone: (828) 256-1915 Fax: (828) 324-9189
Email: mhenni5313@aol.com

Henry, Clarke L., Jr. (Mary)
9119 W 74th St Suite #350, Shawnee MSN, KS 66204
Phone: 913-341-0120 Fax: 913-341-6071
Email: chenryjr@gmail.com

Henry, Gavin (Marilyn)
900 Calon Ave St. Agnes Hospital, Baltimore, MD 21229
Phone: (410) 368-2730 Fax: (410) 951-4007
Email: ghenry1@stagnes.org

Herrbold, Francis (Kelly)
425 W. Third Ave. Suite 510, Albany, GA 31701
Phone: (229) 312-7500 Fax: (229) 312-7505
Email: fherrbold@yahoo.com

Herrera, Luis J. (Jeanne)
1400 S. Orange Ave MP-760, Orlando, FL 32806
Phone: (407) 949-9581 Fax: (407) 872-7754
Email: luis.herrera@orlandohealth.com

Hess, Philip J. (Pamela)
1801 Senate Boulevard Suite 3300, Indianapolis, IN 46202
Phone: (317) 923-1787 Fax: (317) 962-0853
Email: phess2@iuhealth.org

+Hetzler, Norman A., Jr.
380 Hospital Drive Suite 370m Building A, Macon, GA 31217
Phone: (478) 330-7200 Fax: (478) 330-7201
Email: chipmd@live.com

Higgins, Robert S.D. (Molly)
Apartment of Surgery 720 Rutland Avenue, Baltimore, MD 21205
Phone: (443) 287-3498
Email: Robert.higgins@jhmi.edu

**Higgs, William R. (Rebecca)
3715 Dauphin St Bldg. 2, Ste. 600, Mobile, AL 36608
Phone: (251) 990-4836 Fax: (251) 990-4854
Email: bhiggs@bellsouth.net

**Hill, Ronald C. (Lenora)
12 Sterling Run Drive, Fletcher, NC 28732-7800
Phone: (304) 692-4358
Email: hillr956@yahoo.com

Hiller, Laurence F. (Olivia)
2751 Albert Bicknell Drive, Shreveport, LA 71103-3940
Phone: (318) 675-6154 Fax: (318) 675-4689
Email: lfhillier@gmail.com

Hines, Michael H. (Leigh)
3715 Drummond Street, Houston, TX 77025
Phone: 832-544-9230
Email: mhinesmd@gmail.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 267
**Hinkle, Jill Marie**
2500 Rocky Mountain Ave Suite 100, Loveland, CO 80538
Phone: (970) 302-3666 Fax: (970) 624-1891
Email: jill.hinkle@uchealth.org

**Hitch, William S. (Lucy)**
7001 Hodgson Memorial Drive #5, Savannah, GA 31406-2549
Phone: (912) 356-6361 Fax: (912) 352-9800

**Hix, William R. (Jane)**
1079 Burning Tree Drive, Chapel Hill, NC 27517
Phone: (919) 932-7622

**Hoff, Steven J.**
1222 S. Orange Ave 4th floor, Orlando, FL 32806
Phone: (321) 841-7700 Fax: (321) 841-7700
Email: steve.hoff@orlandohealth.com

**Hoffman, Aaron Lee (Emily Hoffman)**
201 Sivley Road, Suite 300, Huntsville, AL 35801
Phone: (256) 536-5594 Fax: (256) 533-3379
Email: heelmd2005@alumni.unc.edu

**Hofstetter, Wayne**
1515 Holcombe Unit 1489, Houston, TX 77030
Fax: (713) 794-4901
Email: whofstetter@mdanderson.org

**Holden, Anthony Austin (Barbara)**
311 North McLean Blvd, Memphis, TN 38112
Phone: (901) 355-0414
Email: aholden19@comcast.net

**Holden, Shaf (Melinda)**
201 Sivley Road SW, Suite 300, Huntsville, AL 35801
Phone: (256) 536-5594 Fax: (256) 533-3379
Email: shafholden@gmail.com

**Holley, C. Wayne (Lori)**
404 McLaws Street, Savannah, GA 31405
Phone: (912) 819-5738 Fax: (912) 819-5753
Email: cwholley@bellsouth.net

**Holman, William L. (Linda)**
ZRB719703 19th Street South, Birmingham, AL 35294-0007
Phone: (205) 934-3853 Fax: (205) 975-6618
Email: wholman@uab.edu

**Holmes, Chester L.**
P.O. Box 305, Ellison Bay, WI 54210
Phone: (414) 854-2146

**Holt, John B. (Diane)**
588 Sterthaus Drive, Ormond Beach, FL 32174
Phone: (386) 672-9501 Fax: (386) 673-0308
Email: jackholt105@gmail.com

**Hoots, Anthony V. (Barbara)**
425 Third Avenue Suite 510, Albany, GA 31701
Phone: (912) 432-5633 Fax: (912) 888-7543
Email: ahoots@ppmh.org
**Hopkins, Richard A. (Jenny)
2401 Gillham Road 4 West Tower-Cardiac Surgery, Kansas City, KS 64108
Phone: (816) 234-3580 Fax: (816) 983-6380
Email: rahopkinsmd@gmail.com

**Horneffer, Peter J. (Barbara)
O’Dea Medical Arts Building 7505 Osler Drive-Suite 306, Baltimore, MD 21204
Phone: (410) 296-2520 Fax: (410) 821-6860
Email: peterhorneffer@gmail.com

Horowitz, Michael D.
P.O. Box 639, Lebanon, GA 30146
Phone: (678) 469-1154
Email: michael_horowitz@mac.com

Horvath, Keith A. (Catherine)
10 Center Drive - MSC 155010 B1D47, Bethesda, MD 20892
Phone: (301) 896-7610 Fax: (301) 480-1649
Email: khorvath@nih.gov

**Hotchkiss, William S. (Virginia)
144 Harvest Drive Huntington Village, Charlottesville, VA 22903

Houck, Ward Vaughn (Caroline)
3510 Oakleigh Cove, Murfreesboro, TN 37129
Phone: (770) 880-0730 Fax: (615) 867-1941
Email: wardhouck@gmail.com

Howe, Harold R., Jr. (Kathy)
301 Hawthorne Lane, Charlotte, NC 28204
Phone: (704) 316 5100 Fax: (704) 377-8825
Email: hrhowe@novanthealth.org

**Howe, W. Robin (Elaine)
1 Highland Hills Way, Landrum, SC 29356
Phone: (864) 895-8115
Email: robinhowe@aol.com

Howington, John A. (Anne)
Saint Thomas Thoracic Surgical Specialists 4320 Harding Road, Nashville, TN 37205
Phone: (615) 222-1270 Fax: (615) 222-1275
Email: john.howington@sth.org

Huang, Kuo Fon (Kimberly)
2115 South Fremont Avenue Suite 5000, Springfield, MO 65804
Phone: 417-820-3960 Fax: (417) 820-3966
Email: kuo.huang@mercy.net

**Hubbell, David S. (Barbara)
100 Beach Drive, NE #802, Saint Petersburg, FL 33701
Phone: (813) 979-3050 Fax: (813) 972-8495

Huddleston, Charles B. (Marye Gleva)
14 Kingsbury Place, Saint Louis, MO 63112-1825
Phone: (314) 268-4183 Fax: (314) 577-5313
Email: chuddle7@slu.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address
Huddleston, Stephen J.  
930 East First Street Suite 303, Duluth, MN 55812  
Phone: 218-576-2998  
Email: shuddleston@slhduluth.com

**Hudson, Loyde H. (Arlene)**  
P.O. Box 8400, Fayetteville, AR 72703  
Phone: (501) 444-0552

**Hudspeth, Allen S. (Kathryn)**  
211 Knollwood Street, Winston Salem, NC 27104  
Phone: (336) 721-1748 Fax: (336) 716-3348

Hughes, George C., IV (Diane Allen)  
Box 3051 DUMC, Durham, NC 27710  
Phone: (919) 403-8673 Fax: (919) 613-5674  
Email: gchad.hughes@duke.edu

Huh, Joseph (Sonia Kang)  
3701 J Street Suite 109, Sacramento, CA 95825  
Phone: 916 733 4100  
Email: joseph.x.huh@kp.org

Hume, Andrew Tucker  
2001 Willow Dr, San Angelo, TX 76904  
Phone: (512) 459-8753 Fax: (512) 483-6807  
Email: andrewthume@gmail.com

Hummel, Brian W. (Kristin)  
9981 S. Healthpark Drive Suite 120, Fort Myers, FL 33908  
Phone: (239) 343-6344  
Email: brian.hummel@leememorial.org

Hunter, R. Merrill (Marilyn)  
3000 New Bern Avenue Suite 1100, Raleigh, NC 27610  
Phone: (919) 231-6333 Fax: (919) 231-6334  
Email: rmhunter50@gmail.com

Husain, S. Adil (Rebecca)  
7703 Floyd Curl Dr. MC 7841, San Antonio, TX 78229  
Phone: 210-381-5074 Fax: (210) 567-2877  
Email: husain@uthscsa.edu

*Iannettoni, Mark D. (E. Anne Iannettoni)*  
ECHI/ECU115 Heart Drive, Room 3107, Greenville, NC 27834  
Phone: (252) 744-5961 Fax: (252) 744-3051  
Email: iannettonim14@ecu.edu

**Ibach, John R., Jr. (Stephanie)**  
904 Greenridge Road, Jacksonville, FL 32207  
Phone: (904) 396-7890 Fax: (904) 396-6065

Ikonomidis, John S.  
Suite BM 282114 Doughty Street, Charleston, SC 29425  
Phone: (843) 876-4842 Fax: (843) 876-4866  
Email: ikonomij@musc.edu

Irani, Adel D. (Natasha)  
6400 Fannin St. Ste. 2850, Houston, TX 77030  
Phone: (713) 486-5100 Fax: (713) 512-7200  
Email: Adel.D.Irani@uth.tmc.edu
Isbell, James M. (Rebecca Isbell, MD)  
Department of Surgery, Box 71275 York Avenue, New York, NY 10065  
Phone: (212) 639-6247  
Email: jamesmisbell@gmail.com

Ising, Mickey  
2438 Sherry Rd, Louisville, KY 40217  
Phone: (502) 759-1565  
Email: mickeyising@gmail.com

**Itkin, Ernest L. (Toni)**  
61 Wilcher Street Suite 4120, Marietta, GA 30060  
Phone: (770) 424-9732 Fax: (770) 421-0228

Jacobs, Jeffrey P. (Stacy)  
601 5TH ST S, 6TH FLOOR BOX 70-6610, Saint Petersburg, FL 33701  
Phone: 727-767-2682 Fax: (727) 767-8606  
Email: jeffjacobs@msn.com

Jaggers, James  
Children's Hospital Colorado Cardiac Surgery B200,  
Aurora, CO 80045  
Phone: 7203830556 Fax: (720) 777-7290  
Email: james.jaggers@childrenscolorado.org

Jaggers, Robert C.  
Cardiovascular Surgical Clinic of NW Arkansas 3276  
N. Northhills Blvd. Fayetteville, AR 72703  
Phone: (479) 587-1114  
Email: rcj2554@yahoo.com

**Jahnke, Edward J. (Betty)**  
1596 San Leandro Lane, Santa Barbara, CA 93108  
Phone: (805) 969-5271  
Email: Drejj@aol.com

Jaquiss, Robert DB (Cheryl)  
Duke University School of Medicine DUMC Box 3474, Durham, NC 27710  
Phone: (919) 448-8225 Fax: (919) 681-4907  
Email: robert.jaquiss@duke.edu

Jaroszewski, Dawn E. (Lucas)  
5777 E. Mayo Blvd, Phoenix, AZ 85054  
Phone: (480) 342-2270 Fax: (480) 342-2269  
Email: jaroszewski.dawn@mayo.edu

‡Javidfar, Jeffrey  
223 Ivy Meadow Lane, Durham, NC 27707  
Phone: (919) 613-5069  
Email: jeffrey.javidfar@duke.edu

**Jeffery, Diane L.**  
1513 Del Webb Blvd. West, Sun City Center, FL 33573  
Phone: (813) 633-2330  
Email: diane@jeffery.com

‡Jeng, Eric  
1505 Fort Clarke Boulevard #1304, Gainesville, FL 32606  
Phone: (310) 922-4265  
Email: eric.jeng@surgery.ufl.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address**
**Jenkins, Edward W. (Mary Jane)**
7410 Lochness Circle, Tulsa, OK 74132-2144
Phone: (918) 388-4409
Email: DREWJMD@AOL.COM

**Jessen, Michael E. (Patti)**
5077 Brandywine Lane, Frisco, TX 75034
Phone: (214) 645-7721 Fax: (214) 645-7701
Email: michael.jessen@utsouthwestern.edu

**Jidarian, Anoush**
1440 E. County Line Road, Suite 2100, Indianapolis, IN 46227
Fax: (317) 497-6271
Email: a.jidarian@gmail.com

**Johnson, George W., Jr. (Marie)**
901 W. Lamberth Rd., Sherman, TX 75092
Phone: (903) 892-2801
Email: gjohnsonjrmd@gmail.com

**Johnson, Robert G.**
Center for Cardiovascular and Thoracic Surgery 3535 Bienville Boulevard, Ocean Springs, MS 39564
Phone: (228) 762-3000
Email: rgjohnson728@sbcglobal.net

**Johnson, Carl M.**
2601 Kentucky Avenue Suite 300, Paducah, KY 42003
Phone: (502) 443-5564 Fax: (502) 443-5549
Email: cmjsn@hotmail.com

**Johnson, Scott B. (Andrea)**
Department of Surgery 7703 Floyd Curl Drive, MC 7841, San Antonio, TX 78229
Phone: (210) 698-8484 Fax: (210) 567-2877
Email: Johnsons@uthscsa.edu

**Johnson, Scott H. (Suzanne)**
890 W. Faris Rd. Suite 550, Greenville, SC 29650
Phone: (864) 455-6800
Email: scottyjohnson@earthlink.net

**Johnson, William E., III**
1855 Spring Hill Ave, Mobile, AL 36607
Phone: (334) 433-0404 Fax: (334) 431-3655
Email: wejohnson3@comcast.net

**Johnston, Alan D.**
M. D. Anderson Cancer Center Orlando 1400 S. Orange Avenue, Orlando, FL 32806
Phone: (407) 648-5384 Fax: (407) 872-7754
Email: AJohns707@aol.com

**Johnston, Robert H. (Sara)**
303 Pasadena, Victoria, TX 77904
Email: bobyjohn@aol.com

**Jones, David R. (Julie)**
1275 York AveBox 7, New York, NY 10065
Phone: 434-284-3515
Email: jonesd2@mskcc.org

272 STSA 63rd Annual Meeting
Jones, Gary P. (Elaine Lavern)
3311 Prescott Road - Suite 202, Alexandria, LA 71301
Phone: (318) 445-0206 Fax: (318) 443-0441
Email: gjones@lacvtx.com

**Jones, James C. (Dianne)
3176 Willow Bend, Lehi, UT 84043

**Jones, James W. (Joan)
31 La Costa Drive, Montgomery, TX 77356-5325
Phone: (573) 882-4158 Fax: (573) 884-4585
Email: jwjones@bcm.edu

**Jones, K. Candis
618 South Main St. Apt #413, Ann Arbor, MI 48104
Phone: (240) 446-9499
Email: koriej@med.umich.edu

**Jones, Robert H. (Catherine)
P.O. Box 2986, Durham, NC 27710
Phone: (919) 684-6077 Fax: (919) 684-5700
Email: jones060@mc.duke.edu

Jones, Robert N. (Mica)
4011 Orchard Drive Suite 3004, Midland, MI 48640
Phone: (989) 488-5410 Fax: (989) 488-5411
Email: robert.jones@midmichigan.org

Jones, Robert Evans (Mimi)
114 Dutch Island Drive, Savannah, GA 31406-3223
Phone: (912) 819-0500 Fax: (912) 350-2298
Email: jonesre56@gmail.com

**Judd, Donald R. (Carolyn)
10162 Tanbridge Rd, Saint Louis, MO 63128-2629
Phone: (314) 647-5525 Fax: (314) 645-5713

**Just, Jorge O. (Sonia)
2120 Redding Road, Birmingham, AL 48009

Justicz, Alexander G.
4725 N Federal Hwy, Fort Lauderdale, FL 33308
Phone: (954) 494-0590
Email: a.justicz@yahoo.com

‡Kachroo, Puja
660 S. Euclid Avenue, Campus Box 8234, St. Louis, MO 63110
Phone: (646) 785-2001 Fax: (314) 747-4216
Email: kachroop@wudosis.wustl.edu

**Kahn, Donald R. (Shirley)
2012 Magnolia Avenue, Birmingham, AL 35205
Phone: (205) 933-7794 Fax: (205) 933-7952
Email: gayle@kahnproperties.com

**Kaiser, George C.
10 Jefferson Rd #1D, Webster Groves, MO 63119-2933
Phone: (314) 962-0446
Email: georgeckaiser@gmail.com

**Senior Member  •New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 273
Kamath, M. Vinayak (Sheila)
Augusta University Cardiothoracic Surgery-BA 4300,
Augusta, GA 30912
Phone: (706) 721-3226 Fax: (706) 721-7508
Email: kamath@gru.edu

**Kanaly, Paul J. (Beverly)
6518 Hillcrest Ave., Oklahoma City, OK 73116
Phone: (405) 951-4345 Fax: (405) 951-4392
Email: kanaly@me.com

Kane, Lauren (Timothy Hamilton)
+Kaneko, Tsuyoshi (Maiko Kaneko)
75 Francis Street, Boston, MA 2115
Phone: (617) 732-7678
Email: tkaneko2@partners.org

Kanter, Kirk R.
Pediatric Cardiac Surgery 1405 Clifton Road, Atlanta, GA 30322
Phone: (404) 785-6330 Fax: (404) 785-6266
Email: kkanter@emory.edu

Kappelman, Mark D. (Susan)
120 Meadowcrest Street Suite 450, Gretna, LA 70056
Phone: (504) 391-7660 Fax: (504) 393-2407
Email: mkappel162@aol.com

Kartis, Thomas, Jr.
2327 Aaron St., Port Charlotte, FL 33952
Phone: (941) 235-4400 Fax: (941) 235-4402
Email: tkartisjrm@earthlink.net

Kasirajan, Vigneshwar (Sucharitha)
1200 E. Board Street, 7 South P.O.Box 980645, Richmond, VA 23298
Phone: (804) 827-1033 Fax: (804) 828-4620
Email: vkasirajan@mcvh-vcu.edu

Kaushal, Sunjay (Avni)
720 Abell Ridge Circle, Towson, MD 21204
Phone: (443) 826-0206 Fax: 
Email: skaushal@email.umaryland.edu

Kauten, James R. (Deanna)
95 Collier Road, Suite 5015, Atlanta, GA 30309-1721
Phone: (404) 233-9700 Fax: (404) 355-4235
Email: james.kauten@piedmont.org

Kavarana, Minoo Naozer (Zarin)
96 Jonathan Lucas Street CSB 424/MSC 613, Charleston, SC 29425
Phone: 843-792-5882
Email: tayjef@musc.edu

‡Kayatta, Michael
1939 Cobblestone Circle NE, Atlanta, GA 30319
Email: mkayatt@emory.edu

**Keeley, Robert L. A.
1234 Franklin Road SW, Roanoke, VA 24016
Phone: (540) 345-1561 Fax: (540) 345-2112
Keeling, W. Brent (Maggie)
49 Jesse Hill Jr Dr SE, Atlanta, GA 30303
Phone: 404-670-5031
Email: brent.keeling@emory.edu

Kelemen, John J., III (Sara)
721 American Avenue Suite 510, Waukesha, WI 53188
Phone: (785) 822-1941 Fax: (262) 928-2689
Email: johnkelemen@mac.com

**Kelley, Henry G., Jr. (Marilyn)**
853 N. Church Street Suite 500, Spartanburg, SC 29303
Phone: (864) 560-1582 Fax: (864) 560-1590

**Kelly, Meghan**
8042 Gannon Avenue, St. Louis, MO 63130
Phone: (314) 775-5024 Fax: (573) 884-2988
Email: mkcff@health.missouri.edu

Kelly, James P. (Christine)
17022 Sandwick lane, Granger, IN 46530
Phone: (574) 647 6542 Fax: (574) 647-6518
Email: jpkellco1@aol.com

Kern, John A. (Catherine)
TCV Surgery PO Box 800679, Charlottesville, VA 22908
Phone: (434) 982-4301 Fax: (804) 243-5781
Email: jkern@virginia.edu

*KERNSTINE, KEMP H (Cassandra Kernstine)*
UT SOUTHWESTERN, THORACIC 5323 HARRY HINES BLVD, MC 8898, DALLAS, TX 75390-8879
Phone: (214) 645-7700 Fax: (214) 645-7701
Email: kemp.kernstine@utsouthwestern.edu

Kesler, Kenneth A.
545 Barnhill Drive EH 215, Indianapolis, IN 46202
Phone: (317) 274-2394 Fax: (317) 274-2940
Email: kkesler@iupui.edu

**Kessinger, John M.**
2514 Country Club Drive, Lynn Haven, FL 32444
Phone: (850) 785-9559
Email: deltayank@aol.com

Khalafi, Reza S. (Kathy)
900 W. Rosedale St., Fort Worth, TX 76104
Phone: (817) 885-7442 Fax: (817) 885-7443
Email: tbroom@txhealthcare.com

Khalil, Kamal G. (Samia Khalil, MD)
6400 Fannin, Suite 2850, Houston, TX 77030-3116
Phone: (713) 486-5100 Fax: (783) 512-7200
Email: kamal.khalil@uth.tmc.edu

Khandhar, Sandeep (Seema)
2921 Teleslart Court Suite 140, Falls Church, VA 22042
Phone: (703) 280-5858
Email: sandeep.khandhar@gmail.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 275
Khansarinia, Saeid  
95 Collier Road NW Suite 2055, Atlanta, GA 30309  
Phone: (404) 605-5177 Fax: (404) 355-4235  
Email: saeid.khansarinia@piedmont.org

KHAWAJA, FAWAD NAEEM (Amna)  
1824 King Street Suite 200, Jacksonville, FL 32204  
Phone: (904) 421-5586  
Email: Pam@ctvs1.com

‡Khullar, Onkar V
‡Kiankhooy, Armin  
1830 Candlewood Court, #208, Charlottesville, VA 22903  
Phone: (434) 260-4444  
Email: armin.kiankhooy@gmail.com

Kilic, Ahmet (Gwen)  
N-831 Doan Hall 410 West 10th Ave., Columbus, OH 43210  
Phone: (614) 505-6908 Fax: (614) 293-7221  
Email: ahmet.kilic@osumc.edu

**Killen, Duncan A. (Lucy)  
12542 West 123rd Terrace, Overland Park, KS 66213  
Phone: (913) 681-9471  
Email: jpieehler@kumc.edu

Kim, Jae Hyun (Jin Hee Park)  
Dalsung-ro 56, Jung-gu, Daegu, 700-712  
Phone: 82537524339 Fax: 82532507307  
Email: jaemax31@gmail.com

Kim, Min Peter (Maria S. Kim)  
6550 Fannin Street SM1661, Houston, TX 77030-4009  
Phone: (713) 441-5177 Fax: (713) 790-5030  
Email: mpkim@houstonmethodist.org

Kim, Peter  
2819 SE 29th Street, Ocala, FL 34471  
Phone: (352) 361-6317  
Email: pyk2009@gmail.com

Kincaid, Edward H. (Shiva)  
Department of Cardiothoracic Surgery Wake Forest University School of Medicine, Winston Salem, NC 27157  
Phone: (336) 716-4359 Fax: (336) 716-3348  
Email: tkincaid@wfubmc.edu

King, Lewis G. (Cheryl)  
6500 N. MopacBldg 2, Suite 2207, Austin, TX 78731  
Phone: (512) 494-9985 Fax: (512) 494-9986  
Email: sandra@capitalcardiothoracic.com

**Kingry, Roy L., Jr. (Julia)  
8704 Paluxy Drive, Tyler, TX 75703  
Phone: (903) 509-9503

**Kiphart, Ridlon J. (June)  
107 Caprock Circle, Boerne, TX 78006-5778  
Phone: (830) 229-5406
Kirklin, James K.
1900 University Blvd #760, Birmingham, AL 35294-0001
Phone: (205) 934-3368 Fax: (205) 975-2553
Email: jkirklin@uab.edu

Kirshbom, Paul M.
1000 Blythe Boulevard, Charlotte, NC 28203
Email: Paul.kirshbom@carolinasherehealthcare.org

Kiser, Andy Christopher
ECU Physicians - Cardiothoracic Surgery 115 Heart Drive,
Greenville, SC 27834
Phone: (252) 744-4400 Fax: (252) 744-2812
Email: kisera16@ecu.edu

Kitchens, William Clifford (Heather)
1348 Walton Way Suite 5700, Augusta, GA 30901
Phone: (706) 737-6922 Fax: (706) 722-8351
Email: wclifffk@earthlink.net

Kitchens, William R. (Scotta)
1348 Walton Way Suite 5700, Augusta, GA 30901-2636
Phone: (706) 7388055 Fax: (706) 722-8351
Email: roddykitchens@gmail.com

*Klapper, Jacob A. (Ann Marie Klapper)
114 Doughty Street, Charleston, SC 29464
Phone: (843) 876-4845 Fax: (843) 876-4866
Email: klapper@musc.edu

Klena, James W. (Leah)
452 Camp Wilbea Road, Franklin, PA 16323
Fax: (814) 676-7887
Email: klenajw@upmc.edu

Kline, Elizabeth M. (Richard)
125 Doughty St. #690, Charleston, SC 29401
Phone: (843) 720-8490 Fax: (843) 727-3602
Email: elizabethkline@comcast.net

Klodell, Charles T. (Cindy)
PO Box 100129, Gainesville, FL 32610
Phone: (352) 273-5501 Fax: (352) 273-5513
Email: Klodell@surgery.ufl.edu

**Knight, Wade L. (Linda)
2401 South 31st Street, Temple, TX 76508
Phone: (254) 724-4910 Fax: (254) 724-8213
Email: wknight@sw.org

*Knoff, Cathy E.
574 Presidio Drive, Rockwall, TX 75087
Phone: (214) 535-7811
Email: cathy.knoff@baylorhealth.edu

Knott-Craig, Christopher J.
50 N. Dunlap3rd Floor, Heart Institute, Memphis, TN 38103
Phone: (901) 287-5995 Fax: (901) 287-5970
Email: cknottcr@uthsc.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 277
Kogon, Brian E.
1405 Clifton Road, Suite 2100, Atlanta, GA 30322
Phone: (404) 785-6330
Email: Bkogon@emory.edu

Kon, Neal D.
Wake Forest School of Medicine Medical Center Boulevard, Winston Salem, NC 27157-1096
Phone: (336) 716-4338 Fax: (336) 716-3348
Email: nkon@wakehealth.edu

*Koster, J. Kenneth, Jr. (Lesley)
836 Prudential Drive Suite 1804, Jacksonville, FL 32207-8345
Phone: (904) 398-3888 Fax: (904) 346-3026
Email: jkkstrjr@aol.com

**Kouchoukos, Nicholas T. (Judith)
3009 N. Dallas Suite 360C, Saint Louis, MO 63131
Phone: (314) 996-5287 Fax: (314) 432-6068
Email: NTKouch@aol.com

Kouretas, Peter C (Niki)
9000 W. Wisconsin Avenue, Suite 730, Milwaukee, WI 53226
Phone: (414) 266-2491 Fax: (414) 266-2075
Email: pkouretas@chw.org

Kourlis, Harry
216 Green Street, Northborough, MA 1532
Phone: (214) 403-8006
Email: hkourlis@aol.com

Koury, A. Michael (Kathryn)
501 Marshall Street Suite 100, Jackson, MS 39202
Phone: (601) 594-4766 Fax: (601) 355-8563
Email: amkoury@gmail.com

Koutlas, Theodore C.
2003 Kootenai Health Way Suite 300, Coeur d’Alene, ID 83814
Phone: (208) 449-6414 Fax: (208) 666-2556
Email: koutlast@gmail.com

Kozower, Benjamin D. (Nicole Fedoravicius)
P.O. Box 8006791215 Lee Street, HEP 4th, Charlottesville, VA 22901
Phone: (434) 924-2145 Fax: (434) 243-6131
Email: kozowerb@wudosis.wustl.edu

**Kraeft, Nelson H. (Bobbie)
2397 Troland Road, Tallahassee, FL 32312
Phone: (904) 386-8164

**Kraeger, Russell R. (Betty)
129 North Bemiston Ave, Saint Louis, MO 63105
Phone: (314) 965-9660 Fax: (314) 965-9670
Email: russell.kraeger@sahstl.com

Krahnert, John F. (Anne)
155 Memorial Drive PO Box 3000, Pinehurst, NC 28374
Phone: (910) 715-4111 Fax: (910) 715-4101
Email: jkrahnert@firsthealth.org
Krasna, Mark J. (Diane)
1945 Route 33, Neptune, NJ 7753
Phone: (732) 776-4724 Fax: (732) 776-4417
Email: mkrasna@meridianhealth.com

Kraut, Jonathan David (Arlene)
4003 Kresge Way Suite 224, Louisville, KY 40207
Phone: (502) 895-2295 Fax: (502) 895-2296
Email: ctdocjk@gmail.com

Kreisel, Daniel (Friederke)
660 S. Euclid Campus Box 8234, Saint Louis, MO 63110
Phone: (314) 362-6021 Fax: (314) 367-8459
Email: kreiseld@wudosis.wustl.edu

Kron, Irving L.
1215 Lee Street, HEP Bldg, Room 4066 Box 80079,
Chattanooga, VA 22908
Phone: (434) 924-2158 Fax: (434) 982-3885
Email: ikron@virginia.edu

Krupnick, Alexander Sasha (Shauna)
660 S. Euclid Campus Box 8234, Saint Louis, MO 63110
Phone: (314) 362-9181 Fax: (314) 367-8459
Email: krupnicka@wudosis.wustl.edu

Kuchler, Joseph A. (Patricia)
2 Tanbark Ct, Voorhees, NJ 8043
Phone: (856) 772-6333 Fax: (856) 772-0788
Email: drkuchler@yahoo.com

Kwong, King F. (Andrea)
Bldg 10, 4-394010 Center Drive, MSC 1201, Bethesda, MD 20892
Phone: 443-622-3518 Fax: (301) 480-8600
Email: kkwong001@hotmail.com

Kypson, Alan P. (Kristal)
ECHI At ECU 115 Heart Drive, Greenville, NC 27834
Phone: (252) 744-3570 Fax: (252) 744-2687
Email: kypsona@ecu.edu

Ladden, David A. (Shelly)
1680 Brentwood Drive, Lufkin, TX 75901
Phone: (936) 671-2135 Fax: (936) 631-6778
Email: dukemaniac1@aol.com

Lafuente, Javier A. (Priscilla)
18400 Katy Fwy Ste 890, Houston, TX 77094
Phone: (832) 522-8600 Fax: (832) 522-8601
Email: jlafuente@jlafuente.com

Lamberth, Wade C. (Frances)
2018 Brookwood Medical Ctr. Drive POB Suite 215,
Birmingham, AL 35209
Phone: (205) 877-2627 Fax: (205) 871-7602
Email: wadelamberth@yahoo.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

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MEMBERSHIP ROSTER

Lambright, Eric S. (Julia)
1313 21st Ave. So. 609 Oxford House, Nashville, TN 37232
Phone: (615) 322-0248 Fax: (615) 936-7003
Email: eric.lambright@vanderbilt.edu

**Lancaster, Joseph R.**
4787 Oak Circle, Boynton Beach, FL 33436
Phone: (407) 734-7914

Lancaster, L. Lee (Terri)
3443 Dickerson Pike Suite 400, Nashville, TN 37207-2524
Phone: (615) 860-1772 Fax: (615) 870-1070

Landolfo, Kevin P. (Dr. Carolyn Landolfo)
4500 San Pablo Road Davis Building, 3 North, Jacksonville, FL 32224
Phone: (904) 953-2228 Fax: (904) 953-7368
Email: landolfo.kevin@mayo.edu

Landreneau, Rodney J. (Sandra)
600 Medical Arts Building 1 Nolte Drive, Suite 660, Kittanning, PA 16201
Phone: (724) 548-3813
Email: landreneaurj@gmail.com

Landvater, Lance E. (Cynthia)
2800 Blue Ridge Rd Suite 201, Raleigh, NC 27607
Phone: (919) 805-1062 Fax: (919) 231-6334
Email: lel3328@aol.com

**Lane, Carl E. (Martha)**
1123 Brent Road, Barnesville, GA 30204
Phone: (478) 742-7566 Fax: (912) 743-2804
Email: timberlanefarms@gmail.com

‡LaPar, Damien J.
829 Rainier Rd, Charlottesville, VA 22908
Email: djl8w@virginia.edu

‡Larson, Sharon Beth
2616 Erwin Road #2533, Durham, NC 27705
Phone: 9725670919
Email: sharonbethlarson@gmail.com

Laschinger, John C. (Elizabeth)
14 Selsed Garth, Lutherville, MD 21093
Phone: (301)796-1210
Email: johnlaschinger@gmail.com

**Lasley, Charles H. (Jan)**
#4 Pelican Place, Belleair, FL 33756-1568
Phone: (727) 584-1039

Lattouf, Omar M.
550 Peachtree Street 6th Floor, Atlanta, GA 30308
Phone: (404) 686-2513 Fax: (404) 686-4959
Email: omar.lattouf@emoryhealthcare.org

Lau, Christine L. (Adam Libby)
UVA PO Box 800679, Charlottesville, VA 22908-0679
Phone: (434) 924-8016 Fax: (434) 244-9429
Email: cll2y@virginia.edu
Laudito, Antonio  
2085 Highway A1A Apt. # 3702, Indian Harbour Beach, FL 32937  
Phone: (321) 210-0318  
Email: lauditoa@gmail.com

**Lawler, Marion R., Jr. (Nan)**  
2601 Clifford Drive, Harlingen, TX 78550  
Phone: (956) 423-0043 Fax: (956) 440-9063  
Email: mlawler2@mlawler.com

Laws, Kenneth H. (Ava)  
Mid State Medical Center 2010 Church Street, Suite 626, Nashville, TN 37203  
Phone: (615) 329-7878 Fax: (615) 329-7899  
Email: klaws@edge.net

Lawton, Jennifer S.  
1800 Orleans Street, Zayed 7101, Baltimore, MD 21287  
Phone: (410) 955-2084 Fax: (410) 955-3809  
Email: lawtongrimmj@gmail.com

Lee, Robert B. (Scottye)  
1112 Pigskin Court, Franklin, TN 37064  
Phone: (615) 875-4325  
Email: bobleemd@aol.com

Lee, Richard (Michelle)  
St. Louis University Hospital  
Center for Comprehensive Cardiovascular Care, Saint Louis, MO 63110  
Phone: (314) 268-7977 Fax: (314) 268-5410  
Email: rlee@slu.edu

LeMaire, Scott A. (Brenda)  
One Baylor Plaza, BCM 390, Houston, TX 77030  
Phone: (832) 355-9910 Fax: (832) 355-9948  
Email: slemaire@bcm.tmc.edu

**LePere, Robert H. (Vicky)**  
2211 Camelback Drive, San Antonio, TX 78209-4261

Leppard, Edward M., Jr. (Constance)  
2750 Laurel Street-Suite 305, Columbia, SC 29204  
Phone: (803) 254-5140 Fax: (803) 779-1279  
Email: smorgan501@yahoo.com

Leshnower, Brad G. (Emily Williams MD)  
1365 Clifton Road NE Suite 2236, Atlanta, GA 30322  
Phone: (404) 778-4466 Fax: (404) 778-5039  
Email: bleshno@emory.edu

Levett, James M. (Paula)  
202 10th Street SE, Cedar Rapids, IA 52403  
Phone: (319) 247-3010  
Email: jmlevett@hotmail.com

Levin, Barry J. (Joanne)  
Camalier Building10215 Fernwood Road, Suite 405, Bethesda, MD 20817  
Phone: (301) 897-5620 Fax: (301) 897-3679  
Email: bjlevinmd@gmail.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 281
Lewis, Clifton T.P. Sr. (Anne)
833 Princeton Avenue SW POB III, Suite 200A, Birmingham, AL 35211
Phone: (205) 786-2776 Fax: (205) 786-6227
Email: clifton.lewis@bhsala.com

Lick, Scott D. (Michele)
1501 N. Campbell Avenue #4302, Tucson, AZ 85724-5071
Phone: (520) 626-7806 Fax: (520) 626-4042
Email: scott.d lick@gmail.com

*Lima, Brian
3900 Junius Street Suite 415, Dallas, TX 75246
Phone: (214) 820-7100 Fax: (214) 820-6863
Email: brian.lima@baylorhealth.edu

**Lima, Brian
3900 Junius Street Suite 415, Dallas, TX 75246
Phone: (214) 820-7100 Fax: (214) 820-6863
Email: brian.lima@baylorhealth.edu

**Lindberg, Harald L. (Jorunn N)
Ostadalsveien 60, Oslo, 753
Phone: 90119527
Email: hlindbe@online.no

**Lindsey, Edward S. (Margaret Ann)
#4 Rosa Park Place, New Orleans, LA 70115
Phone: (504) 897-4440

Linker, Robert W. III (Margaret)
4003 Kresge Way Suite 224, Louisville, KY 40207
Phone: (502) 895-2295 Fax: (502) 895-2296
Email: rlinker@bhsi.com

Livesay, James J. (Robin)

Lobdell, Kevin W. (Maureen)
1000 Blythe Blvd 3rd Floor, SHVI Administration, Charlotte, NC 28232
Phone: (704) 355-1582 Fax: (704) 355-6227
Email: kevin.lobdell@carolinashealthcare.org

Locher, James P., Jr. (Amanda)
MMG Cardiovascular Service s112 NE Crescent Ave, Peoria, IL 61606-1901
Phone: (309) 672-4670
Email: jplocher1@aol.com

**Lochridge, Stanley K. (Tracy)
2871 Acton Road Suite 100, Birmingham, AL 35243
Phone: (205) 838-3836 Fax: (205) 838-3976
Email: SKL00742@aol.com

**LoCicero, Joseph, III (Martha)
1158 Church St., Mobile, AL 36604
Phone: (251) 591-0061 Fax: (251) 432-4142
Email: lociceroj@comcast.net

Lodge, Andrew J. (Barbara Alexander)
Box 3340, DUMC, Durham, NC 27710
Phone: (919) 681-2343 Fax: (919) 681-4907
Email: andrew.lodge@duke.edu

282 STSA 63rd Annual Meeting
Logan, William D., Jr. (Pat)
305 Ellis Street, Carthage, MS 39051
Phone: (601) 267-5114 Fax: (601) 267-1381

Long, Graydon A. (Virginia)
812 Hildeen Road, Lexington, KY 40502-2928

Longaker, Dail W. (Mary Lou)
1850 Laurel Street, Columbia, SC 29201-2623
Phone: (803) 256-3400 Fax: (803) 256-2039

Lonquist, James L. (Lauralyn)
1717 North E Street Suite 331, Pensacola, FL 32501
Phone: (850) 484-6600 Fax: (850) 479-1697
Email: James.lonquist@bhcpns.org

Lopez, Nicholas M (Cara)
2601 Kentucky Ave, Paducah, KY 42003
Phone: (270) 443-5564
Email: nmlopez22009@gmail.com

Lou, Feiran
2001 21st Avenue South Apt. 401, Nashville, TN 37212
Phone: (646) 241-4971
Email: feiranl@gmail.com

Loughridge, Billy Paul (Linda)
2100 South Utica Suite 204, Tulsa, OK 74114
Phone: (918) 744-7213 Fax: (918) 744-7214
Email: BLLridge@aol.com

Louis, Clauden
PO Box 1887 Clauden Louis, Beltsville, MD 20704
Phone: (301) 528-2667
Email: claudenlouis@gmail.com

Lowry, Terry S. (Paula Stickney-Lowry)
2936 North Elm Street, Lumberton, NC 28359
Phone: (910) 671-6619 Fax: (910) 608-0487
Email: terry.lowry@duke.edu

Lucas, Aaron E. (Betty)
4402 Churchman Ave Suite 205, Louisville, KY 40215
Phone: (502) 366-8825 Fax: (502) 366-0044
Email: ael@iamlucas.com

Lucke, John C. (Barbara)
1100 Tunnel Road Asheville VAMC #112, Asheville, NC 28805
Phone: (828) 299-2540 Fax: (828) 299-2567
Email: thoracicxp@msn.com

Luu, Theresa D.
61 Whitcher Street, Suite 4120, Marietta, GA 30060
Phone: (770) 424-9732 Fax: (770) 424-0228
Email: Luu.theresa@yahoo.com

Ly, Truc Trung
601 Dublin Dr., Mishawaka, IN 46545
Phone: (574) 335-6000 Fax: (574) 335-0738
Email: lytruc@yahoo.com

**Senior Member +New Member ‡Resident Member *Home Address
Lyda, Tim S. (Virginia)
4330 Medical Drive Suite 325, San Antonio, TX 78229-3326
Phone: (210) 615-7700 Fax: (210) 615-1958
Email: tslyda@aol.com

Lyons, Jefferson M. (Ellen)
3525 Olentangy River Rd Suite 5300, Columbus, OH 43214
Phone: (614) 566-3500
Email: jefferson.lyons@ohiohealth.com

**Lyons, William S. (Dorothy)**
5601 Seminary Road, Suite 6, Falls Church, VA 22041
Phone: (703) 998-8600 Fax: (703) 998-8600

**Mack, John W. (Diane)**
7836 Carnes Road, Townsend, TN 37882
Phone: (865) 305-6955 Fax: (865) 305-8238
Email: jwmack@comcast.net

Mack, Michael J. (Barbara)
1100 Allied Drive, Plano, TX 75093
Phone: (469) 814-4105
Email: michael.mack@BSWHealth.org

**Mackenzie, James W. (Melinda)**
pt. of Surgery PO Box 19, New Brunswick, CT 08903-0019
Phone: (732) 235-7802 Fax: (732) 235-8150
Email: mackenjw@umdnj.edu

**Macris, Allen G. (Eftichia)**
6375 Blackwater Trail, Atlanta, GA 30328
Phone: (404) 255-2600
Email: am416@aol.com

Macris, Michael P. (Donna)
1631 North Loop W. Suite 240, Houston, TX 77008
Phone: (713) 465-7979 Fax: (713) 465-5278
Email: mmacris@lonestarheart.com

‡Madden, Jesse
4000 City Walk Way, Apt. 304, Charlottesville, VA 22902
Phone: (434) 466-0309
Email: madden.jesse@gmail.com

Magee, Mitchell J. (Karen)
7777 Forest Lane, Suite A 307, Dallas, TX 75230
Phone: (214) 363-9339
Email: mitchell.magee@hcahealthcare.com

Maggart, Michael L.
9125 Cross Park Drive Suite 200, Knoxville, TN 37923-4505
Phone: (423) 632-5900 Fax: (423) 637-2114
Email: mmaggart@covhlth.com

Magovern, George J., Jr. (Jamie)
14th Floor South Tower 320 East North Avenue, Pittsburgh, PA 15212
Phone: (412) 359-3715 Fax: (412) 359-3878
Email: gmagover@wpahs.org
Mainwaring, Richard D.
300 Pasteur Drive Falk CVRC, Stanford, CA 94305
Phone: 650-723-0190 Fax: (916) 733-7112
Email: mainwaring@stanford.edu

Mallidi, Hari (Susmitha)
75 Francis Street Division of Thoracic Surgery, Boston, MA 2115
Phone: (617) 278-0495 Fax: (617) 264-5214
Email: hmallidi@partners.org

Maloney, James D. (Tracy)

Maltais, Simon (Manon Landry)
200 First Street SW, Rochester, MN 55905
Phone: (507) 255-7067 Fax: (507) 255-8674
Email: maltais.simon@mayo.edu

Maniari, Hersh (Purvi)
1 Barnes Jewish Hospital Pl, St. Louis, MO 63110
Phone: (314) 362-7431
Email: maniarh@wustl.edu

Manning, Peter B. (Kathryn Ann)
Division of Cardiothoracic Surgery, Box 8234 One Children’s Place, St. Louis, MO 63110
Phone: (314) 454-6165 Fax: (314) 454-2381
Email: manningp@wudosis.wustl.edu

**Marbarger, John P. (Sharon)
4 Country Estates Place, St. Louis, MO 63131
Phone: (314) 251-1956 Fax: (314) 736-1956
Email: jpmjr1@mac.com

Margolis, Marc (Sheryl)
3800 Reservoir Road NW Pasquerilla Healthcare Center 4th Floor, Washington, DC 20007
Phone: (202) 444-6985 Fax: (877) 376-2421
Email: marc@margolisnetwork.com

**Marks, Jenifer L.
1444 S. Potomac Street, Suite 390, Aurora, CO 80012
Phone: (303) 226-4650
Email: jenimarks14@gmail.com

Marshall, M. Blair
3800 Reservoir Road, NW, Washington, DC 20007
Phone: (202) 444-5045 Fax: (877) 376-2421
Email: mbm5@gunet.georgetown.edu

**Marshall, William G. (Marsha)
University of South Florida College of Medicine 3500 E. Fletcher Ave., Ste. 530, MDC 62, Tampa, FL 33613
Phone: (813) 974-7663 Fax: (813) 974-8487
Email: wmarshal@health.usf.edu

Martin, J.E. ‘Rick’ (Suzie)
5320 S. Rainbow Blvd Suite 282, Las Vegas, NV 89118-1895
Phone: (702) 737-3808 Fax: (702) 737-7364
Email: ratsmartin@aol.com

“Senior Member  +New Member  ‡Resident Member  *Home Address
Martin, Jeffery S. (Susan)
Eight Richland Medical Park Suite 400, Columbia, SC 29203
Phone: (803) 765-0871 Fax: (803) 765-9215
Email: jeffery.martin@palmettohealth.org

Martin, Jeremiah Thomas
1711 27th Street Braunlin Building, Suite 206, Portsmouth, OH 45662
Phone: (740) 356-8772 Fax: (750) 354-2138
Email: MartinJT@somc.org

Martin, Linda W.
Thoracic Cardiovascular Surgery P.O. Box 800679, Charlottesville, VA 22908-067
Phone: (434) 243-6443 Fax: (434) 244-9429
Email: LM6YB@virginia.edu

Martin, Tomas D.
217 Hillcrest Street, Orlando, FL 32801
Phone: (407) 425-1566
Email: tdmartin2000@gmail.com

+Martinez, Joseph J.
1057 Wyndham Lane, Helena, AL 35080
Phone: (334) 701-0559
Email: jjmartinez@uabmc.edu

Mascio, Christopher E. (Beth)
34th Street & Civic Center Blvd Suite 12NW10, Philadelphia, PA 19104
Phone: (215) 590-2708 Fax: (215) 590-2715
Email: mascioc1@email.chop.edu

Masroor, Saqib (Aisha)
111760 SW 40 Street Suite 722, Miami, FL 33175
Phone: 2017900793 Fax: (786) 428-1062
Email: saqib.masroor@hcahealthcare.com

**Matthews, John T.
329 Coatsland Drive, Jackson, TN 38301
Phone: (901) 424-5080 Fax: (901) 424-4109
Email: breezewood@gmail.com

**Mattingly, William T. (Sally)
23 Middleton Gardens Place, Bluffton, SC 29910-4908
Email: bckbnridge@gmail.com

**Mattox, Kenneth L. (June)
One Baylor Plaza, Houston, TX 77030
Phone: (713) 798-4557 Fax: (713) 796-9605
Email: kmattox@aol.com

Mauney, Michael C. (Cheryl)
3009 North Ballas Road Suite 360C, Saint Louis, MO 63131
Phone: (314) 996-5287 Fax: (314) 996-5287
Email: mmauney@bjc.org

**Mavroudis, Constantine (Martha)
315 E. New England Avenue #2, Winter Park, FL 32789
Phone: (407) 303-3697 Fax:
Email: constantine.mavroudis.md@flhosp.org
**Maxey, Thomas S.**
1001 Blythe Blvd Suite 300, Charlotte, NC 28203
Phone: (704) 381-3916
Email: thomas.maxey@carolinashealthcare.org

**Mayer, John E. (Christine)**
Cardiac Surgery 300 Longwood Ave, Boston, MA 2115
Phone: (617) 355-8258 Fax: (617) 730-0214
Email: john.mayer@cardio.chboston.org

**Mayfield, William R. (Shirley)**
61 Whitcker St NE Suite 4120, Marietta, GA 30060
Phone: (770) 424-9732 Fax: (770) 421-0228
Email: bill.mayfield@wellstar.org

**McCardle, Robert J. (Sally)**
1731 Laurel Street, Columbia, SC 29201
Phone: (803) 739-6301 Fax: (803) 78202732

**McCoy, Daniel W.**
215 Riverbend Dr, Gadsden, AL 35901
Phone: 4236768088 Fax: (256) 456-0231
Email: danielwmccoy@comcast.net

**McCurdy, James Richard (Carol)**
500 East Robinson Suite 2300, Norman, OK 73071
Phone: (405) 329-4102 Fax: (405) 307-5628
Email: rick.mccurdy@sbcglobal.net

**McElveen, Donald E. (Amada)**
West Virginia University Medical Center Department of Surgery,
Morgantown, WV 26506
Phone: (304) 293-2367 Fax: (304) 293-4711

**McElveen, Russell L.**
805 Pamplico Highway Medical Mall B, Suite 300, Florence, SC 29505
Phone: (843) 250-3454 Fax: (843) 276-2762
Email: russell.mcelveen@twc.com

**McElvein, Richard B.**
97 Carey Lane, Falmouth, MA 2540
Phone: (508) 548-3850

**McFadden, P. Michael (Jennifer)**
1520 San Pablo StreetSuite 4300, Los Angeles, CA 90033
Phone: (323) 442-5849 Fax: (323) 442-5956
Email: mmcfadden@surgery.usc.edu

**McGee, Lawrence S. (Evelina)**
15 Midtown Park Dr. WestSuite C, Mobile, AL 36606
Phone: (251) 432-2701 Fax: (251) 432-0469

**McKenzie, Emmett Dean (Laurie J. McKenzie, M.D.)**
6621 Fannin Street W Tg345H, Houston, TX 77030
Phone: (832) 826-1929 Fax: (832) 825-1904
Email: edmckenz@texaschildrens.org

**McLaughlin, Joseph S. (Irene)**
10 East Lee Street #2507, Baltimore, MD 21202
Phone: (410) 328-3218 Fax: (410) 328-2750

**Senior Member △New Member ‡Resident Member †Home Address**

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MEMBERSHIP ROSTER

• McMahon, Daniel P.
  2307 Silver Charm Circle, Suffolk, VA 23435
  Phone: (251) 422-2587 Fax: (757) 953-0845
  Email: cpmcmahon@hotmail.com

**McMullan, Martin H. (Lyllian)
Clinical Affairs - Box 928325
00 N. State Street, Jackson, MS 39216
Phone: (601) 815-9292 Fax: (601) 815-5474
Email: mmcmullan@umc.edu

McKee, Jeffrey D. (Shannon)
Cardiothoracic and Vascular Surgeons, PA, Austin, TX 78756
Phone: (512) 459-8753
Email: jmcneil@ctvstexas.com

Meadows, Fred A. (Carol)
5 St. Vincent Cir. Suite 501, Little Rock, AR 72205-5414
Phone: (501) 666-2894 Fax: (501) 666-9017
Email: jshahan@cvspa.com

**Meadows, Charles T. (Helen)
136 North Bay Drive, Bullard, TX 75757

• Mehaffey, James H.
  113 Morgan Court, Charlestown, WA 22903
  Phone: (828) 779-3929
  Email: jhm9t@virginia.edu

Mehran, Reza J.
1515 Holcombe Unit 1489, Houston, TX 77030
Phone: (713) 563-3908 Fax: (713) 794-4901
Email: rjmehran@mdanderson.org

Mehta, Inder (Neeta)
1514 Jefferson Hwy., New Orleans, LA 70121
Phone: 720-903-0808
Email: inderdmehata@gmail.com

Mendeloff, Eric N.
7777 Forest Lane Suite B 115, Dallas, TX 75230
Phone: (972) 566-2525 Fax: (972) 566-2032
Email: eric.mendeloff@hcahealthcare.com

Mendes, O. C. (Judith)
1601 South Apollo Boulevard, Melbourne, FL 32901
Phone: (407) 768-2816 Fax: (407) 952-2607
Email: ojmendes@aol.com

**Mentzer, Robert M., Jr. (Monika)
540 East Canfield Rm 1241, Detroit, MI 48201-1928
Phone: (313) 577-1335 Fax: (313) 577-8777
Email: rmentzer@med.wayne.edu

Merrill, Walter H. (Morgan)
AA 1214 Medical Center North 1161 21st Ave South,
Nashville, TN 37232-2102
Phone: (615) 812-2939
Email: walter.h.merrill@vanderbilt.edu
†Merritt, HelenMari (Tracy Genore)
University of Nebraska Department of CT Surgery, Omaha, NE 68198
Phone: (210) 863-8289
Email: helenmari.merritt@gmail.com

Mery, Carlos M. (Marissa Wagner, MD)
6621 Fannin, WT-19345, Houston, TX 77030
Phone: (617) 281-0090 Fax: (832) 825-1904
Email: mery@bcm.edu

Messerschmidt, William H. (Bonnie)
One Medical Park Blvd. Suite 458-W, Bristol, TN 37620
Phone: 423-230-5005 Fax: 423-230-5170
Email: bmill1@mac.com

Mettler, Bret Allen (Kelly)
5247 Doctor's Office Tower 2200 Children's Way, Nashville, TN 37232
Phone: (615) 936-5500
Email: bret.mettler@vanderbilt.edu

Meyer, Dan M. (Peggy)
5323 Harry Hines Boulevard, Dallas, TX 75390
Phone: (214) 645-7716 Fax: (214) 645-9708
Email: danm.meyer@utsouthwestern.edu

Meyers, Bryan F. (Julie Usher)
Queeny Tower, Suite 3108 Barnes-Jewish Hospital Plaza,
Saint Louis, MO 63110-1013
Phone: (314) 362-8598 Fax: (314) 367-8459
Email: meyersb@wustl.edu

Meyers, Cary H. (Laura Hall Meyers)
35 Ocean Way Drive, Ponce Inlet, FL 32127
Phone: (386) 226-2593 Fax: (386) 226-2593
Email: cary.meyers@surgery.ufl.edu

Milano, Carmelo A.
DUMC Box 3043, Durham, NC 27710
Phone: (919) 684-3243 Fax: (919) 684-8563
Email: carmelo.milano@duke.edu

Mill, Michael R.
Division of Cardiothoracic Surgery 3040 Burnett Womack Bldg.
Chapel Hill, NC 27599-7065
Phone: (919) 966-3381 Fax: (919) 966-3475
Email: mrm@med.unc.edu

+Miller, Ashley (Jameson)
2108 East Third Street Suite 300, Chattanooga, TN 37404
Phone: (423) 624-5200 Fax: (423) 624-4440
Email: amiller@actvsurgeons.com

Miller, Daniel L. (Pamela)
WellStar Health System General Thoracic Surgery, Marietta, GA 30060
Phone: 770 5652224 Fax: (404) 778-4346
Email: daniel.miller@wellstar.org

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 289
MEMBERSHIP ROSTER

Miller, James E. (Sarah)
835 W. 55th St, Kansas City, MO 64113
Phone: (913) 390-8050 Fax: (913) 390-8049
Email: jesbmiller@aol.com

**Miller, Joseph I. (Louise)**
1858 Breckenridge Dr NE, Atlanta, GA 30345
Phone: (404) 634-3498 Fax:
Email: jmillerjr@sbcglobal.net

Miller, O. LaWayne, Jr. (Rita)
2501 Jimmy Johnson Blvd Suite 301, Port Arthur, TX 77640
Phone: (409) 853-5990 Fax: (409) 722-4010
Email: olmillerjr@sbcglobal.net

Mills, Stephen A.
306 Westwood Ave Suite 505, High Point, NC 27262
Phone: (336) 889-7700 Fax: (336) 889-7701
Email: stevemills1@mac.com

Minnich, Douglas (Heather)
703 19th Street South 716 Zeigler Research Building,
Birmingham, AL 35294
Phone: (205) 940-6258 Fax: (205) 996-9500
Email: dminnich@uab.edu

Mitchell, Michael E. (Aoy)
9000 W. Wisconsin Ave, MS B730, Milwaukee, WI 53226
Phone: (414) 266-2491 Fax: (414) 266-2075
Email: MMitchell@chw.org

**Mitts, Donald L. (Elizabeth)**
2123 Auburn Avenue-Suite 238, Cincinnati, OH 45219
Phone: (513) 651-1180 Fax: (513) 651-2175
Email: mckenziej@ohioheart.org

Mohr, Friedrich W
Klinik fur Herzchirurgie Strumpellstrasse 39 , Leipzig , 4289
Email: mohrf@medizin.uni-leipzig.de

Molena, Daniela (John Herron)
1275 York Avenue, New York, NY 10065
Phone: 585-4104712
Email: molenad@mskcc.org

Molina, Ezequiel Jesus (Marina Skorupski)
106 Irving Street, NW Physicians Office Building - Suite 2200,
Washington, DC 20010
Phone: (202) 877-7464 Fax: (202) 877-3503
Email: ezequielj.molina@medstar.net

‡Monfre, Joseph M.
2950 Zion Ln #201, Casper, WY 82604
Phone: (210) 567-6158
Email: jmonfre@mac.com

**Montague, Norton T., III (Cynthia)**
9 Innisbrook Lane, Birmingham, AL 35242
Moon, Marc R.  
One Barnes-Jewish Hospital Plaza Queeny Tower, Suite 3108,  
Saint Louis, MO 63110-1013  
Phone: (314) 362-0993 Fax: (314) 362-0328  
Email: moonm@wustl.edu

Moore, Wistar, Ill  
700 Doctors Court, Leesburg, FL 34748  
Phone: (352) 787-9838 Fax: (352) 728-8705  
Email: Wmoore@ocalaheart.com

+Moore, Jessica  
2200 Orleans Street, Baltimore, MD 21231  
Phone: (410) 614-3891  
Email: jmoor110@jhmi.edu

Mora, Bassem N.  
200 1st St SW, Rochester, MN 55905  
Phone: (507) 5132210 Fax: (507) 255-8674  
Email: mora.bassem@mayo.edu

Moraca, Robert J. (Holly)  
320 E. North Avenue 14th Floor, South Tower, Pittsburgh, PA 15212  
Phone: (412) 359-8820 Fax: (412) 359-3878  
Email: rmoraca@wpahs.org

Morell, Victor O. (Amy L. Mattson)  
Children's Hospital of Pittsburgh of UPMC Faculty Pavilion, 5th Floor,  
Pittsburgh, PA 15224  
Phone: (412) 692-7625 Fax: (412) 692-5817  
Email: victor.morell@chp.edu

Morgan, Joel C.  
4622 Country Club Road Suite 180, Winston Salem, NC 27104  
Phone: (336) 768-9510 Fax: (336) 768-4155  
Email: tjsmiley@novanthealth.org

Morris, Cullen D. (Leigh)  
Medical Services Building 1199 Prince Ave., 2nd Floor, Athens, GA 30606  
Phone: 706-475-1950 Fax: (706) 208-1526  
Email: cmorris@emory.edu

**Morris, J. Robert (Mary)  
Virginia Beach, VA

Mortman, Keith D. (Kristy)  
2150 Pennsylvania Avenue, NW, Washington, DC 20037  
Phone: (202) 741-3220 Fax: (202) 741-3488  
Email: kmortman@mfa.gwu.edu

**Moseley, Patterson W. (Sherry)  
630 Dunmar Circle, Winter Springs, FL 32708  
Fax: (407) 422-0166  
Email: sherbrookpat@aol.com

Motta, Joseph  
3370 Burns Road-Suite 206, Palm Beach Gardens, FL 33140  
Phone: (561) 626-9801 Fax: (561) 626-9804

**Senior Member  +New Member  ‡Resident Member  *Home Address
Moulton, Michael J. (Mary Lee)
2035 181st Circle, Omaha, NE 68150
Phone: (402) 559-4424 Fax: (402) 559-6913
Email: michael.moulton@unmc.edu

Moy, Peter M. (Barbara)
3000 Coliseum Dr. Ste 200, Hampton, VA 23666
Phone: (757) 736-7250 Fax: (757) 262-1444
Email: pmmoy@cox.net

‡Muesse, Jason L.
2442 Kings Court NE, Atlanta, GA 30345-2120
Phone: (970) 219-1610 Fax: (404) 778-4346
Email: jmuesse@gmail.com

**Mullen, Donald C. (Patricia)
18 Westbrook Drive, Newton, GA 30263
Phone: (770) 683-4528
Email: donaldcmullen@gmail.com

Mullenix, Philip S. (Cristina)
2700 Spencer Rd, Chevy Chase, MD 20815
Phone: (301) 806-9688
Email: mullenixphilip@gmail.com

Mullellt, Timothy W.
740 S. Limestone Suite A301, Lexington, KY 40536-1700
Phone: (859) 323-6494 Fax: (859) 257-4682
Email: timothy.mullett@uky.edu

Mulligan, Charles Ray, Jr. (Sharon)
Thoracic Surgery, Suite 2100 Helen F. Graham Cancer Center & Research Institute, Newark, DE 19713
Phone: (302) 463-4530 Fax: (302) 463-4578
Email: crmulli@msn.com

Mumtaz, Muhammad (Farhana Khan)
Baylor College of Medicine 315 N. San Saba St. Suite 1135, San Antonio, TX 78207
Phone: 7578022663 Fax: (210) 704-4520
Email: mamumtaz@yahoo.com

Munfakh, Nabil A. (Paula)
11155 Dunn Road Suite 209 East, Saint Louis, MO 63136
Phone: (314) 355-3003 Fax: (314) 355-0515
Email: munfakhn@wustl.edu

Murphy, Douglas A. (Susan)
5665 Peachtree-Dunwoody Road Suite 200, Atlanta, GA 30342
Phone: (404) 778-7200 Fax: (404) 778-6826
Email: douglas.murphy@emoryhealthcare.org

Murphy, Edward T. (Sally A. Murphy)
100 Michigan Street NEMC 103, Grand Rapids, MI 49503
Phone: (616) 459-7258 Fax: (616) 459-5215
Email: murphy@wmcts.com

Murphy, Michael C.
3009 North Dallas Road Suite 360C, Saint Louis, MO 63131
Phone: (314) 996-5287 Fax: (314) 432-6068
Email: michaelmurphy82@me.com
Murrah, Charles Patrick (Alison)
Emory Clinic Athens 1199 Prince Avenue MSB 2nd floor,
Athens, GA 30606
Phone: (706) 475-1950 Fax: (706) 475-1955
Email: patrickmurrah@yahoo.com

*Murray, Gordon F. (Sharon)
4217 Skeffington Court, Southport, NC 28461
Phone: (910) 448-0048 Fax: (910) 457-6365
Email: gmurray@hsc.wvu.edu

‡Murthy, Raghav A.
7532 Charmant Dr Apt. 321, San Diego, CA 92122
Phone: (313) 319-9227
Email: raghavamurthy@yahoo.com

*Mutrie, Christopher Jennings (Lauren Mutrie)
6029 Walnut Grove Road, Suite 401, Memphis, TN 38120
Phone: (901) 226-0456 Fax: (901) 226-0458
Email: chris.mutrie@bmg.md

Myers, John C. (Pauline)
1401 E State St, Rockford, IL 61104
Phone: (779) 696-4764 Fax: (815) 696-2463
Email: jmyers@swedishamerican.org

Nachbauer, Craig A. (Sharalyn)
North Country Thoracic and Vascular, PC12 Healey Avenue,
Plattsburgh, NY 12901
Phone: (518) 314-1520 Fax: (518) 314-1178
Email: nachbauerc@gmail.com

Naef, Andreas P.
12 Avenue Villardin, Pully-Lausanne, CH1009
Phone: 41 21 729 52 08 Fax: (412) 123-8596

Nasir, Basil Saad
7115-2775 Laurel St. Vancouver, BC V5Z 1M9
Phone: (778) 386-8280
Email: basilsnasir@gmail.com

Nath, Dilip S.
111 Michigan Avenue NW, Washington, DC 20010
Phone: (323) 872-9983 Fax: (202) 476-5572
Email: DNath@cnmc.org

Naunheim, Keith S. (Rosanne)
Keith S. Naunheim52 Middlesex Drive, Saint Louis, MO 63144
Phone: (314) 577-8360 Fax: (314) 577-8315
Email: naunheim@slu.edu

Nelson, Jennifer Solms (Drew Nelson)
101 Juniper Place, Chapel Hill, NC 27514
Phone: (919) 636-0651
Email: jsolmsnelson@gmail.com

**Nelson, Ken (Sharon)
609 Purdue, Tyler, TX 75703
Phone: (903) 877-7460 Fax: (903) 877-5548

**Senior Member  *New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 293
Neravetla, Soumya R.
19 Rio Rd, Savannah, GA 31419
Phone: (912) 921-8926 Fax: (912) 921-8989
Email: cardiac.reddy@gmail.com

Nesbitt, Jonathan C. (Sally)
1710 The Vanderbilt Clinic 1301 Medical Center Drive, Nashville, TN 37232-4682
Phone: (615) 322-0248 Fax: (615) 343-5993
Email: jon.nesbitt@vanderbilt.edu

**Nesmith, M. A., Jr. (Carolyn)
1121 NW 64th Terrace, Gainesville, FL 32605
Fax: (352) 332-6098
Email: cnesm42946@aol.com

**Neville, Edwin C. (Diane)
1021 Park Street, Scranton, PA 18509-1414
Phone: (717) 344-1231 Fax: (717) 344-1255

New, R. Brent (Sharon)
1010 W. 40th, Austin, TX 78756
Phone: (512) 459-8753 Fax: (512) 483-6807
Email: rbnewmd@gmail.com

**Newman, William H. (Ernestine)
1205 Longleaf Drive, Fayetteville, NC 28305
Phone: (910) 485-6464

Newsom, Barry D. (Nancy)
Suite 808701 University Blvd. East, Tuscaloosa, AL 35401
Phone: (205) 759-4228 Fax: (205) 345-0841
Email: bdnewsom2@comcast.net

Newton, Joseph R. (Jill)
600 Gresham Drive Suite 8600, Norfolk, VA 23507-1904
Phone: (757) 388-6005 Fax: (757) 388-6006
Email: macs@macts.com

Nguyen, Tom C.
6400 Fannin, Suite 2850, Houston, TX 77030
Phone: (713) 486-5117 Fax:
Email: tom.c.nguyen@gmail.com

Nielsen, James L. (Jody)
1717 N E Street Suite 331, Pensacola, FL 32501
Phone: (850) 937-0717 Fax: (850) 857-1745
Email: james.nielsen@bhcpns.org

Nifong, L. Wiley (Daphne)
East Carolina Heart Institute 115 Heart Drive, Greenville, NC 27834
Phone: (252) 744-2187 Fax: (252) 744-3542
Email: nifongl@ecu.edu

**Nightingale, David S. (Patricia)
6900 U.S. Highway 42, Louisville, KY 40241
Phone: (502) 339-9901 Fax: (502) 339-8858
Email: dsnight@earthlink.net
Norcross, James F. (Shirley)
902 West Randol Mill Road Suite 200, Arlington, TX 76012-4703
Phone: (817) 461-8327 Fax: (817) 275-2525
Email: jfnormd0623@att.net

"Norenberg, Richard G. (Arlene)
Baypinnes VA Medical Center DEPT of Surgery, P.O. Box 5005,
Bay Pines, FL 33744
Phone: (727) 385-5650 Fax: (727) 398-9584
Email: rgnorenberg@gmail.com

Novick, William M.
1346 Brayshore Drive, Memphis, TN 38017
Phone: (901) 869-4243 Fax: (901) 432-4243
Email: bill.novick@cardiac-alliance.org

"Nunn, Daniel B. (Gloria)
5125 Yacht Club Road, Jacksonville, FL 32210-8323
Phone: (904) 384-0176 Fax: (904) 387-4597
Email: dbnunn@bellsouth.net

"Nunnally, Lester C. (Jeanne)
5538 Jessamine Lane, Orlando, FL 32839
Phone: (407) 851-2529
Email: Jlipsg7@aol.com

Oaks, Timothy E. (Ann Oaks)
Ely Surgical Associates 3940 Arrowhead Blvd, Suite 230,
Mebane, NC 27302
Phone: (336) 712-0460 Fax: (336) 716-3348
Email: toaks@triad.rr.com

O’Brien, James E. Jr. (Lina)
2401 Gillham Road, Kansas City, MO 64108
Phone: (816) 234-3580 Fax: (816) 802-1245
Email: jobrien@cmh.edu

"Ochsner, John L. (Mary Lou)
1514 Jefferson Highway, New Orleans, LA 70121
Phone: (504) 842-4070 Fax: (504) 842-6767
Email: jlochsner@mac.com

"Odyniec, Norman A. (Mary)
9208 Le Velle Drive, Chevy Chase, MD 20815
Phone: (301) 906-3900 Fax: (301) 656-9632

Ofenloch, John C. (Tiffany)
455 Pinellas St Ste 320, Clearwater, FL 33756
Phone: (727) 446-2273 Fax: (727) 441-4986
Email: john.ofenloch@baycare.org

Ogle, William (Jeanne)
1381 Port Lane, Osage Beach, MO 65065
Phone: (573) 270-2861
Email: noeta61@gmail.com

"Okano, Takeshi (Betty)
2313 Lanai Avenue, Bellair Bluffs, FL 33770-1971
Phone: (727) 584-7295

**Senior Member  +New Member  ‡Resident Member  *Home Address
Okum, Eric J. (Bess)

**Olcott, Eugene D.**  
6013 Merrymount Rd., Fort Worth, TX 76107  
Phone: (817) 732-1900

**Olinde, Henry D. H. (Diane)**  
7225 Barford Ave, Baton Rouge, LA 70808  
Phone: (504) 924-5396 Fax: (504) 924-5590  
Email: holinde@cox.net

**Olivet, Ronald T. (Linda)**  
1814 Northridge Road, Tuscaloosa, AL 35406-3624  
Fax: (205) 349-4114

**O’Rourke, James (Lisa O’Rourke)**  
1532 Lone Oak Road Suite 445, Paducah, KY 42003  
Phone: (270) 538-5837 Fax: (270) 538-5835  
Email: jlavstar@aol.com

Oswalt, John D. (Karen)  
1010 West 40th Street, Austin, TX 78756  
Phone: (512) 459-8753 Fax: (512) 483-0586  
Email: joswalt@ctvstexas.com

Otaki, Yoshio (Chiyo)

Otero, Carmelo (Carmen)  
225 E. Sonterra Blvd Ste 201, San Antonio, TX 78258  
Phone: (210) 615-6626 Fax: (210) 615-1318  
Email: cotero@aol.com

**Othersen, H. Biemann, Jr. (Janelle)**  
Department of Surgery 171 Ashley Avenue, Charleston, SC 29425  
Phone: (843) 792-3851 Fax: (843) 792-3858

Owen, Edmond W. (Kathryn)  
3950 New Covington Pike, Suite 290, Memphis, TN 38128  
Phone: (901) 383-8232 Fax: (901) 383-8277  
Email: eo@owenclinic.com

**Owens, Joseph L., Jr. (Emily)**  
156 Hampton Point Drive, Saint Simons Island, GA 31522-3310  
Phone: (912) 638-6479

Pagni, Sebastian (Jennifer)  
3900 Kresge Way Suite 46, Louisville, KY 40207  
Phone: (502) 899-3858 Fax: (502) 899-3878  
Email: sebastian.pagni@bhsi.com

**Pai, Ganesh M. (Sharada)**  
330 Waters Edge Court, Lexington, SC 29072  
Phone: (803) 487-7474 Fax: (803) 926-0328  
Email: gmpai@aol.com

Pal, Jay D. (Angela)  
1959 NE Pacific Street Box 356310, Seattle, WA 98195  
Phone: (206) 858-3792  
Email: jaydpal@uw.edu
**Palatchi, Albert S. (Donna)**
2500 Gulf Blvd. 203 A, Belleair Beach, FL 33786
Phone: (727) 595-2530

**Palatianos, George M. (Elisabeth)**
Zamanou 40A, Glyfada, 166 74, Greece
Phone: 30694474280 Fax: (210) 968-1000
Email: gpalatianos@yahoo.com

**Palazzo, Anthony J.**
310 N State of Franklin Road Suite 101, Johnson City, TN 37604
Phone: (423) 929-7393
Email: melissa_palazzo@comcast.net

**Palmer, George J., III (Sheila)**
217 Hillcrest Street, Orlando, FL 32801
Phone: (407) 425-1566 Fax: (407) 422-0166
Email: cutter9512@hotmail.com

‡Pan, Hao
7703 Floyd Curl Drive MC7841, San Antonio, TX
Phone: (310) 755-8480
Email: PanH3@uthscsa.edu

‡Parks, William E. (Susan)
4402 Churchman Avenue Caritas Medical Bldg. #1, Suite 205,
Louisville, KY 40215
Phone: (502) 366-8825 Fax: (502) 366-0044
Email: weparks822@att.net

**Parrino, Patrick Eugene (Charlotte)**
1514 Jefferson Highway, New Orleans, LA 70121
Phone: (504) 842-3966 Fax: (504) 842-2278
Email: eparrino@ochsner.org

‡Parsee, Ana
1000 Papaya Lane, Winter Springs, FL 32708
Phone: (813) 817-9105
Email: aparsee@yahoo.com

**Parsons, Alden (Stephen)**
Rex Thoracic Specialists 2800 Blue Ridge Road, Raleigh, NC 27607
Phone: (919) 306-2164 Fax: (713) 794-4901
Email: aldenparsons@gmail.com

**Parsons, Billy D. (Terri Lynn)**
611 Alcorn Drive Suite 200, Corinth, MS 38834
Phone: (903)278-0007 Fax: (662) 665-4645
Email: bdpcvmd@aol.com

**Pascotto, Robert D. (Joan)**
8010 Summerlin Lakes Drive STE 100, Fort Myers, FL 33907-1849
Phone: (941) 939-1767 Fax: (941) 939-5895
Email: taroleerjp@aol.com

**Senior Member  +New Member  ‡Resident Member  *Home Address**

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MEMBERSHIP ROSTER

Pass, Lawrence J. (Jan)
2400 Patterson Street Suite 307, Nashville, TN 37203
Phone: (615) 340-0070 Fax: (615) 340-9379
Email: ljpassmd@comcast.net

Pastuszko, Peter (Wendy B. Abramson)
2401 Gillham Rd., Kansas City, MO 64108
Phone: (816) 234-3580 Fax: (816) 802-1245
Email: ppastuszko@cmh.edu

**Pate, James W. (Anne)**
910 Madison Ave 2nd Floor, Rm 208, Memphis, TN 38163
Phone: (901) 448-5912 Fax: (901) 448-7588
Email:jpate@uthsc.edu

‡Patel, Hetal D.
3600 Winthrop Drive, #6101, Lexington, KY 40514
Phone: (601) 310-1245
Email: hetal.patel@uky.edu

Patel, Himanshu Jagdish (Heena)
1500 East Medical Center Drive 5144 Cardiovascular Center,
Ann Arbor, MI 48109-5864
Phone: (734) 615-9129 Fax: (734) 764-2255
Email: hjpatel@med.umich.edu

Patel, Vijay S. (Lina)
3945 Hammonds Ferry, Evans, GA 30809
Phone: (706) 721-3226 Fax: (706) 721-7508
Email: vijay_patel_us@yahoo.com

‡Pattakos, Gregory
2525 McCue Road, Apt. 326, Houston, TX 77056
Phone: (202) 230-4884 Fax:
Email: gregpattakos@yahoo.com

Patterson, Alexander (Susan)
660 South Euclid Ave Box 8234, St. Louis, MO 63110
Phone: (314) 362-6025 Fax: (314) 747-4087
Email: pattersona@wustl.edu

Peeler, Benjamin Banks
1514 Jefferson Highway, CT-8, New Orleans, LA 70121
Phone: (504) 842-3907 Email: bbankspl1@gmail.com

**Peirce, E. Converse, II (Esther)**
HC 77 Box 618, Hancock, ME 04640-9801
Phone: (207) 422-8247

Pennathur, Arjun (Revathi)
200 Lothrop St., C-800, Pittsburgh, PA 15213
Email: apennathur@aol.com

Pennington, D. Glenn (Dottie)
East Tennessee State University PO Box 75075, Johnson City, TN 37614
Phone: (423) 439-6771 Fax: (423) 439-6259
Email: penningg@etsu.edu
Peper, William A.
300 Richland West Suite 2, Waco, TX 76712
Phone: (254) 772-2300 Fax: (254) 772-5514
Email: william.peper@gmail.com

Pereira, Sara Jane (Keith)
2643 Patterson Road Suite 403, Grand Junction, CO 81506
Phone: (970) 298-7675 Fax: (970) 245-2984
Email: sara.pereira@sclhs.net

**Perryman, Richard A.
1150 North 35th Avenue Suite 440, Hollywood, FL 33021
Phone: (954) 962-5000 Fax: (954) 961-7027
Email: RPerryman@mhs.net

Petit, Scott J. (Barbara)
8 Richland Medical Park Suite 400, Columbia, SC 29203
Phone: (803) 765-0871 Fax: (803) 765-9215
Email: scott.petit@palmettohealth.org

Petracek, Michael R. (Constance)
1215 - 21st Avenue So Suite 5209 MCE South Tower, Nashville, TN 37205
Phone: (615) 343-9185 Fax: (615) 343-5248
Email: michael.petracek@vanderbilt.edu

Petrik, Pavel V. (Linda Petrik)
1331 West Avenue J, #203, Lancaster, CA 93534
Phone: (661) 733-0181 Fax: (661) 718-2472
Email: p.petrikmd@verizon.net

Pettitt, Timothy W. (Deborah Pettitt)
200 Henry Clay Avenue, New Orleans, LA 70118
Phone: (504) 896-9868 Fax: (504) 896-3952
Email: tpettit1@lsuhsc.edu

**Peyton, Marvin D.
440 NW 15th Street, Oklahoma City, OK 73103
Phone: (405) 271-5789 Fax: (405) 271-3288
Email: MDP@ouhsc.edu

Peyton, Rob B. (Rob Peyton)
2800 Blue Ridge Road Suite 201, Raleigh, NC 27607
Phone: (919) 971-4790
Email: robertpeyton@mac.com

**Pickard, Laurens R. (Julie)
6560 Fannin Suite 1846, Houston, TX 77030
Phone: (713) 797-1211 Fax: (713) 795-9805
Email: pickardlaurens@sbcglobal.net

Pickens, Allan (Abraxas)
Emory Crawford Long Medical Tower Thoracic Surgery 6th Floor 550 Peachtree St. N.E., Atlanta, GA 30308
Phone: (404) 686-2515 Fax: (404) 686-4788
Email: allan.pickens@emoryhealthcare.org

Pierson, Richard Norris, III (Allene)
110 South Paca Street 7N-134 Cardiac Surgery, Baltimore, MD 21201
Phone: (410) 328-5842 Fax: (410) 328-2750
Email: rpierson@mail.umaryland.edu

**Senior Member +New Member ‡Resident Member *Home Address
**Pinckley, James N. (Peggy)**  
1900 S. National Avenue Suite 3400, Springfield, MO 65809  
Phone: (417) 841-3960 Fax: (417) 841-3967

**Pitman, John M., Jr. (Helene)**  
326 Monticello Drive, Williamsburg, VA 23185  
Phone: (804) 229-4958 Fax: (804) 229-3118

**Playforth, R. Herman (Elizabeth)**  
6105 Sulphur Well Rd, Lexington, KY 40509  
Phone: Fax: (859) 264-7784  
Email: herman@playforth.com

Plunkett, Mark D. (Connie)  
420 N.E. Glen Oak Ave., Peoria, IL 61603  
Phone: 818-970-6795 Fax: (859) 257-4682  
Email: mdplunkett@icloud.com

Pluscht, Peter, III  
1855 Spring Hill Avenue, Mobile, AL 36607  
Phone: (334) 633-2314 Fax: (334) 633-3135  
Email: jbell@ctvsapc.com

Polimenakos, Anastasios C. (Maria)  
partment of Cardiovascular Surgery 1120 15th Street, BAA 8300, Augusta, GA 30912  
Phone: (706) 721-2336 Fax:  
Email: anapolisis@aol.com

Pollard, Thomas R. (Camy Hammond)  
9125 Cross Park Drive Suite 200, Knoxville, TN 37923-4505  
Phone: (865) 659-2110 Fax: (865) 637-2114  
Email: 5pollard@comcast.net

Pollock, Samuel B. (Laura)  
3900 Kresge Way Suite 46, Louisville, KY 40207  
Phone: (502) 899-3858 Fax: (502) 899-3878  
Email: spollock@bhsi.com

Poston, Robert S. (Susan)  

**Pradhan, Duleep J. (Gale)**  
6722 Milani Street, Lake Worth, FL 33467  
Phone: (561) 968-3238 Fax: (561) 968-3238

Prager, Richard L. (Lauren)  
5144 Cardiovascular Center 1500 East Medical Center Drive, Ann Arbor, MI 48109-5864  
Phone: (734) 936-4974 Fax: (734) 764-2255  
Email: rprager@umich.edu

**Prather, J. Richard (Evelyn)**  
6758 Tangleberry Lane, Memphis, TN 38138  
Phone: (901) 523-8990

Preventza, Ourania  
6770 Bertner Street, C350, Houston, TX 77030  
Phone: (832) 355-9910 Fax: (832) 255-9920  
Email: opsmile01@aol.com
Price, Theolyn
1165 Charles Grove, Colorado Springs, CO 80906
Phone: (507) 269-9463 Fax: (407) 473-3553
Email: price.theolyn@alumni.mayo.edu

Prillaman, Paul E., Jr. (Ginger)
1311 70th Street NW, Bradenton, FL 34209

Prince, Syma
12200 Park Central Drive Suite 500, Dallas, TX 75251
Phone: (972) 566-4087 Fax: (972) 566-4264
Email: syma.prince@hcahealthcare.com

Putnam, Joe B. Jr. (Jacqueline)
4th Floor 1235 San Marco Boulevard, Jacksonville, FL 32207
Phone: 1 (844) 632-2278 Fax: (904) 202-7377
Email: bill.putnam@bmcjax.com

Quintessenza, James A.
601 5TH ST S, 6TH FLOOR BOX 70-6610, Saint Petersburg, FL 33701
Phone: (727) 767-6666 Fax: (727) 767-8606
Email: jaqmd@mac.com

Rahbar, Ahmad (Marylon)
1021 Mount De Chantal Road, Wheeling, WV 26003-6328
Phone: (304) 243-1000 Fax: (304) 243-1523
Email: ahmadrahbar@yahoo.com

Ramlawi, Basel (Nasrin)
6550 Fannin St Suite 1401, Houston, TX 77030
Phone: (713) 441-5200 Fax: (713) 793-7428
Email: bramlawi@tmhs.org

Rams, James J. (Jan)
112 Yorkshire Dr., Pittsburgh, PA 15238
Phone: (412) 963-7984

Rankin, J. Scott (Sue)
320 Lynnwood Blvd, Nashville, TN 37205
Phone: (615) 969-1543
Email: jsrankinmd@cs.com

Rawitscher, Robert E. (Carol)
2812 Fenwich Lane, Plano, TX 75093
Fax: (972) 867-9464
Email: rrawitscher@yahoo.com

Rayburn, S. Thomas, III
10100 Kanis Road, Little Rock, AR 72205
Phone: (501) 223-5757 Fax: (501) 223-5758
Email: trmd1@hotmail.com

Rayl, John E. (Billie)
Veterans Admin. Hospital Suite 151, Lake City, FL 32055

Read, Raymond C. (Lillian)
304 Potomac St., Rockville, MD 20850
Phone: (501) 660-2038 Fax: (501) 671-2523

**Senior Member  +New Member  ‡Resident Member  *Home Address
Reade, Clifton (Erin)
ACTVS 2108 E 3rd St Suite 300, Chattanooga, TN 37404
Phone: (423) 624-5200 Fax: (423) 624-4440
Email: creade@actvsurgeons.com

Reames, Mark K. (Gay)
1001 Blythe Boulevard Suite 300, Charlotte, NC 28203
Phone: (704) 373-0212 Fax: (704) 372-1249
Email: mark.reames@carolinashealthcare.org

Reardon, Michael J. (Robin)
6550 Fannin Street Suite 1401, Houston, TX 77030-2709
Phone: (713) 441-5200 Fax: (713) 390-3370
Email: mreardon@houstonmethodist.org

Reda, Hassan K.
740 S. Limestone Suite A301, Lexington, KY 40536
Phone: (859) 323-6494 Fax: (859) 257-4682
Email: hreda2@uky.edu

Reddy, V. Seenu (Meera)
3513 Woodmont Boulevard, Nashville, TN 37215
Phone: (615) 342-6900 Fax: (615) 342-6899
Email: seenu.reddy@hcahealthcare.com

Redmond, Clyde (Susan)
Mercy Clinic Joplin 100 Mercy Way, Suite 310, Joplin, MO 64804
Phone: (417) 556-8600 Fax: (417) 556-8602
Email: clyde.redmond@mercy.net

Reece, T. Brett (Leena)
12631 East 17th Avenue Room 6602, MS C310, Aurora, CO 80045
Phone: (303) 724-7428 Fax: (303) 724-2806
Email: brett.reece@ucdenver.edu

Rego, Alfredo (Molly Anne)
3650 NW 82 Ave Suite 207-208, Doral, FL 33166
Phone: (305) 935-9883 Fax: (305) 792-9901
Email: regoamd@aol.com

**Reinhardt, J. Robert (Nora)
19921 Downing Road, Holt, MO 64048

**Reul, George J. (Susan K. Reul)
P.O. Box 20345, Houston, TX 77025
Phone: (832) 355-4929 Fax: (832) 355-3424
Email: greul@heart.thi.tmc.edu

Reul, Ross M. (Terri)

**Rhee, John W. (Barbara)
1625 North George Mason Drive Ste 288, Arlington, VA 22205
Phone: (703) 558-6491 Fax: (703) 524-4365
Email: rhee@cox.net
Ricci, Marco (Michelle)
1 University of New Mexico MSC10 5610, Albuquerque, NM 87131-0001
Phone: (505) 272-6901 Fax: (505) 272-6909
Email: marcoricci@salud.unm.edu

Rice, David C.
1400 Pressler Suite 19, 6000, Houston, TX 77030
Phone: (713) 794-1477 Fax: (713) 794-4901
Email: drice@mdanderson.org

Richardson, John B.
2871 Acton Road Suite 100, Birmingham, AL 35243
Phone: (205) 879-5733 Fax: (205) 969-3513

Rigby, Swayze (Joni)
7777 Hennessey Boulevard Suite 1008, Baton Rouge, LA 70808
Phone: (225) 766-0416 Fax: (225) 766-6941
Email: swayzerigby@cox.net

**Riggs, Orval E. (Inez)
1300 North Hughes, Little Rock, AR 72207
Phone: (501) 666-1315
Email: RioReo@msn.com

**Riley, Stancel M. (Kerri)
21 Chauncy Street Apt 3, Cambridge, MA 2138
Phone: (617) 945-2402 Fax: (617) 945-2403
Email: rileyward176@gmail.com

Ring, W. Steves (Denise)
5323 Harry Hines Boulevard, Dallas, TX 75390-8879
Phone: (214) 645-7706 Fax: (214) 645-9708
Email: steve.ring@utsouthwestern.edu

Roach, Harry A. (Maria)
4228 Houma Blvd Suite 300, Metairie, LA 70006-2990
Phone: (504) 454-2222 Fax: (504) 454-2388
Email: hmroach@msn.com

Robaczewski, David L. (Susan)
818 Congress Street, Portland, ME 4102
Phone: 9194228467
Email: robaczewskis@aol.com

**Roberts, Arthur J.
Jersey Shore Cardiac & Thoracic Surgery Assoc. 1944 Corliss Avenue, Suite 204, Neptune, NJ 7753
Phone: (732) 776-4610 Fax: (732) 776-4647

Roberts, Harold G. (Angelica)
8251 West Broward Boulevard Suite 300, Plantation, FL 33324
Phone: (954) 475-9535 Fax: (954) 475-4637
Email: hgrmd@aol.com

Roberts, John R. (Katherine White)
2400 Patterson Street Suite 215, Nashville, TN 37203
Phone: (615) 390-9075 Fax: (615) 340-3547
Email: johnbob999@msn.com

**Senior Member  +New Member  ‡Resident Member  *Home Address
**Robertson, William A.**
*Oak Knoll Farm 1185 Millers Lane, Manakin Sabot, VA 23103*
Phone: (804) 282-2227 Fax: (804) 282-2228

**Robicsek, Francis (Livia)**
*Suite 3001 1001 Blythe Boulevard, Charlotte, NC 28203*
Phone: (704) 444-3901 Fax: (704) 373-0781
Email: frobicsek@carolinashealthcare.org

Robinson, Bryce
*349 N. Green Street, Winston-Salem, NC 27101*
Phone: (331) 278-2704
Email: brrobinson@wakehealth.edu

Robinson, Lary A. (Susannah)
*12902 Magnolia Drive Thoracic Oncology Program, Tampa, FL 33612-9497*
Phone: (813) 745-6895 Fax: (813) 745-3027
Email: lary.robinson@moffitt.org

Robinson, John R. (Sue)
*3311 Ivy Hills Blvd, Cincinnati, OH 45244*
Phone: (513) 421-3494 Fax: (513) 345-2606
Email: jrrerig@aol.com

**Rodgers, Bradley M. (Martha)**
*University of Virginia Department of Surgery - Box 800709, Charlottesville, VA 22908-0709*
Phone: (804) 924-2673 Fax: (804) 924-2656
Email: bmr@virginia.edu

Rodriguez, Jose Rafael (Amber)
*30 E. Apple St. Suite 1480, Dayton, OH 45409*
Phone: (937) 208-3220
Email: Jr.rod22@gmail.com

Rodriguez, Evelio (Lisa Bellin)
*4230 Harding Road Suite 430, Nashville, TN 37205*
Phone: (615) 222-5500 Fax: (615) 222-5601
Email: Evelio.Rodriguez@sth.org

Rodriguez Aguero, Jesus (Joan Lois)
*620 South 12th Street, McAllen, TX 78501*

**Rodriguez-Ramos, Ernest R. (Deboarah Clark)**
*700 S. Sycamore St., Ste 6, Petersburg, VA 23803*
Phone: (804) 861-8600 Fax: (804) 861-8610

Ronson, Russell S.
*2038 Brookwood Medical Center Dr. POB Suite 215, Birmingham, AL 35209*
Phone: (205) 877-2627 Fax: (205) 802-6590
Email: rsr822@yahoo.com

Rosenbaum, David H.
*3 Audubon Plaza, Suite 560, Louisville, KY 40217*
Phone: (502) 636-8004 Fax: (502) 636-8384
Email: dhrosenbaum@me.com
Rosenbloom, Michael (Carol)
3 Cooper Plaza Suite 411, Camden, NJ 8103
Phone: (856) 342-2141
Email: Rosenbloom-Michael@cooperhealth.edu

Rosengart, Todd (Debra)
One Baylor Plaza Mailstop BCM390, Houston, TX 77030
Phone: (713) 798-1317 Fax: (713) 798-6609
Email: todd_rosengart@bcm.edu

Ross, Scott D. (Alesia)
125 Doughty Street Suite 690, Charleston, SC 29403
Phone: (843) 720-8490 Fax: (843) 727-3602
Email: scott.ross@rsfh.com

*Rouse, Richard G. (Veronica)*
4330 Medical Drive Suite 325, San Antonio, TX 78229-3326
Phone: (210) 615-7700 Fax: (210) 496-3342
Email: rrouse@swbell.net

Rovin, Joshua (Peggy Crawford)
455 Pinellas St Suite 320, Clearwater, FL 33756
Phone: (727) 446-2273 Fax: (727) 441-4966
Email: Joshua.Rovin@Baycare.Org

Rowe, III, Joseph Franklin (Anne Henley Rowe)
2001 Crystal Spring AvenueSuite 201, Roanoke, VA 24014
Phone: (540) 344-5781 Fax: (540) 342-9308
Email: jahrowe@cox.net

Rubenstein, Forrest
14 Imbrie Place, Sea Bright, NJ 7760
Phone: (540) 797-7740
Email: fruben@hotmail.com

**Rubin, Joseph W. (Edith)**
22 River Reach Way, Charleston, SC 29407
Phone: (843) 225-2946 Fax: (843) 225-2948
Email: jrubin@knology.net

Ruiz, Victor H. (Colleen)
573 Twin Fawns, St Louis, MO 63131
Phone: 314-9097371 Fax: (314) 434-2454
Email: vcvra5@gmail.com

Ryan, William H. (Janice)
Cardiac Surgery Specialists 4716 Alliance Blvd, Plano, TX 75093
Phone: (469) 800-6200 Fax: (469) 800-6210
Email: whryanmd@yahoo.com

**Sade, Robert M. (Rinne)**
114 Doughty Street Suite 277, Charleston, SC 29425-2950
Phone: (843) 876-0182
Email: sader@musc.edu

Sadoff, John D. (Judith)
9 Park Place, Swansea, IL 62226
Phone: (618) 233-5722 Fax:
Email: jdsadoff@charter.net

**Senior Member +New Member ‡Resident Member *Home Address**
**Sadow, Samuel H. (Bruna)**
529 S. Flagler Drive Ste. 18G, West Palm Beach, FL 33401
Phone: (772) 335-9800 Fax: (772) 335-9090
Email: ssadow5398@aol.com

Safi, Hazim J.
*University of Texas Medical School* 6400 Fannin, Suite 2850, Houston, TX 77030
Phone: (713) 661-8056 Fax: (713) 512-7200
Email: hazim.j.safi@uth.tmc.edu

**Saha, Sibu P. (Becky)**
740 S. Limestone St. A301, Lexington, KY 40536-0284
Phone: (859) 323-6494 Fax: (859) 257-4682
Email: ssaha2@uky.edu

Saint, David L. (Rhonda)
1405 Centerville Road Suite 5000, Tallahassee, FL 32308
Phone: (850) 878-6164 Fax: (850) 656-5575
Email: dlsaint@mac.com

Sako, Edward Y. (Jennifer Sorenson)
7703 Floyd Curl Drive, San Antonio, TX 78229-3900
Phone: (210) 567-2878 Fax: (210) 567-2877
Email: sako@uthscsa.edu

Salazar, Jorge D.
300 Longwood Avenue Bader 273, Boston, MA 2115
Phone: (713) 376-9344
Email: jorge.salazar@cardio.chboston.org

Salerno, Tomas A. (Helen)
1611 NW 12 AveET 3072, Miami, FL 33136
Phone: (305) 585-5271 Fax: (305) 672-6027
Email: tsalerno@med.miami.edu

Sancheti, Manu Suraj (Cameron Sancheti)
5665 Peachtree Dunwoody Road Suite 200, Atlanta, GA 30342
Phone: (404) 778-7200 Fax: (404) 778-6626
Email: msanch2@emory.edu

Sanchez, Juan A. (Lise)
900 Caton Ave, Baltimore, MD 21229
Phone: (410) 368-2748 Fax: (410) 951-4007
Email: juan.sanchez@stagnes.org

Sand, Mark E. (Leslie)
1222 S. Orange Avenue, Orlando, FL 32806
Phone: 321-841-7700 Fax: (404) 422-0166
Email: mark.sand@orlandohealth.com

**Sanfelippo, Peter M. (Cecelia)**
1817 Raveneaux Lane, Tyler, TX 75703
Phone: (903) 877-7468 Fax: (903) 877-5892
Email: petersanfelippo@aol.com

**Sanford, Marshall C.**
Santos, Andrea  
95 Collier Rd Suite 2055, Atlanta, GA 30309  
Phone: (770) 490-5088 Fax: (404) 355-4235  
Email: andrea.santos@piedmont.org

Sarateanu, Cristian Sorin  
409 W. Oak Street, Suite 202, Carbondale, IL 62901  
Phone: 6179539643 Fax: (618) 529-0556  
Email: sarateanu@gmail.com

Sarin, Eric L.  
5665 Peachtree Dunwoody Road NE Suite 200, Atlanta, GA 30342  
Phone: (404) 895-0736 Fax: (404) 778-6626  
Email: esarin@emory.edu

**Sasser, William F. (Molly)  
5 Woodbridge Manor Road, Saint Louis, MO 63141  
Phone: (314) 577-8351 Fax: (314) 567-5082  
Email: wfsasser@sbcglobal.net

Sauls, F. Clark  
901 W. Maple Suite 201, Enid, OK 73701  
Phone: (580) 237-3608  
Email: fcsauls@sbcglobal.net

Savage, Edward B. (Susan)  
2950 Cleveland Clinic Blvd, Weston, FL 33331  
Phone: (954) 659-5320  
Email: edward.savage.md@live.com

**Schaff, Hartzell V. (Voni Schaff)  
200 First Street SW, Rochester, MN 55905  
Phone: 507-285-9881 Fax: (507) 255-7378  
Email: schaff@mayo.edu

Scharff, James Rowe (Tiffany)  
3009 N. Dallas Road Suite 360 C, St. Louis, MO 63131  
Phone: (314) 996-5287  
Email: jimscharff@sbcglobal.net

**Scheerer, Rudolph P. (Joanne)  
808 North Olive Avenue, West Palm Beach, FL 33401  
Phone: (561) 832-1378 Fax: (561) 832-6771  
Email: RS58JT@aol.com

Schena, Stefano  
11155 Dunn Road Professional Building 1, Suite 209E,  
St. Louis, MO 63136  
Phone: (314) 355-3003 Fax: (314) 355-0515  
Email: schenas@wudosis.wustl.edu

Schipper, Paul (Elizabeth Caswell)  
3181 Southwest Sam Jackson Park Road L353, Portland, OR 97239  
Phone: (503) 494-7820 Fax: (503) 494-7829  
Email: schippep@ohsu.edu

**Schmidt, Frank E. (Sidonie)  
1137 Jefferson Avenue, New Orleans, LA 70115-3011  
Phone: (504) 568-4576 Fax: (504) 568-4633

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 307
Schmidt, Frank Ernest, Jr.
13494 E. 600 Rd., Inola, OK 74036
Phone: (918) 502-3200 Fax: (918) 502-3205
Email: FESJRMD@YAHOO.COM

Schoettle, Glenn Phillip (Lynn)
Thoracic and Cardiovascular Surgery Associates 6005 Park Avenue, Memphis, TN 38119
Fax: (901) 274-0741
Email: philshoettle@yahoo.com

‡Schubert, Sarah

Schultz, Scot C.
101 South Ravenel Street Suite 270, Florence, SC 29502
Phone: (843) 777-7019
Email: canes99@yahoo.com

**Schumacher, Paul D.
81 Oakleigh Drive, Maitland, FL 32751
Email: pdschu@cfl.rr.com

**Schumer, Erin (Carter Scott)

‡Schwartz, Gary
3410 Worth St. Suite 545, Dallas, TX 75230
Phone: (443) 660-9954
Email: gary.schwartz@baylorhealth.edu

**Scott, Meredith L. (Susan)
2051 Beaver Creek Rd., Shell, WY 82441
Phone: (307) 765-9518 Fax: (307) 765-9561
Email: mlscott1@hughes.net

Sears, Nicholas J. (Michelle Marie)
450 Knights Run Ave Suite 1406, Tampa, FL 33602
Phone: (813) 972-5030 Fax: (813) 977-6173

Sebastian, Vinod A.
1935 Medical Drive District, Suite C3211, Dallas, TX 75235
Phone: (214) 456-5000 Fax: (214) 456-5015
Email: vinod.sebastian@utsouthwestern.edu

See, W. Mike (Joni)
University of Missouri Hospital Drive, DC011.00, Columbia, MO 65212
Phone: (573) 882-6956 Fax: (573) 884-0437
Email: wmseemd@yahoo.com

Segurola, Romualdo Jose
3650 NW 82nd Ave Suite 207, Doral, FL 33166
Phone: (305) 406-3596 Fax: (305) 858-7721
Email: rspetermd@aol.com

**Selby, John H. Jr. (Kay)
4117 Hillsboro Pike Ste 103-266, Nashville, TN 37215
Phone: (615) 463-8096
Email: jselby0@yahoo.com
Sell, Jeffrey Edward (Christine)
1540 S. Tamiami Trail Suite 503, Sarasota, FL 34239
Phone: (941) 917-8791 Fax: (941) 917-8793
Email: jeffreysellmd@earthlink.net

**Selle, Jay G. (Sheila)**
The Sanger Clinic 1001 Blythe Blvd-Suite 300, Charlotte, NC 28203
Phone: (704) 373-1500 Fax: (704) 372-1249

*Sepesi, Boris (Phaedra Harbaugh)*
2518 Bellefontaine, Houston, TX 77030
Phone: (713) 792-7664 Fax: (713) 794-4901
Email: bsepesi@mdanderson.org

**Sethi, Gulshan K. (Neelam)**
7300 N. Cobblesstone Road, Tucson, AZ 85718
Phone: 520 243 0008 Fax: (520) 626-4042
Email: gsethi2807@aol.com

**Sewell, David H. (Mary)**
1723 Orchard Ct, Kingsport, TN 37660
Phone: (423) 378-5558 Fax: (423) 378-5298

†Shah, Asad A.
7 Kilary Drive, Durham, NC 27713
Phone: (919) 784-7110
Email: asad.shah@unchealth.unc.edu

Shah, Ashish S. (Rebecca)
5025 Medical Center East VUMC/ Cardiac Surgery 1215 21st Ave South,
Nashville, TN 37232
Phone: (615) 343-7363
Email: ashish.s.shah@vanderbilt.edu

**Shah, Hasmukh H. (Indira)**
3600 Gaston Avenue Suite 404, Dallas, TX 75246
Phone: (214) 824-0881 Fax: (214) 821-3760

Shaker, I. J. (Judy)
840 Pine Street-Suite 510, Macon, GA 31201
Phone: (478) 737-5719 Fax: (478) 633-8390
Email: samshaker@cox.net

**Shallal, John A. (Julita)**
5354 Reynolds Street Suite 206, Savannah, GA 31405
Phone: (912) 354-0392 Fax: (912) 352-1842

**Shane, Ramon A. (Cheryl)**
3564 S. Lexus, Springfield, MO 65807
Phone: (417) 887-8546

Sharma, Mahesh S.
4401 Penn Avenue Faculty Pavilion, 5th Floor, Pittsburgh, PA 15224
Phone: 469-387-4037 Fax: (412) 692-5817
Email: sharmams2@upmc.edu

**Shelby, J. Stanford (Susan)**
2751 Albert Bichnell Drive Suite 2D, Shreveport, LA 71103
Phone: (318) 632-9438 Fax: (318) 636-2030
Email: jshelby@worldnet.att.net

**Senior Member  +New Member  ‡Resident Member  *Home Address**
Shen, K. Robert (Ann Marie Karnyski)  
200 First Street SW, Rochester, MN 55905  
Phone: (507) 284-2511 Fax: (507) 284-0058  
Email: shen.krobert@mayo.edu

Sheridan, Brett C. (Emily Leonard)  
3037 Burnett Womack Building Campus Box 7065,  
Chapel Hill, NC 27599  
Phone: (919) 966-3381  
Email: Brettcsheridan@gmail.com

Shoptaw, James Harold Jr.  
3889 Russell Dyche Memorial Highway, London, KY 40741  
Phone: 478-275-9420  
Email: jshoptaw@aol.com

Sidell, Peter M. (Mary Kay)  
15701 Glenisle Way, Fort Myers, FL 33912  
Email: psidell@comcast.net

Silvestry, Scott C.  
2415 N. Orange Avenue, Suite 600, Orlando, FL 32804  
Phone: (407) 303-2474 Fax: (407) 303-7195  
Email: scott.silvestry@gmail.com

Simmons, Earl M., Jr. (Gerry)  
1616 S. Perry Street, Montgomery, AL 36104  
Phone: (334) 264-8120

Simpson, William F., Jr. (Judy)  
701 University Boulevard East Suite 808, Tuscaloosa, AL 35401-2086  
Phone: (205) 349-5064 Fax: (205) 759-5639  
Email: fordsimp@yahoo.com

Simsir, Sinan A.  
4400 W. 95th Street, Suite 205, Oak Lawn, IL 60453  
Phone: (847) 386-6067  
Email: simsir@comcast.net

Sink, James D.  
13030 Morehead, Chapel Hill, NC 27517  
Phone: (919) 967-3778 Fax: (919) 967-4341  
Email: jewm@aol.com

Sinning, Mark A.  
2203 Nevse Blvd, New Bern, NC 28560  
Phone: (252) 638-8118 Fax: (252) 638-5192

Skipper, Eric R.  
1001 Blythe Boulevard Suite 300, Charlotte, NC 28203  
Phone: (704) 444-3918 Fax: (704) 373-0781  
Email: eric.skipper@carolinas.org

Skylizard, Loki (Maria Sandra Duarte)

Slaughter, Mark (Martha)  
201 Abraham Flexner Way Suite 1200, Louisville, KY 40202  
Phone: (502) 558-9202 Fax: (502) 561-2190  
Email: mark.slaughter@louisville.edu
**Smiley, Robert H. (Mary Katherine)**
2306 San Augustine Lane, Friendswood, TX 77546
Phone: (281) 996-0241 Fax: (281) 996-0577
Email: bokat3150@sbcglobal.net

**Smith, Charlie D. III (Deborah)**
411 Seminole Ave, Florence, SC 29501
Phone: (803) 765-0871 Fax: (803) 765-9215

**Smith, Peter K. (Cynthia)**
Box 3442, Durham, NC 27710
Phone: (919) 684-2890 Fax: (919) 681-7905
Email: smith058@mc.duke.edu

**Smith, J. Marvin, III (Jill)**
Heart Plaza One 6800 IH-10 West, Suite 300,
San Antonio, TX 78201-2011
Phone: (210) 616-0008 Fax: (210) 616-0231
Email: jms, III@heartrepair.net

**Smith, Jeremy**
2108 East Third St Suite 300, Chattanooga, TN 37404
Phone: (423) 624-5200 Fax: (423) 624-4440
Email: jsmith@actvsurgeons.com

**Snow, Norman J. (Renee)**
PO Box 83, Post Mills, VT 5058
Phone: (802) 333-9649
Email: normansnow@sbcglobal.net

**Snyder, Harold E. (Deborah)**
113 Bristol Place, Ponte Vedra Beach, FL 32082

**Soberman, Mark S.**
Regional Cancer Treatment Center 400 West Seventh Street,
Frederick, MD 21701
Phone: (240) 566-3574
Email: mark.soberman@gmail.com

**Sommers, Keith E.**
4007 N. Taliaferro Avenue Suite C, Tampa, FL 33603
Phone: (813) 238-0810
Email: keith.sommers@baycare.org

**Sonett, Joshua R.**
161 Fort Washington Ave Suite 301, New York, NY 10032
Phone: (212) 305-8086 Fax: (212) 305-4085
Email: js2106@cumc.columbia.edu

**Song, Howard K. (Sally Y. Segel)**
3181 SW Sam Jackson Park Road L353, Portland, OR 97239
Phone: (503) 494-7820 Fax: (503) 494-7829
Email: hoem@ohsu.edu

**Spalding, Alanson R., III (Susan)**
2712 Valley Brook Place, Nashville, TN 37215
Phone: (615) 953-1075
Email: lance.spalding@gmail.com

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 311
Sparkman, Brian K.
576 Boardwalk Boulevard, Ridgeland, MS 39216
Phone: (513) 502-4035
Email: bsparkman@umc.edu

Speir, Alan M.
2921 Telestar Court Ste 140, Falls Church, VA 22042
Phone: 703-434-9299 Fax: (703) 280-2654
Email: aspeir1@gmail.com

Sperling, Jason S. (Jodie)
1444 S. Potomac Street Suite 300, Aurora, CO 80012
Phone: (303) 226-4650 Fax: (303) 751-6069
Email: j.s.sperling@gmail.com

Spotnitz, William D. (Denise Schain)
2738SW 92nd Drive, Gainesville, FL 32608
Phone: (352) 514-5009 Fax: (352) 846-0356
Email: wspotnitz@gmail.com

Spratt, John A. (Linda)
125 Doughty Street Suite 690, Charleston, SC 29403
Phone: (843) 5773661 Fax: (843) 727-3602
Email: jspratt@ctsofcharleston.com

Spray, Thomas L. (Melissa)
34th Street and Civic Center Boulevard Suite 12NW10, Philadelphia, PA 19104
Phone: (215) 590-2708 Fax: (215) 590-2715
Email: spray@email.chop.edu

Sprinkle, James D. (Joan)
156 Stratford Place, Danville, VA 24541
Phone: (434) 791-3455

Squires, John J.
3174 Matador Drive, Dallas, TX 75220
Phone: (214) 802-8398
Email: jack.squires@gmail.com

St. Louis, James D. (Jennifer)
15700 Portico Dr, Wayzata, MN 55391
Phone: (816) 302-8026 Fax: (816) 302-8026
Email: jdstlouis@cmh.edu

Stahl, Richard D. (Kathy)
9850 Genesee Avenue Suite 560, La Jolla, CA 92037
Phone: (619) 455-6330 Fax: (619) 455-5408
Email: rdstahl@hotmail.com

Stanfield, T. Mark (Anna D’Amico)
800 Hospital Drive, Madisonville, KY 42431
Phone: (270) 326-3800 Fax: (270) 326-3855
Email: mstanfie@trover.org

Stapleton, Dennis J. (Karen)
399 9th Street North Suite 300, Naples, FL 34102
Phone: (239) 624-4200 Fax: (239) 624-4201
Email: dennis479@aol.com
Stasik, Chad N. (Stephanie)  
7703 Floyd Curl Drive MC 7841, San Antonio, TX 78229  
Phone: (210) 567-2878 Fax: (210) 567-2877  
Email: stasik@uthscsa.edu

**Staub, E. Wilson (Jan)**  
1600 Morganton Road, W-15, Pinehurst, NC 28374  
Phone: (910) 692-6144

**Steier, Michael E.**  
1235 Florida Avenue, Fort Myers, FL 33901

Steliga, Matthew Allen (Kelly)  
4301 West Markham Ave #713, Little Rock, AR 72205  
Phone: (501) 686-7884 Fax: (501) 686-8503  
Email: masteliga@uams.edu

Stelly, Terry Chris  
1855 Spring Hill Avenue, Mobile, AL 36607  
Phone: (251) 633-2314 Fax: (251) 633-3135  
Email: tstelly@ctvsapc.com

**Stephenson, Sam E. (Janet)**  
10553 Scott Mill Road, Jacksonville, FL 32257  
Phone: (904) 268-1980

+Stepp, Lindsay O.  
4366 Maryland Avenue Apt. 201, St. Louis, MO 63108  
Phone: (502) 718-2797  
Email: lstepp@slu.edu

Stevens, William S., Jr. (Sarah)  
SIU School of Medicine PO Box 19684, Springfield, IL 62794-9684  
Phone: (217) 545-7600 Fax: (217) 545-2552  
Email: wstevens3@siumed.edu

Stevens, Randy M. (Sony)  
3601 A Street, Philadelphia, PA 19134-1095  
Phone: (484) 270-8064  
Email: rstev2@gmail.com

Stewart, James R. (Bobbie)  
9700 Chadwick Drive, Leawood, KS 66206-2112  
Phone: (816) 516-8287 Fax: (913) 341-2365  
Email: jrs1040@aol.com

Stewart, Robert D. (Robyn)  
9500 Euclid Ave M41, Cleveland, OH 44195  
Phone: (216) 444-9125 Fax: (216) 445-3692  
Email: stewartr4@ccf.org

Stiegler, Robert M. (Marsha)  
1001 Blythe Blvd. Suite 300, Charlotte, NC 28203  
Phone: (704) 373-0212 Fax: (704) 372-1249  
Email: mstiegler@aol.com

+Stiles, Brendon M. (Diem Nguyen)  
525 E. 68th Street, Suite M404, New York, NY 10065  
Phone: (212) 746-0848 Fax: (212) 746-8223  
Email: brs9035@med.cornell.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address**
Stinson, Wade W (Susan)
1601 SW Archer Rd Rm 112H, Gainesville, FL 32608-1135
Phone: (352) 278-8271 Fax: (352) 225-3063
Email: wade.stinson@va.gov

**Stoneburner, John M. (Frances)
451 Southland Drive, Danville, VA 24541
Phone: (804) 793-4045
Email: heartbt1@msn.com

**Stoney, William S. (Marian)
St. Thomas Medical Building 4230 Harding Road-5th Floor,
Nashville, TN 37205
Phone: (615) 385-4781 Fax: (615) 385-9265
Email: wsstoney@comcast.net

Stouffer, Chadwick (Adeline)
4750 Waters Avenue Suite 500, Savannah, GA 31404
Phone: (912) 352-8346 Fax: Email: cstouffer@savannahvascular.com

Stowe, Cary L. (Patrice)
PO Box 643383, Vero Beach, FL 32964-3383
Phone: (772) 563-4580 Fax: (772) 563-4690
Email: cclstowe@msn.com

Stowell, Donald E. (Toni)
16917 Claybridge Circle, Edmond, OK 73012
Phone: (405) 531-8681 Fax: (405) 271-3288
Email: destowell7@gmail.com

Stulak, John M. (Jamie)
1300 Creek Lane SW, Rochester, MN 55902
Phone: (507) 255-7064 Fax: (507) 255-7378
Email: stulak.john@mayo.edu

Suarez-Cavelier, Jorge E. (Diane)
217 Hillcrest Street, Orlando, FL 32801
Phone: (407) 425-1566 Fax: (407) 422-0166
Email: jsuarez1@cfl.rr.com

•Sullivan, Jennifer L.
1325 Eastmoreland Ave Suite 460, Memphis, TN 38104
Phone: (901) 448-2918 Fax: (901) 266-6447
Email: jsulli53@uthsc.edu

Sundaram, Shankar Meenakshi (Kamilini Nadarajah)
2707 Cole Avenue Apartment 242, Dallas, TX 75204
Phone: (972) 838-0984
Email: sms5217@yahoo.com

Sundt, Thoralf (Kathleen)
Massachusetts General Hospital 55 Fruit Street, Boston, MA 2114
Phone: (617) 643-9745 Fax: (617) 726-5804
Email: tsundt@partners.org

**Sutherland, R. Duncan (Carol)
3301 Shadow Wood Circle, Highland Village, TX 75077
Phone: (505) 336-4309
Email: rsutherland74@gmail.com
**Sutton, John P.**  
1010 Old Wharf, Sea Brook Island, SC 29455  
Phone: (843) 768-1165  
Email: jps246810@aol.com

**Swain, Julie A.**  
1 Gustave L. Levy Place Box 1028, New York, NY 10029  
Phone: (212) 659-6800  
Email: Julie.Swain@MountSinai.org

‡Swanson, Julia C.  
3000 Bissonnet Apt. 2311, Houston, TX 77005  
Phone: (503) 957-7935  
Email: juliaswan@me.com

Sweeney, Michael S. (Laura)  
6560 Fannin #1824, Houston, TX 77030  
Phone: (713) 795-4334  
Email: sjacquet@sbcglobal.net

Swisher, Stephen G. (Kelly K. Hunt)  
1515 Holcombe Boulevard Box 445, Houston, TX 77030  
Phone: (832)519-9750 Fax: (713) 794-4901  
Email: sswisher@mdanderson.org

**Symbas, Peter N. (Hytho)**  
69 Butler Street SE, Atlanta, GA 30303  
Phone: (404) 616-4461 Fax: (404) 616-4509

**Szentpetery, Szabolcs (Victoria)**  
3431 Lady Marian Court, Midlothian, VA 23113  
Phone: (804) 545-2932  
Email: big2pete1@me.com

Szwerc, Michael Francis (Stephanie)  
729 Lindwood Drive, Greensburg, PA 15601  
Phone: (724) 689-0520  
Email: m6624fs@gmail.com

**Takaro, Timothy (Marilyn)**  
Veterans Administration Medical Center 1100 Tunnel Road, Asheville, NC 28805

Tam, Vincent K.H. (Melanie)  
1500 Cooper Street, Dodson Building Floor 3, Fort Worth, TX 76104-2724  
Phone: (682) 885-6400 Fax: (682) 885-6101  
Email: vtam@cookchildrens.org

+Tang, Paul C.Y. (Queenie Tan)  
600 Highland Avenue, H4/352, Madison, WA 53792-3236  
Phone: 2036402947 Fax: (608) 263-0547  
Email: pchytang@gmail.com

Tavares, Sergio (Denise Rae)  
601 Texan Trail, Suite 205, Corpus Christi, TX 78411  
Phone: (512) 884-7081 Fax: (361) 884-5202  
Email: Tavaress@sbcglobal.net

**Senior Member  +New Member  ‡Resident Member  *Home Address**
**Taylor, Robert L. (Connie Taylor)**  
20 Muirfield Ln, Amarillo, TX 79124-4939  
Phone: (806) 236-4279  
Email: RobertTaylor79109@gmail.com

**Teman, Nicholas**  
2460 N. Berkshire Road, Charlottesville, VA 22901  
Phone: (786) 395-1981  
Email: nrt4c@virginia.edu

**Temes, Gerald D. (Maura)**  
201 Abraham Flexner WaySuite 1004, Louisville, KY 40202  
Phone: (502) 589-3173

**Tenekjian, Vasken K. (Marilyn)**  
3640 High StreetSuite 2F, Portsmouth, VA 23707-3236  
Phone: (757) 397-2383 Fax: (757) 397-5201

**Thiele, J. Peter**  
4108 High Summit, Dallas, TX 75224  
Phone: (972) 241-9846

**Thio, Richard T. (Jane)**  
1001 Clubland Court, Marietta, GA 30068  
Phone: (770) 971-8222 Fax: (678) 560-9489  
Email: rthio@bellsouth.net

**Thomas, Gregory A. (Michele)**  
1010 First Street North Suite 250 - The Physician Center,  
Alabaster, AL 35007  
Phone: (205) 620-7523 Fax: (205) 620-8673  
Email: gthomas7766@charter.net

**Thomas, James P. (Mary Lou)**  
535 Sanctuary Drive, Longboat Key, FL 34228  
Phone: (304) 327-3524 Fax: (304) 327-8337

**Thompson, Jess Lee, Ill (Sarah)**  
920 Stanton L. Young Boulevard, WP2230, Oklahoma City, OK 73104  
Phone: (405) 271-5789 Fax: (405) 271-3288  
Email: jessthompsonmd@gmail.com

**Thompson, Karen S.**  
142 Godchaux Dr, Houma, LA 70360  
Phone: (678) 953-1820  
Email: ksthompsonndo@yahoo.com

**Thompson, Eric (Tanya)**  
4320 Wornall Road, Suite 50-II, Kansas City, MO 64111  
Phone: (816) 931-3312 Fax: (573) 256-3004  
Email: ethompson@mahls.com

**Thompson, Richard (Jennifer)**  
6430 Winding Ridge Circle, Lincoln, NE 68512  
Phone: (402)481-8430 Fax: (717) 299-6577  
Email: thomp105@gmail.com

**Thomson, Norman B., Jr. (Gail G.)**  
3434 Gin Lane, Naples, FL 34102-7813  
Phone: (239) 403-3553 Fax: (239) 403-3875  
Email: nbthomson2@gmail.com

316 STSA 63rd Annual Meeting
Thourani, Vinod H. (Marissa L. Thourani)
550 Peachtree St. 6th Floor MOT, Atlanta, GA 30308
Phone: (404) 274-3136 Fax: (404) 686-4959
Email: vthoura@emory.edu

**Threlkel, James B. (Eleanor)
1315 North Lake Elbert Drive, Winter Haven, FL 33881
Phone: (863) 294-4004
Email: jbthrel@aol.com

Thurber, John S. (Lynette)
The Physician Center Suite 250, Alabaster, AL 35007
Phone: (205) 620-7523 Fax: (205) 620-8673
Email: john.s.thurber@gmail.com

‡Todd, Henry F.
610 McFerrin Avenue, Nashville, TN 37206
Phone: (615) 322-0248
Email: henry.f.todd@vanderbilt.edu

Tong, Betty Caroline (Suhail Mithani)
DUMC Box 3531, Durham, NC 27710
Phone: 4432265069 Fax: (919) 684-8508
Email: betty.tong@duke.edu

Toole, John Matthew (Katy Morgan)
125 Doughty St Suite 690, Charleston, SC 29403
Phone: (843) 720-8490 Fax: (843) 727-3602
Email: john.toole@rsfhs.com

**Toyohara, Hiroshi (Akiko)
210 Crestridge Road, Knoxville, TN 37919
Phone: (865) 602-2441 Fax: (865) 584-5532

**Traad, Ernest A. (Nancy)
765 Crandon Boulevard Apt 510, Key Biscayne, FL 33149-2568
Phone: (305) 674-2782 Fax: (305) 674-2865

Trachiotis, Gregory D. (Tanya)
50 Irving Street NW Cardiothoracic Surgery - 112 VAMC,
Washington, DC 20422
Phone: (202) 745-8626 Fax: (202) 745-8385
Email: gregory.trachiotis@med.va.gov

Trachte, Aaron L. (Leslye)
3401 W. Gore Blvd, Lawton, OK 73505
Phone: (580) 357-4339 Fax: (580) 357-4423
Email: trachtea@memorialhealthsource.com

‡Tran, Minh P. (Jill)
3341 Unicorn Lake Boulevard, Denton, TX 76210
Phone: (214) 669-7974 Fax: (469) 800-1410
Email: DallasTXMD@yahoo.com

Travis, Jeffrey A. (Sheila)
2728 Sunset Blvd Suite 101, West Columbia, SC 29169
Phone: (803) 936-7095 Fax: (803) 936-7908
Email: jatravis@lexhealth.org

**Senior Member  +New Member  ‡Resident Member  *Home Address
MEMBERSHIP ROSTER

**Treasure, Robert L.**  
116 LaRue Ann Court, San Antonio, TX 78213  
Phone: (210) 340-1715  
Email: rtreasure@satx.rr.com

**Tribble, David E. (Dorothy)**  
1850 Laurel Street, Columbia, SC 29201  
Phone: (803) 256-3400 Fax: (803) 256-2039  
Email: tribble@sc.rr.com

Tribble, Curtis G. (Megan)  
PO Box 800679, Charlottesville, VA 22908-0679  
Phone: (434) 924-2000 Fax: (434) 244-7588  
Email: ctribble@virginia.edu

Tribble, Reid W. (Mary)  
Eight Richland Medical ParkSuite 400, Columbia, MO 29203  
Phone: (803) 765-0871 Fax: (803) 765-9215  
Email: rwtcvs@aol.com

Tripathy, Uttam (Shobana)  
1601 Main StreetSuite 202, Richmond, TX 77469  
Phone: (281) 232-1908 Fax: (281) 232-1914  
Email: utrips@yahoo.com

**Trotter, Michael C.**  
221 Crittenden Street, Greenville, MS 38701  
Email: mdatrotter@gmail.com

Trotter, Timothy Howard  
54 Jeffrey Way, Fort Smith, AK 72903  
Phone: (479) 314-6000  
Email: thtrottermd@cox.net

**Tucker, William Y., Jr. (Nancy)**  
26074 US Highway 65, Colo, IA 50056  
Fax: (910) 889-7701  
Email: wytucker@mac.com

Turek, Joseph (Betsy)  
UIHC - Cardiothoracic Surgery 200 Hawkins Drive SE 520 GH, Iowa City, IA 52242  
Phone: (319) 384-8365 Fax: (319) 356-3891  
Email: joseph-turek@uiowa.edu

Turina, Marko I.  
University Hospital Ramistrasse 100, Zurich, 8091  
Phone: 12553298  
Email: marko.turina@chi.usz.ch

Turnage, Bryce (Beth)  
8333 North Davis Highway, 4th Floor, Pensacola, FL 32514  
Phone: (601) 553-2135 Fax: (601) 553-2049  
Email: bryceturnage@hotmail.com

**Turney, Shannon W. (Peggy)**  
1515 Toney Dr., Huntsville, AL 35802  
Phone: (256) 881-5848 Fax: (256) 881-5848  
Email: tturney@comcast.net

318 STSA 63rd Annual Meeting
Tweddell, James S. (Sue Ellen)
1125 Fort View Drive, Cincinnati, OH 45202
Phone: (513) 636-6599
Email: james.tweddell@cchmc.org

**Tyndal, Edward C. (Martha Kay)
235 Tyndal Farm Rd., Columbiana, AL 35051
Phone: (205) 250-6076

**Tyson, Kenneth R. T. (Sue)
601 Rocky Hollow Drive, Burnet, TX 78611-4103
Phone: (512) 756-7591
Email: kentyson@281.com

**Umstott, Charles E. (Elizabeth)
19 Museum Drive, Newport News, VA 23606
Phone: (757) 596-7631 Fax: (757) 596-7078

**Ungerleider, Graham H.
1281 West 4th Street, Suite G, Winston-Salem, NC 27101
Phone: (336) 913-1926
Email: gungerle@wakehealth.edu

Ungerleider, Ross M. (Jamie)
Brenner Children’s Hospital, 10th Floor, Winston-Salem, NC 27157-1096
Phone: (336) 941-3293 Fax: (336) 716-1295
Email: rungerle@wakehealth.edu

+‡Urencio, Miguel
159 Harper St., Ridgeland, MS 39157
Phone: (601) 850-4075
Email: jmurencio@gmail.com

Urschel, Betsey B.
4930 Manson Ct., Dallas, TX 75229
Phone: (214) 444-8331 Fax: (214) 824-2503
Email: r.x@me.com

Van Gelder, Hugh M. (Susie)
601 7th Street South, Suite 530, Saint Petersburg, FL 33701-4731
Phone: (727) 526-9355 Fax: (727) 553-7451
Email: hmvg1@tampabay.rr.com

Vaporciyan, Ara A. (Phillipa)
1515 Holcombe Blvd. Box 1489, Houston, TX 77030
Phone: (713) 745-4533 Fax: (713) 794-4901
Email: avaporci@mdanderson.org

Vasilakis, Alexander (Marion)
Heritage Valley Beaver 1000 Dutch Ridge Road, Beaver, PA 15009
Phone: (724) 773-8289 Fax: (724) 773-4532
Email: avasilakis@hvhs.org

+Vassileva, Christina M. (Christian Moses)
114 Doughty Street MSC 295, BM 280, Charleston, SC 29425
Phone: (843) 876-4843 Fax: (843) 876-4866
Email: vassileva@musc.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 319
MEMBERSHIP ROSTER

Vassiliades, Thomas A. Jr. (Venetia)
8200 Coral Sea St. MVS 71, Mounds View, MN 55112
Phone: 763-514-9800
Email: tavassil@gmail.com

Vaughan, G. Dennis, III (Edna)
1551 Ben Sawyer Villa #46, Mt. Pleasant, SC 29464
Email: gdv, III@bellsouth.net

Veeramachaneni, Nirmal K. (Deepika Polineni)
3901 Rainbow Boulevard, Kansas City, KS 66160
Phone: (913) 588-9742
Email: nveeramachaneni@kumc.edu

Vigilance, Deon W. (Monique Vigilance)
IU Health Physicians Cardiovascular Surgeons 1801 N. Senate Blvd., Indianapolis, IN 46202
Phone: (317) 923-1787 Fax: (317) 926-6259
Email: dvigilan@iuhealth.org

Vilaro-Nelms, Juan R.
#16 Terrazas Tintillo, Guaynabo, PR 966
Phone: (787) 281-0122 Fax: (787) 753-3596
Email: mvilaro56@hotmail.com

Vontz, Frederick K.
580 West 8th Street Suite 6001, Jacksonville, FL 32209

Voorhis, Charles C., III
418 Cherry Street, Panama City, FL 32401

Vricella, Luca A. (Simona)
600 N. Wolfe Street Blalock 618, Baltimore, MD 21287
Phone: (443) 287-1262 Fax: (443) 287-3636
Email: lvricella@jhmi.edu

Wagner, Robert B. (Sylvia)
Rockville, MD
Phone: (301) 294-9040 Fax: (301) 424-0029
Email: rbw054@gmail.com

Walker, William A.
939 Emerald Ave Suite 905, Knoxville, TN 37917
Phone: (865) 647-3350
Email: wawalker@cvtsurg.com

Walker, Courtnye Allyson (Elbert Tillerson)
3420 Flanders Rd, Jefferson City, MO 65109
Phone: (843) 324-8551 Fax: (573) 761-7196
Email: nolo09@hotmail.com

**Walker, James H. (Helen)
600 Morris Street Suite 101, Charleston, WV 25301
Phone: (304) 388-7120 Fax: (304) 388-7124
Email: walkertcv@aol.com

**Walker, Olyn M. (Marva)
4415 Shady Lane, Wichita Falls, TX 76309
Phone: (940) 761-2922 Fax: (940) 761-8421
Walker, Jennifer (Mark)
Division of Cardiac Surgery S3-71, Worcester, MA 1655
Phone: (508) 334-2577
Email: Jennifer.Walker@umassmemorial.org

**Walkup, Harry E. (Mary)
12836 Still Pond Creek Road, Worton, MD 21678-1567
Phone: (410) 348-5618

Wall, Matthew J., Jr.
One Baylor Plaza, Houston, TX 77030
Phone: (713) 873-3421 Fax: (713) 798-6084
Email: mwall@bcm.tmc.edu

Wallenhaupt, Stephen L.
200 Hawthorne Lane, Charlotte, NC 28233-3549
Phone: (704) 384-5725 Fax: (704) 316-9144
Email: slwallenhaupt@novanthealth.org

**Walls, Joseph T.
1031 Bourn Avenue, Columbia, MO 65203

Walsh, John A. (Mary)
61 Memorial Medical Parkway Suite 1-800 B, Palm Coast, FL 32164
Phone: (386) 586 0760 Fax: (386) 586 0762
Email: johnwalsh@msn.com

Walsh, Garrett L.
1515 Holcombe Boulevard Unit 1489, Houston, TX 77030
Phone: (713) 792-6849 Fax: (713) 794-4901
Email: gwalsh@mdanderson.org

Walters, Henry (Katherine)
Children’s Hospital of Michigan 3901 Beaubien, Detroit, MI 48201
Phone: (313) 745-5538 Fax: (313) 993-0531
Email: hwalters@dmc.org

Ward, Austin N.
4612 Marlberry Place, Lexington, KY 40509
Phone: (270) 556-3314
Email: austinward@uky.edu

**Ware, Robert D. (Peggy)
3548 Captians Way, Knoxville, TN 37922
Phone: (423) 632-5900 Fax: (423) 637-2114

Warren, Edward T. (Angie)
1900 Malvern Avenue Suite 403, Hot Springs National Park, AR 71901
Phone: (501) 262-2556 Fax: (501) 624-5029
Email: twarren@HSNP.com

**Watson, Donald C., Jr. (Susan)
47 Cedar Hill Drive, Biltmore Forest, NC 28803
Phone: (828) 277-0677 Fax: (828) 277-0677
Email: dwutmem@aol.com

Watts, Larry T.
1001 Blythe Blvd., Ste. 300, Charlotte, NC 28203
Phone: (704) 373-0212

**Senior Member  +New Member  ‡Resident Member  *Home Address

STSA 63rd Annual Meeting 321
MEMBERSHIP ROSTER

**Waxman, Jonathan**  
670 Glades Rd., Boca Raton, FL 33431  
Phone: (561) 395-2626 Fax: (561) 395-7026  
Email: jonathanwaxmanmd@yahoo.com

**Weaver, James P. (Anne)**  
4301 Ben Franklin Blvd., Durham, NC 27704-2167  
Phone: (919) 471-0215 Fax: (919) 471-4642  
Email: jpweaver@duke.edu

**Webb, Watts R. (Frances)**  
364 Windermere Blvd, Alexandria, LA 71303  
Phone: (318) 445-9482  
Email: wattsrwebb@yahoo.com

‡Wei, Benjamin (Victoria)  
3460 Oak Canyon Drive, Birmingham, AL 35243  
Phone: (205) 934-5937 Fax: (205) 975-2815  
Email: benjaminweimd@gmail.com

Weiman, Darryl S. (Kathleen)  
910 Madison Ave 2nd Floor, Rm 208, Memphis, TN 38163  
Phone: (901) 652-2351 Fax: (901) 448-7588  
Email: dweiman@uthsc.edu

Weiss, Eric S.  
1141 N. Old World 3rd St. Unit 3002, Milwaukee, WI 53203  
Phone: (262) 777-1726 Fax: (414) 649-3794  
Email: eric.weiss@aurora.org

Wells, D. Christopher (Eleanor)  
901 Bowring Park, Nashville, TN 37215  
Phone: (615) 818-0666  
Email: dchriswells@gmail.com

**Wells, Van Henry (Ruth)**  
6388 Cottingham Place, Memphis, TN 38120-3202

•Weston, Jaye Alexander  
711 Holiday Drive Apt. 37, Gavelston, TX 77550  
Phone: (281) 687-8813  
Email: jaweston@utmb.edu

•Wheatley, Grayson H., III  
2400 Patterson Street, Suite 307, Nashville, TN 37203  
Phone: (215) 707-8303 Fax: (215) 707-1576  
Email: grayson.wheatley@tuhs.temple.edu

**White, John J. (Andrea)**  
11803 Stendall Drive North, Seattle, WA 98133  
Fax: (206) 417-3689  
Email: gawjjw@yahoo.com

White, Robert Keith  
312 Grammont St Ste 410, Monroe, LA 71201-7457  
Phone: (318) 966-6300 Fax: (318) 675-6141  
Email: rkw716@bellsouth.net
**Wildstein, Gilbert (Lynn)**  
GA  
Fax: (404) 261-2624  
Email: gilwild@cs.com

**Williams, Marcus Gerard**  
4 Phillip Court, Johnson City, TN 37604  
Phone: (423) 282-1685  
Email: MWilliams@mycva.com

**Williams, J. Mark (Jackie)**  
Brody School of Medicine at ECU Department of Cardiovascular Sciences, Greenville, NC 27834  
Phone: (252) 744-5232 Fax: (252) 744-5233  
Email: williamsjohnm@ecu.edu

‡Williams, Derek  
3930 Bowser Ave #2, Dallas, TX 75219  
Phone: (314) 406-0260  
Email: derkwill@gmail.com

**Williams, Matthew Lanier**  
Heart and Vascular Pavilion 51 N. 39th Street, Philadelphia, PA 19104  
Email: matthew.williams@uphs.upenn.edu

**Wilson, Louie Cecil (Gail)**  
7 Yester Place Suite 302, Mobile, AL 36608  
Fax: (251) 344-4307  
Email: wilson188@comcast.net

**Wilson, Charles H. (Judith)**  
1200 North Elm Street, Greensboro, NC 27401  
Phone: (336) 832-8745 Fax: (336) 832-8192  
Email: charles.wilson@mosescone.com

Wolf, Bradley Aaron  
6029 Walnut Grove Rd Suite 401, Memphis, TN 38120  
Phone: (901) 226-0456 Fax: (901) 226-0458  
Email: brad.wolf@bmg.md

**Wolf, Rodney Y. (Brenda)**  
6029 Walnut Grove Road Suite 401, Memphis, TN 38120  
Phone: (901) 747-3066 Fax: (902) 747-2966

**Wolfe, Walter G. (Jackie)**  
P.O. Box 3507, Durham, NC 27710  
Phone: (919) 684-4117 Fax: (919) 681-8912  
Email: bradl005@mc.duke.edu

**Wolpowitz, Allan (Teri Lee)**  
413 Wild Horse Circle, Boulder, CO 80304-0459  
Phone: (303) 413-8450 Fax: (303) 413-8451

**Wood, Richard E. (Judith)**  
3600 Gaston Avenue-Suite 404, Dallas, TX 75246  
Phone: (214) 827-3890 Fax: (214) 823-9310  
Email: richarwo@baylorhealth.edu

**Senior Member  +New Member  ‡Resident Member  *Home Address**
**Woods, Edward L. (Josephine Marcia)**
The Geisinger Clinic Cardiothoracic Surgery, Danville, PA 17822-2150
Phone: (570) 271-6367 Fax: (570) 271-5840
Email: ewoods@geisinger.edu

**Woods, Leon P. (Ann)**
8409 Mile Tree Drive, Fort Smith, AR 72903
Phone: (501) 452-1379

**Woo-Ming, Michael O. (Prudence)**
Indian River Memorial Hospital 91 Cache Cay Drive, Vero Beach, FL 32963
Phone: (772) 234-2481 Fax: (772) 234-2481
Email: WMFACS@yahoo.com

Wozniak, Thomas C. (Kristi)
1801 N. Senate Blvd. MPC 2, Indianapolis, IN 46202
Phone: (317) 963-1010 Fax: (317) 929-3256
Email: twozniak@iuhealth.org

**Wright, Creighton B. Sr. (Carolyn)**
224 East Second Street, Covington, KY 41001-1704
Phone: (513) 421-3494 Fax: (513) 345-2606
Email: cbw@one.net

Wright, Christopher C. (Sandy)
890 West Faris Road Suite 550, Greenville, SC 29605
Phone: (864) 455-6800 Fax: (864) 455-6825
Email: cwright107@aol.com

Wudel, Leonard James Jr. (Carlyn Marie)
Wake Forest Baptist Medical Center Medical Center Boulevard, Winston-Salem, NC 27157
Phone: (336) 716-2124
Email: ljwudel@gmail.com

**Wukasch, Don C. (Linda)**
500 W. 18th Street, Austin, TX 78701-1229
Phone: (512) 472-4700 Fax: (512) 472-4701
Email: donwuk@swbell.net

Wyatt, David Alan (Sharon)
2001 Crystal Spring Avenue Suite 201, Roanoke, VA 24014
Phone: (540) 853-0100 Fax: (540) 342-9308
Email: dawyatt@carilionclinic.org

Yang, Stephen C.
600 North Wolfe Street Blalock 240, Baltimore, MD 21287
Phone: (410) 614-3891 Fax: (410) 614-9428
Email: syang@jhmi.edu

Yarbrough, William M. (Ashley)
2750 Laurel Street Suite 305, Columbia, SC 29204
Phone: (803) 254-5140 Fax: Email: yarbro72@gmail.com

Yarbrough, John W. (Anne)
1480 Greenhill Rd. Columbia, SC 29206
Phone: (803) 254-5140 Fax: (803) 779-1279
Email: yarbrojw@yahoo.com
**Yeh, Thomas J. (Doris)**
4700 Waters Avenue Suite 403, Savannah, GA 31404
Phone: (912) 352-0024 Fax: (912) 353-9196
Email: y7927@aol.com

Yeh, Thomas
1430 Tulane Ave (SL-22), New Orleans, LA 70112
Phone: (504) 988-7520 Fax:
Email: yehjr@aol.com

Yendamuri, Sai (Sunita Manuballa)
Roswell Park Cancer Institute Elm and Carlton Streets,
Buffalo, NY 14263
Phone: (716) 845-5873 Fax: (716) 845-7692
Email: nancy.sikora@roswellpark.org

**Youngblood, Robert W. (Peggy)**
1517 Tanglewood Circle, Florence, SC 29501
Phone: (843) 662-9562 Fax: (843) 678-9276
Email: ryoungblood8633@aol.com

‡Yount, Kenan Whitaker
613 Shamrock Road, Charlottesville, VA 22903
Phone: (434) 422-2472 Fax: (434) 982-3885
Email: kenan.w.yount@gmail.com

**Yousufuddin, Mohammed (Nafees)**
230 Spring Valley Road, Columbia, SC 29223
Phone: (803) 788-9031
Email: m_yousufuddin@msn.com

Yuh, David D.
Yale University Section of Cardiac Surgery 333 Cedar Street,
Boardman Building 204, New Haven, CT 6520
Phone: 203 785-3000 Fax: (410) 955-3809
Email: david.yuh@yale.edu

**Zakaria, Majed S.**
P.O. Box 1060, Riverdale, GA 30274

**Zakharia, Alex T. (Andree)**
325 Catalina Avenue, Coral Gables, FL 33134
Phone: (305) 445-6921 Fax: (305) 661-5799
Email: kzakharia@juno.com

Zehr, Kenton J.
2301 Essex Street, Baltimore, MD 21224-3616
Phone: (507) 254-0908
Email: zehrkj@mac.com

Zellner, James L. (Barbara)
2108 East Third Street Suite 300, Chattanooga, TN 37404
Phone: (423) 624-5200 Fax: (423) 624-4440
Email: jzellner@actvsurgeons.com

**Zeok, John V. (Suzanne)**
1601 Quaker Ridge Point, Raleigh, NC 27615
Phone: (919) 231-6333 Fax: (919) 231-6334
Email: JOHNZ60794@AOL.COM

**Senior Member  +New Member  ‡Resident Member  *Home Address**
**Zimberg, Yale H. (Goldie)**  
Commonwealth Surgeon 5855 Bremo Road Suite 506, Richmond, VA 23226-1925  
Phone: (804) 285-3225 Fax: (804) 285-0360

**Zocco, J. James**  
1941 Oakengate Lane, Midlothian, VA 23113  
Phone: (804) 320-2751 Fax: (804) 330-3831  
Email: zocdoc@ymail.com

**Zollinger, Richard W., II (Elizabeth)**  
3701 Oldridge Ct., Charlotte, NC 28226  
Phone: (704) 543-0122  
Email: rzollinger@me.com

Zorn, George L. (Jennifer)  
3901 Rainbow Blvd Mailstop 4035, Kansas City, MO 66160  
Phone: (816) 931-3312  
Email: gzorn@kumc.edu

**Zorn, Jr., George L. (Jane)**  
3116 Old Ivy Road, Birmingham, AL 35210  
Phone: (205) 951-9751 Fax: (205) 975-7214  
Email: gzorn3116@charter.net

**Zumbro, George L., Jr. (Pennie)**  
501 Blackburn Dr, Augusta, GA 30904-8201  
Phone: (706) 854-8340 Fax: (706) 854-8341  
Email: GeorgeZumbro@aol.com

Zwischenberger, Joseph B. (Sheila)  
MN 264, A. B. Chandler Med Ctr 800 Rose St, Lexington, KY 40536-0298  
Phone: (859) 323-6013 Fax: (859) 323-1045  
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Sea Bright
Forrest Rubenstein

Trenton
Robert S. Poston

Voorhees
Joseph A. Kuchler

NEW MEXICO
Albequerque
Marco Ricci

NEVADA
Las Vegas
J.E. Rick’ Martin
Neel V. Dhudshia

NEW YORK
Buffalo
Sai Yendamuri
Stephen W. Downing

New York
Brendon M. Stiles
Daniela Molena
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James M. Isbell
Joshua R. Sonett
Julie A. Swain
Matthew Bott
Paul Jubeong Chai

Plattsburgh
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Syracuse
Gary R. Green

OHIO
Beachwood
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Cincinnati
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Geoffrey A. Answini
George M. Callard
James S. Tweddell
John R. Robinson
Mario Castillo-Sang
William H. Cook

Cleveland
Robert D. Stewart

Columbus
Ahmet Kilic
Jefferson M. Lyons
Jonathan M. Enlow

Dayton
Jose Rafael Rodriguez

Kettering
Karl J. Borsody

Portsmouth
Jeremiah Thomas Martin

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Edmond
Donald E. Stowell

Enid
F. Clark Sauls

Inola
Frank Ernest Schmidt, Jr.

Lawton
Aaron L. Trachte

Nichols Hills
R. Darryl Fisher

Norman
James Richard McCurdy

Oklahoma City
Charles Craig Elkins
Harold M. Burkhart
James M. Hartsuck
Jess Lee Thompson, III
Marvin D. Peyton
Paul J. Kanaly
R. Mark Bodenhamer
Ronald C. Elkins
Subrato J. Deb
William D. Hawley
Tulsa
Billy Paul Loughridge
Donald R. Bergman
Edward W. Jenkins
Frank N. Fore
Robert L. Anderson
Robert C. Blankenship

OREGON
Ashland
Daniel C. Campbell, Jr.

Eugene
John M. Armitage

Portland
Howard K. Song
Paul Schipper

PENNSYLVANIA
Beaver
Alexander Vasilakis

Bethlehem
William R. Burfeind, Jr.

Bryn Mawr
L. Henry Edmunds

Danville
Edward L. Woods
Matthew A. Facktor

Franklin
James W. Klena

Greensburg
Michael Francis Szwerc

Hershey
Joseph Brian Clark

Kittanning
Rodney J. Landreneau

Lancaster
Jeffrey Todd Cope

Lititz
Paul S. Brown, Jr.

Philadelphia
Christopher E. Mascio
J. William Gaynor
Joel D. Cooper
John W. C. Entwistle, Ill

352 STSA 63rd Annual Meeting
Matthew Lanier Williams
Randy M. Stevens
Thomas L. Spray

**Pittsburgh**
Arjun Pennathur
Danny Chu
George J. Magovern, Jr.
James J. Rams
Mahesh S. Sharma
Robert J. Moraca
Victor O. Morell

**Scranton**
Edwin C. Neville

**Womelsdorf**
Christian L. Gilbert

**SOUTH CAROLINA**
**Bluffton**
William T. Mattingly

**Charleston**
Chadrick E. Denlinger
Christina M. Vassileva
Elizabeth M. Kline
Fred A. Crawford, Jr.
H. Biemann Othersen, Jr.
Jacob A. Klapper
John S. Ikonomidis
John A. Spratt
John Matthew Toole
Joseph W. Rubin
Michael L. Edwards
Minoo Naozer Kavarana
R. Randolph Bradham
Robert M. Sade
Scott M. Bradley
Scott D. Ross

**Columbia**
Dail W. Longaker
David E. Tribble
Edward M. Leppard, Jr.
J.W. Randolph Bolton
James Ryan Burke
Jeffery S. Martin
John W. Yarbrough
Mohammed Yousufuddin
Reid W. Tribble
Robert J. McCardle
Scott J. Petit
William M. Yarbrough

**Dale**
Marshall C. Sanford
Florence
Charlie D. Smith, III
Michael J. Carmichael
Robert W. Youngblood
Russell L. McElveen
Scot C. Schultz
Alan P. Kypson
Andy Christopher Kiser
Barry R. Davis
Carl E. Anderson
Christopher C. Wright
Hugh M. Dennis
Scott H. Johnson
William Bolton

Greenwood
Claudio Guareschi

Hilton Head Island
Morris H. Drucker

Irmo
John W. Brown

Kiawah Island
Sewell H. Dixon, Jr.

Landrum
W. Robin Howe
Ganesh M. Pai

Mauldin
James F. Ballenger

Mt. Pleasant
G. Dennis Vaughan, III

Sea Brook Island
John P. Sutton

Spartanburg
Henry G. Kelley, Jr.

West Columbia
Jeffrey A. Travis

TENNESEE
Bristol
William H. Messerschmidt

Chattanooga
Ashley Miller
Clifton Reade
James Robert Headrick
James L. Zellner
Jeremy Smith
Nashville
Alanson R. Spalding, III
Ashish S. Shah
Ben R. Barton
Bret Allen Mettler
D. Christopher Wells
David P. Bichell
Davis C. Drinkwater
Dennis M. Gilmore
Eric L. Grogan
Eric S. Lambright
Evelio Rodriguez
Feiran Lou
Grayson H. Wheatley, III
Harvey W. Bender, Jr.
Henry F. Todd
J. Scott Rankin
Jackson Harris
John C. Austin
John A. Howington
John H. Selby, Jr.
John R. Roberts
Jonathan C. Nesbitt
Judson G. Randolph
Karla G. Christian
Kenneth H. Laws
L. Lee Lancaster
Lawrence J. Pass
Michael R. Petracek
Robert A. Hardin
Tammy M. Baxter
Timothy F. Danish
V. Seenu Reddy
Walter H. Merrill
William C. Alford
William H. Edwards
William S. Stoney

Oak Ridge
William C. Hall

Signal Mountain
Joel E. Avery

Townsend
John W. Mack

TEXAS
Abilene
David E. Carlson

Amarillo
Masoud A. Alzeerah
Robert L. Taylor
W. Allison Guynes
Arlington
Darien W. Bradford
James F. Norcross

Austin
Don C. Wukasch
Homer S. Arnold
Jeffrey D. McNeil
John D. Oswalt
Lewis G. King
Mark C. Felger
R. Brent New
Reginald C. Baptiste
Stephen J. Dewan

Bellaire
Kim Insua de la Cruz

Boerne
Ridlon J. Kiphart

Brownsville
Carlos M. Chavez

Bullard
Charles T. Meadows

Burnet
Kenneth R. T. Tyson

Corpus Christi
Sergio Tavares

Dallas
Betsey B. Urschel
Brian Lima
Dan M. Meyer
Derek Williams
Eric N. Mendeloff
Gary Schwartz
Gerald F. Geisler
Gonzalo V. Gonzalez-Stawinski
Hasmukh H. Shah
J. Michael DiMaio
J. Peter Thiele
James R. Edgerton
John J. Squiers
Joseph M. Forbess
Kemp H. Kernstine
Kristine J. Guleserian
Mitchell J. Magee
Richard E. Wood
Shankar Meenakshi Sundaram
Syma Prince
Todd M. Dewey
Vinod A. Sebastian
W. Steves Ring
GEOGRAPHIC

Denton
Minh P. Tran
Tung H. Cai

Fair Oaks Ranch
Andrea J. Carpenter

Fort Worth
Eugene D. Olcott
Reza S. Khalafi
Vincent K.H. Tam

Friendswood
Robert H. Smiley

Frisco
Michael E. Jessen

Galveston
Abe DeAnda, Jr.
Vincent R. Conti

Garland
Edson HK Cheung

Gavelston
Jaye Alexander Weston

Harlingen
Marion R. Lawler, Jr.

Highland Village
R. Duncan Sutherland

Houston
Adel D. Irani
Anthony L. Estrera
Ara A. Vaporciyan
Basel Ramlawi
Boris Sepesi
Carlos M. Mery
Charles D. Fraser, Jr.
David C. Rice
Denton A. Cooley
Emmett Dean McKenzie
Garrett L. Walsh
George J. Reul
Grady L. Hallman
Gregory Pattakos
Hazim J. Safi
J. Michael Duncan
James J. Livesay
Javier A. Lafuente
Jeffrey S. Heinle
Joseph Stapleton Coselli
Julia C. Swanson
Kamal G. Khalil
Kenneth L. Mattox
Lauren Kane
Laurens R. Pickard
Mara B Antonoff
Matthew J. Wall, Jr.
Michael H. Hines
Michael J. Reardon
Michael S. Sweeney
Michael P. Macris
Min Peter Kim
Oscar H. Frazier
Ourania Preventza
Puja Gaur
Reza J. Mehran
Ross M. Reul
Scott A. LeMaire
Stephen G. Swisher
Subhasis Chatterjee
Timothy Hamilton
Todd Rosengart
Tom C. Nguyen
Wayne Hofstetter
William E. Cohn

Humble
vinder S. Bhatia

Lufkin
David A. Ladden

McAllen
Jesus Rodriguez Aguero
James W. Jones

Nacogdoches
James A. Allums
Lyle L. Brown

Plano
Michael J. Mack
Robert E. Rawitscher
William H. Ryan

Port Aransas
Robert Gerald Carlson

Port Arthur
O. LaWayne Miller, Jr.

Richmond
Uttam Tripathy

Rockport
William M. Ashe

Rockwall
Cathy E. Knoff
GEOGRAPHIC

San Angelo
Andrew Tucker Hume
Jason E. Felger

San Antonio
Alfonso Chiscano
Amanda L. Eilers
Broadus Zane Atkins
Bryan Scott Helsel
Carmelo Otero
Chad N. Stasik
Clinton E. Baisden
David Bennet Graham
Edward Y. Sako
Evaristo Fernandez Sada
Hao Pan
J. Marvin Smith, III
John H. Calhoon
Muhammad Mumtaz
Renata B. Ford
Richard G. Rouse
Robert H. LePere
Robert L. Treasure
S. Adil Husain
Scott B. Johnson
Tim S. Lyda

Sherman
George W. Johnson, Jr.

Temple
Byung H. Chung
Ronald H. Hayward
Wade L. Knight

The Woodlands
H. Andrew Hansen, II

Tyler
Ken Nelson
Peter M. Sanfelippo
Roy L. Kingry, Jr.

Victoria
Robert H. Johnston

Waco
Philip H. Croyle
Robert T. Angel
William A. Peper

Wichita Falls
Olyn M. Walker

UTAH
Lehi
James C. Jones
Ogden
Rafe C. Connors

Salt Lake City
Phillip Todd Burch

VIRGINIA
Arlington
John W. Rhee

Bedford
Harry P. Clause, Jr.

Charlottesville
Armin Kiankhooy
Bradley M. Rodgers
Christine L. Lau
Curtis G. Tribble
Damien J. LaPar
Gorav Ailawadi
Irving L. Kron
James J. Gangemi
Jennifer L. Alejo
Jesse Madden
John A. Kern
Kenan Whitaker Yount

Charlottesville (cont.)
Linda W. Martin
Nicholas Teman
Ravi Ghanta
Robert Bruce Hawkins, II
Sarah Schubert
Thomas M. Daniel
William S. Hotchkiss

Danville
James D. Sprinkle
John M. Stoneburner

Falls Church
Alan M. Speir
Lucas R. Collazo
Sandeep Khandhar
William S. Lyons
Thomas M. Fulcher

Hampton
Peter M. Moy

Lynchburg
David W. Frantz
Stuart H. Harris, Jr.

Manakin Sabot
William A. Robertson
<table>
<thead>
<tr>
<th>Location</th>
<th>Members</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midlothian</td>
<td>J. James Zocco, Szabolcs Szentpetery</td>
</tr>
<tr>
<td>Moseley</td>
<td>Robert T Ferguson</td>
</tr>
<tr>
<td>Newport News</td>
<td>Charles E. Umstott</td>
</tr>
<tr>
<td>Norfolk</td>
<td>Joseph R. Newton</td>
</tr>
<tr>
<td>Oakton</td>
<td>Nelson A. Burton</td>
</tr>
<tr>
<td>Petersburg</td>
<td>Ernest R. Rodriguez-Ramos, Frederick D. Bergen</td>
</tr>
<tr>
<td>Portsmouth</td>
<td>Vasken K. Tenekjian</td>
</tr>
<tr>
<td>Richmond</td>
<td>Anthony D. Cassano, David H. Harpole, Thomas D. Christopher</td>
</tr>
<tr>
<td>Richmond (cont.)</td>
<td>Vigneshwar Kasirajan, Yale H. Zimberg</td>
</tr>
<tr>
<td>Spotsylvania</td>
<td>Michael C. Banker</td>
</tr>
<tr>
<td>Suffolk</td>
<td>Daniel P. McMahon</td>
</tr>
<tr>
<td>Virginia Beach</td>
<td>J. Robert Morris, John P. Clarke, Walter E. Beasley, III</td>
</tr>
<tr>
<td>Williamsburg</td>
<td>John M. Pitman, Jr.</td>
</tr>
<tr>
<td>Winchester</td>
<td>R. Daley Goff, Jr.</td>
</tr>
</tbody>
</table>
Yorktown
Walter H. Graham

VERMONT
Burlington
R. Morton Bolman, Ill

Post Mills
Norman J. Snow

WASHINGTON
Bellevue
Robert S. Binford
James H. Mehaffey

Madison
Paul C.Y. Tang

Seattle
Jay D. Pal
John J. White

WISCONSIN
Ellison Bay
Chester L. Holmes

Madison
James D. Maloney
Nilto C. De Oliveira
Shahab A. Akhter

Milwaukee
Eric S. Weiss
John David Crouch
Michael E. Mitchell
Peter C Kouretas

Waukesha
John J. Kelemen, III

WYOMING
Charleston
James H. Walker

Elkview
Kristine Deel

Huntington
John D. Harrah

Morgantown
Donald E. McDowell
Robert A. Gustafson
Vinay Badhwar
South Charleston
John Deel

Wheeling
Ahmad Rahbar

Casper
Joseph M. Monfre

Jackson
Kenneth M. Begelman

Shell
Meredith L. Scott

CANADA
Toronto
Tirone E. David

Vancouver
Basil Saad Nasir
Sanjiv K. Gandhi

Victoria
Cliff Choong

GERMANY
Hannover
Axel E. Haverich

Leipzig
Friedrich W Mohr

GREECE
Glyfada
George M. Palatianos

NORWAY
Oslo
Harald L. Lindberg

PORTUGAL
Leca Da Palmeira
Mario N. Gomes
PUERTO RICO
Guaynabo
Juan R. Vilaro-Nelms

Mayaguez
Raul F. Garcia-Rinaldi

San Juan
Ivan F. Gonzalez

SOUTH KOREA
Daegu
Jae Hyun Kim

SWITZERLAND
Pully-Lausanne
Andreas P. Naef

Zurich
Marko I. Turina
CONSTITUTION
AND BYLAWS
ARTICLE I: NAME
The name of the Corporation shall be the SOUTHERN THORACIC SURGICAL ASSOCIATION, INC. (hereinafter designated as “the Association”).

ARTICLE II: OBJECTIVES
The Association is a not-for-profit corporation whose principle objectives are to disseminate knowledge and information and to stimulate progress in the field of thoracic and cardiovascular surgery in the designated geographic area. The mission of the organization is to: support southern and southern trained members of the cardiothoracic surgery community and their families in the pursuit of the highest quality patient care, education, scientific achievement, collegiality, and life balance.

The Association will:
1. Disseminate knowledge, encourage research and report at the annual meeting, scientific session and postgraduate course on the advancements within the field of thoracic and cardiovascular surgery.
2. Promote fellowship among thoracic and cardiovascular surgeons throughout the designated geographic area.
3. Assure that the activities of the Association are undertaken without any discrimination with regard to race, color, religious creed, national origin, ancestry, physical handicap, medical condition, marital status or sex.

ARTICLE III: OFFICES
The Association shall have and continuously maintain a registered office and a registered agent in the State of Illinois, and may have such other offices in or outside the State of Illinois at the Council’s discretion.

ARTICLE IV: MEMBERS
SECTION 1. Membership. There shall be six (6) categories of members: Active, Senior, Resident, Student, Associate, and Honorary Member. Members shall be individuals who support the purpose of the Association and who agree to comply with the Association’s rules and regulations. Active and Senior members shall be entitled to hold office and shall have voting privileges. Active and Senior Members must be board certified by the American Board of Thoracic Surgery or its foreign equivalent. If an Active Member moves from the designated membership geographical area outlined in SECTION 2, he or she may retain membership as long as all other requirements for membership are satisfied. Members whose practices have been limited because of disability, or who have reached the age of 65 years, may apply for Senior Membership. The Association shall not be required to subscribe to The Annals of Thoracic Surgery for Senior members. Associate Members include support staff for practicing cardiothoracic surgeons including, but not limited to, nurses, nurse practitioners, perfusionists, physician assistants, and research staff. Honorary membership can be bestowed upon a worthy recipient upon recommendation of the Council and ratification by a two-thirds majority of the votes at the annual meeting. Honorary Members are broadly defined as physicians who have made significant contributions to the field of cardiothoracic surgery. Nomination for Honorary Membership can be made to the Council in writing for review prior to the spring Council Meeting. Honorary Members are welcomed at all scientific and business meetings of the Association.
but have no obligations or responsibilities in the organization. Honorary, Associate, Resident, and Student Members do not have voting privileges, nor may they hold office. Resident Members must be matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education that is within the STSA region provided for in SECTION 2 to be classified as a Resident Member. Resident Members may retain membership up to three years following the completion of their thoracic surgery training. Resident members who have been certified in thoracic surgery by the American Board of Thoracic Surgery (ABTS) may, upon written request to the Association and with approval of the Membership Committee and the Council, transition directly, with no initiation fee applied, to Active Membership. If no such official request is forthcoming, Resident Membership will be terminated and reinstatement will be dependent upon a formal application for Active Membership, with its associated requirements, including initiation fee and approval by the full membership. Student Members may apply for membership by expressing a desire to enter the field of cardiothoracic surgery. Student members may transfer to Resident Member status once they have matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education that is within the STSA region.

SECTION 2. Applicants. An applicant for Active Membership must at the time of acceptance reside, or have previously practiced cardiothoracic surgery for at least one year, or have completed a thoracic or general surgery residency program, or have completed a thoracic or cardiovascular research or clinical fellowship for at least twelve consecutive months in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. An applicant for active membership must be certified by the ABTS. Applicants who meet the practice requirement above but whose training has been in countries other than the United States of America, and who are certified as proficient in thoracic and cardiovascular surgery by appropriate authorities in their home country, may apply. At least seventy-five percent of the practice of the applicant must be devoted to the field of thoracic and cardiovascular surgery, which may include research and peripheral vascular surgery. If an applicant is unsuccessful in obtaining membership in two successive years, an interval of two years must elapse before he/she may reapply. The Membership Committee and the Council may recommend acceptance of foreign training and certification by stating that, in their opinion, it represents equivalent status. The Membership Committee and Council may recommend acceptance of individuals who, despite not meeting membership criteria regarding training, practice or research in the STSA region, have demonstrated significant involvement with the organization through their participation in the annual meeting, contributions to the scientific program, and service to the organization. Applicants so approved by the Membership Committee and the Council may become Active Members upon election by the membership at an annual meeting.
An applicant for Resident Membership must at the time of acceptance be matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. Individuals who have completed their education in one of the above programs and are in the process of acquiring certification in thoracic surgery by the ABTS are eligible to apply for Resident Membership.

An applicant for Associate Membership must at the time of acceptance be working in field of allied health related to the practice of cardiothoracic surgery in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean.

An applicant for Student Membership must at the time of acceptance be enrolled in medical school or general surgery residency in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. They must submit a written statement of interest in cardiothoracic surgery.

Active Membership status will not become effective, nor a certificate of membership presented, unless and until such elected applicant registers at one of the next four annual meetings following his/her initial election to membership. Resident and Associate Membership status will not become effective, nor a certificate of membership presented, unless and until such elected applicant registers for and attends an annual meeting following his or her election to membership. Exception for this requirement may be granted by a majority vote of the Council. Failure to comply with this procedure will require reapplication for membership.

SECTION 3. Applications. Application forms for Active, Resident, Associate, and Student Membership are available from the Secretary-Treasurer or at www.stsa.org and are forwarded to the Chairman of the Membership Committee for verification. Applications will be verified by the Membership Committee in accordance with the policies and procedures established by the Council.

SECTION 4. Certificates. The Council shall issue a Certificate of the Association evidencing the member’s admission to the Association and indicating membership status. These certificates remain the sole property of the Association and shall be surrendered upon written demand and/or for non-payment of dues.

SECTION 5. Resignation. Members may resign from the Association at any time by giving written notice to the Secretary-Treasurer of the Association. Such resignation shall not relieve the member of any obligation for dues, assessments or other charges previously accrued and unpaid. Membership is not transferable or assignable.
SECTION 6. Termination of Membership. The Council, by affirmative vote of two-thirds of all Council members present and voting at any duly constituted meeting of the Council, may suspend or expel a member for cause after an appropriate hearing in accordance with policies and procedures established by the Council. The Council, by affirmative vote of a majority of all Council members present and voting at any duly constituted meeting of the Council may terminate the membership of any member who has become ineligible for membership in accordance with the policies and procedures established by the Council.

SECTION 7. Application for Reinstatement. Any former members of the Association may apply for reinstatement through the regular application procedure.

ARTICLE V: DUES AND ASSESSMENTS
The initiation and annual dues for each category of member of the Association, the time for paying such dues, and other assessments, if any, shall be determined by the Council. Annual dues are not refundable.

ARTICLE VI: MEETING OF MEMBERS
SECTION 1. Annual Meeting. The annual meeting of the members shall be held at a date, time and place determined by the Council and shall be held in conjunction with the scientific session of the Association.

SECTION 2. Purpose. The purpose of the annual meeting is to: elect officers and councilors; receive reports from the Association on the activities of the Council; provide members an opportunity to express their opinions on matters affecting the Association; and to dispense with such other business, as necessary. The order of business for a meeting shall be determined in advance by the President and subsequently adopted at a called meeting.

SECTION 3. Special Meetings. Special meetings of the membership may be called by the President or the Council. Such special meetings shall be held at a date, time and place as determined by the Council.

SECTION 4. Notice of Meetings. Written notice stating the date, time and place of any annual or special meeting shall be delivered no less than seven (7) days, nor more than 30 days, before the date of the meeting to each member entitled to vote at the meeting. In the case of removal of one or more Council members, a merger, consolidation, dissolution or sale of assets, a written notice of no less than twenty (20) days or more than sixty (60) days before the date of the meeting will be given by, or at the direction of, the President, the Secretary, or the Council.

SECTION 5. Quorum. The quorum for the transaction of business at a meeting of members or special meeting shall be a majority of the members attending that meeting.

SECTION 6. Voting. Each member with voting rights shall be entitled to only one (1) vote. A majority of the votes present at a meeting where a quorum is present shall be necessary for the adoption of any matter voted upon by the members, except where otherwise provided by law, the articles of incorporation of the Association or these bylaws.

SECTION 7. Informal Action. Required action may be taken without a meeting if a consent in writing, setting forth the action taken, is signed by not less than the minimum number of members necessary to authorize such action at a meeting, except for dissolution of the Association, which must be voted on at a special meeting of the members entitled to vote.
ARTICLE VII: OFFICERS AND THE COUNCIL

SECTION 1. General Powers. The property, business and affairs of the Association shall be managed by the Council. The Council may adopt such rules and regulations for the conduct of its business as shall be deemed advisable and may, in the execution of the power granted, appoint such agents as necessary. In addition, the Council shall act as a Board of Censors for the trial of all alleged offenses against the bylaws. A report by the Chairman of the Council shall be made to the members at the annual meeting.

SECTION 2. Number, Tenure and Qualifications. The Council shall consist of the Past President, the Chairman of the Council (Immediate Past President), the President, the President-Elect, the Vice President, the Secretary/Treasurer, the Director of Continuing Medical Education, the Historian and three Councilors-At-Large. The Secretary/Treasurer Elect, the representative of the Board of Governors of the American College of Surgeons, representative of the Advisory Council for Cardiothoracic Surgery of the American College of Surgeons, the Editor of The Annals of Thoracic Surgery, the Chairman of the Program Committee, the Chairman of the Membership Committee, and the Chairman of the Postgraduate Program Committee shall attend the Council meetings without vote.

SECTION 3. Election. The eligible members will elect the Council Officers shall be elected annually to serve a one-year term, except the Secretary/Treasurer whose term shall be for four years and the historian whose term shall be for four years and who can be re-elected. The President, Vice President and Secretary/Treasurer are not eligible for re-election. The term of office of councilors-at-large shall be two years. Two Councilors shall be elected one-year and one Councilor the next year to replace the retiring members, unless a vacancy or vacancies has occurred, in which case an additional Councilor(s) shall be appointed by the President to fill the vacant term(s).

SECTION 4. Resignation. Any Council member may resign at any time by giving written notice to the President. Such resignation shall take effect when the notice is delivered, unless the notice specifies a future date. Another exception would be, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

SECTION 5. Annual Meetings. The annual meeting of the Council shall be held at the time and place designated by the Council in connection with the annual members meeting.

SECTION 6. Regular Meetings. The Council may hold regular meetings at such place and at such times as designated by the Council.

SECTION 7. Special Meetings. Special meetings of the Council may be held at any place and time on the call of the President or at the request in writing of any three Council members.

SECTION 8. Notice of Meetings. Notice of special meetings of the Council shall be delivered by, or at the direction of, the Secretary/Treasurer to each Council member at least seven (7) days before the day on which the meeting is to be held. Notice may be waived in writing by a Council member, either before or after the meeting. Neither the business to be transacted at, nor the purpose of any special meeting of the Council, need be specified in the notice or waiver of notice of such meeting.

SECTION 9. Quorum. A majority of the Council members entitled to vote shall constitute a quorum for the transaction of business at any meeting of the Council.
SECTION 10. Manner of Acting. The act of a majority of the Council members at a meeting at which a quorum is present shall be the act of the Council, unless the act of a greater number is required by law, the articles of incorporation, or by these bylaws.

SECTION 11. Informal Action. Action may be taken by the Council without a meeting if a consent in writing, setting forth the action so taken, is signed by all the Council members.

SECTION 12. Participation at Meetings by Conference Telephone. Members of the Council, or of any committee designated by the Council, may take any action permitted or authorized by these bylaws by means of conference telephone, or similar telecommunications equipment, in which all persons participating in the meeting can communicate with each other. Participation in such a meeting shall constitute presence in person at such meeting.

SECTION 13. Compensation. Council members, as such, shall not receive any stated compensation for their services on the Council, but the Council may, by resolution, authorize reimbursement for reasonable expenses incurred in the performance of their duties. The Council will occasionally review the reimbursement policies.

ARTICLE V, III: OFFICERS AND EXECUTIVE DIRECTOR

SECTION 1. Officers. The officers of the Association shall consist of the President, the President-Elect, the Vice President, the Secretary/Treasurer, the Chairman (Immediate Past President), the Past President, the Historian, and such other officers and assistant officers as may be elected in accordance with the provisions of this Article. The Council may elect or appoint such other officers as it shall deem necessary. These officers shall have the authority to perform such duties as may be prescribed from time-to-time by the Council.

SECTION 2. President. The President shall be the principal elected officer of the Association. The President shall preside at all meetings of the Association. The President shall appoint members to the standing committees and to any other special committee, which may be deemed necessary for the welfare of the association. The President shall perform all other duties appropriate to the conduct of the office. At the conclusion of the annual meeting, the retiring President shall automatically become a Councilor for a two-year term of office in the capacity of Chairman the first year and Past President the second year.

SECTION 3. President-Elect. The President-Elect shall participate in all the meetings and deliberations of the Council during the year elected and shall accede to the office of President the following year.

SECTION 4. Vice President. In the absence of the President, or in the event of his or her inability or refusal to act, the Vice President shall perform the duties of the President. When so acting, the Vice President shall have all the powers, and be subject to all the restrictions, of the President. The Vice President shall perform such other duties as may be assigned by the President or by the Council.

SECTION 5. Secretary/Treasurer. As Secretary he/she shall: keep the minutes of the meetings of the members and of the Council in one or more books provided for that purpose; see that all notices are duly given in accordance with the provisions of these bylaws, or as required by law; be custodian of the Council’s records; keep a register of the post office address of each member, which shall be furnished to the Secretary by such member; notify candidates of their election to membership; and in general perform all duties incident to the office of Secretary, and such
other duties that may be assigned by the President or by the Council. The administrative duties of the Secretary may be assigned, in whole or in part, to the Executive Director by the Council.

As Treasurer, he/she shall keep an account of all monies received and expended by the Association and shall make disbursements authorized by the Council. All sums received shall be deposited or invested in such bank, trust company, or other depositories authorized by the Council. The Treasurer shall perform all the duties incident to the office of Treasurer and such other duties as may be assigned by the President or by the Council. The administrative duties of the Treasurer may be assigned, in whole or in part by the Council, to the Executive Director. He/she shall present an annual report to the membership for audit.

SECTION 6. Secretary/Treasurer-Elect. The Secretary/Treasurer-Elect shall serve as understudy to the Secretary/Treasurer for a term of one year.

SECTION 7. Chairman. The immediate Past President shall be the Chairman of the Council and perform such duties as occasionally may be designated by the President or by the Council. Upon termination of the term of office as President, the President shall become Immediate Past President for a one-year term.

SECTION 8. Past President. The Past President shall serve on the Council and perform such duties as may be designated by the President, Chairman of the Council, or by the Council. Upon termination of the term of office as Immediate Past President, the Immediate Past President shall become Previous Past President for a one year term.

SECTION 9. Director of Continuing Medical Education. The Director of Continuing Medical Education shall be appointed by the President for a term of four years and shall oversee and coordinate the Program and Postgraduate Programs, and the administration aspects of continuing education, and chair the Continuing Education Committee.

SECTION 10. Executive Director. The administrative duties and day-to-day operation of the Association shall be conducted by a salaried staff head or firm employed or appointed by the Council. The Executive Director shall be responsible to the Council. The Executive Director shall have the authority to execute contracts on behalf of the Association and as approved by the Council. The Executive Director may carry out the duties of the Secretary of the Association and may carry out the duties of the Treasurer as directed by the Council. The Executive Director shall employ and may terminate the employment of staff members necessary to carry out the work of the Association and shall perform such other duties as may be specified by the Council.

SECTION 11. Historian. The Historian shall record the history of the Association, keep archives of the programs and minutes of the Business and Council meetings, and report the deaths of members at the annual business meeting. In addition, he/she shall perform all other duties appropriate to this office and other duties assigned by the President for Council.

ARTICLE IX: COMMITTEES
The President shall appoint committees as may be necessary for the proper conduct and management of the Association. The standing Committees of the Association shall be:

SECTION 1. Executive Committee. The Executive Committee shall consist of the officers of the Association and the Executive Director. The Executive Director shall be ex-officio, a member of the Executive
Committee without the right to vote. The Executive Committee may exercise the authority of the Council in the management of the affairs of the Association during the intervals between meetings of the Council, subject at all times to the bylaws of the Association, and the prior resolutions, regulations and directives issued, adopted or promulgated by the Council. A majority of the members of the Executive Committee shall constitute a quorum for the transaction of business. Meetings may be called by the President or by any two Executive Committee members.

SECTION 2. Program Committee. The Program Committee shall consist of the President, the Director of Continuing Medical Education, the Secretary/Treasurer, and additional members appointed to the Program Committee. Appointment to the Program Committee shall be for a period of three years. Appointment(s) to this committee shall be made by the President each year. The senior member of the appointed members shall serve as Chairman. It shall be the duty of the committee to review the abstracts of scientific papers submitted by the members and arrange the program for the annual meeting. At least one author of each abstract for the regular scientific program should be a member of the association. No more than 25 percent of the papers presented at the annual meeting may be presented by authors who are not members, provided that such papers are of unusual merit.

SECTION 3. Postgraduate Program Committee. The Postgraduate Program Committee shall consist of the Director of Continuing Medical Education and appointed members. Appointment to the Postgraduate Program Committee shall be for a period of three years. Appointments to this committee shall be made by the President each year. The senior appointed member of the committee shall act as chair. It shall be the duty of this committee to arrange a Postgraduate Continuing Medical Education Program to cover broad and varied aspects of thoracic surgery to be presented at the time of the annual meeting.

SECTION 4. Membership Committee. This committee shall consist of four members. Appointment to the Membership Committee shall be for a period of four years. One new appointee to this committee shall be made by the President each year. The senior member of the committee shall serve as Chairman. This committee shall receive applications for membership in the association and after consideration of the applicants may propose them to the Council for approval and to the membership for election.

SECTION 5. Continuing Medical Education Committee. This committee shall consist of the Chairman of the Postgraduate Committee, the Chairman of the Program Committee, and the Director of Continuing Medical Education who shall serve as Chairman. It shall be the duty of this committee to set up the objectives of the next annual meeting with the said objectives being presented for approval by the Council at their interim meeting and forwarded to members prior to the annual meeting.

SECTION 6. Nominating Committee. This committee shall consist of the four Immediate Past Presidents with the most senior Past President serving as Chairman. This committee shall prepare a slate of nominees for officers and Councilors for the following year. This report is submitted to the organization at its annual meeting. The recommendations of the Nominating Committee are not intended to exclude direct nominations from the floor.

SECTION 7. Other Committees. Other committees may be designated by a resolution adopted by a majority of the Council present at a meeting at which a quorum is present (Ad Hoc Committees may be designated by the President with approval of the Council). Except as otherwise provided
in such resolution, members of each committee shall be members of the Association, and the President of the Association shall appoint the members thereof. Any member may be removed by the person or persons authorized to appoint such member whenever in their judgment the best interests of the Association shall be served by such removal.

SECTION 8. Term of Office. Each member of a committee shall continue as such until the next annual meeting of the Council or until a successor is appointed, unless the committee is terminated, or the member is removed from the committee, ceases to qualify as a member, or the member resigns from the committee.

SECTION 9. Vacancies. Vacancies in the membership of any committee may be filled by appointments made in the same manner as provided in the case of the original appointments.

SECTION 10. Quorum. Unless otherwise provided in the resolution of the Council designating a committee, a majority of any committee shall constitute a quorum for committee action. The act of a majority of committee members present and voting at a meeting, at which a quorum is present, shall be the act of the committee.

SECTION 11. Participation at Meetings by Conference Telephone. Committee members may participate in and act at any committee meeting through the use of a conference telephone or other communications equipment by means of which all persons participating in the meeting can communicate with each other. If the Chairman of a committee so orders, participation in such meetings shall constitute attendance at the meeting.

SECTION 12. Meetings of Committees. Subject to action by the Council, each committee by a majority vote of its members shall determine the time and place of meetings and the notice required.

SECTION 13. Informal Action. Any action required or taken at a meeting of a committee may be taken without a meeting if a consent in writing, setting forth the action so taken, is signed by all of the committee members.

SECTION 14. Rules. Each committee may adopt rules for its own government not inconsistent with these bylaws or with rules adopted by the Council.

ARTICLE X: OFFICIAL ORGAN
The Annals of Thoracic Surgery shall be the official publication of the Southern Thoracic Surgical Association. Papers read before the Association shall be forwarded to the Editor of The Annals of Thoracic Surgery for consideration for publication at the time requested by the Program Committee Chair and Editor of The Annals.

ARTICLE XI: CONTRACTS, CHECKS, DEPOSITS AND FUNDS, BONDING

SECTION 1. Contracts. The Council may authorize any officer or officers, agent or agents of the Association, in addition to the officers so authorized by these bylaws, to enter into any contract or execute and deliver any instrument in the name of, and on behalf of, the Association. Such authority may be general or confined to specific instances.

SECTION 2. Depositories. All funds of the Association not otherwise employed shall be deposited to the credit of the Association in such banks, trust companies or other depositories as the Council may designate.
SECTION 3. Checks, Drafts, Notes, Etc. All checks, drafts or other orders for
the payment of money and all notes or other evidences of indebtedness
issued in the name of the Association shall be signed by such officer or
officers, or agent or agents, of the Association and in such manner as
shall be determined by resolution of the Council.

SECTION 4. Bonding. The Council shall provide for the bonding of such
officers and employees of the Association, as needed.

SECTION 5. Delivery of Notice. Any notices required to be delivered
pursuant to these bylaws shall be deemed to be delivered when
transferred or presented in person or deposited in the United States mail
addressed to the person at his/her or its address as it appears on the
records of the Association, with sufficient first-class postage prepaid
thereon.

SECTION 6. Investments. Unless otherwise specified by the terms of a
particular gift, bequest or devise, grant or other instrument, the funds
of the Association may be invested, in such manner as the Council may
deem advantageous, without regard to restrictions applicable to trusts or
trust funds.

ARTICLE XII: BOOKS AND RECORDS
The Association shall keep correct and complete books and records of
accounts and shall also keep minutes of the proceedings of its members,
Council, and committees having any of the authority of the Council, and
shall keep at the registered or principal office a record giving the names
and addresses of the members entitled to vote. All books and records of
the Association may be inspected by any member, or his or her agent or
attorney, for any proper purpose at any reasonable time.

ARTICLE X, III: FISCAL YEAR
The fiscal year of the Association shall be established by the Council.

ARTICLE XIV: WAIVER OF NOTICE
Whenever any notice is required to be given under the provisions of
the General Not For Profit Corporation Act of the State of Illinois or
under the provisions of the articles of incorporation or the bylaws of
the Association, a waiver in writing signed by the person or persons
entitled to such notice, whether before or after the time stated therein,
shall be deemed equivalent to the giving of such notice. Attendance at
any meeting shall constitute waiver of notice unless the person at the
meeting objects to the holding of the meeting because proper notice
was not given.

ARTICLE XV: INDEMNIFICATION OF DIRECTORS, OFFICERS,
EMPLOYEES AND AGENTS; INSURANCE
SECTION 1. Right to Indemnification. Each person who was or is a party or
is threatened to be made a party to, or is involved in, any action, suit or
proceeding—whether civil, criminal, administrative or investigatory—by
reason of the fact that he/she, or a person of whom he/she is the legal
representative, is or was a director, officer, employee or agent of the
Association, or is or was serving at the request of the Association, shall
be indemnified and held harmless by the Association to the fullest extent
authorized by the laws of Illinois against all costs, charges, expenses,
liabilities and losses reasonably incurred or suffered by such person in
connection with and such indemnification shall continue to a person
who has ceased to be associated with the Association. This includes
attorneys’ fees, judgments, fines, ERISA excise taxes or penalties and

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amounts paid, or to be paid, in settlement. The right to indemnification conferred in this Article XV shall be a contract right and shall include the right to be paid by the Association the expenses incurred in defending any such proceeding in advance of its final disposition. For the purpose of determining the reasonableness of indemnifiable expenses, the fees and expenses of separate counsel from counsel for the Association, or other joint defendants being indemnified by the Association, shall not be indemnifiable unless there exists a bonafide conflict of interest.

SECTION 2. Right of Claimant to Bring Suit. If a claim under Section 1 of Article XV is not paid in full by the Association within a reasonable amount of time after a written claim has been received by the Association, the claimant may at any time thereafter bring suit against the Association to recover the unpaid amount of the claim and, if successful in whole or in part, the claimant shall also be entitled to be paid the expenses of prosecuting such a claim. It shall be a defense to any action that the claimant has failed to meet a standard of conduct which makes it permissible under Illinois law for the Association to indemnify the claimant for the amount claimed. But the burden of proving such defense shall be on the Association.

SECTION 3. Non-Exclusive of Rights. The right to indemnification and the payment of expenses incurred in defending a proceeding in advance of its final disposition conferred in Article XV shall not be exclusive of any other right which any person may have or hereafter acquire under any statute, provision of the articles of incorporation, bylaws, agreement, vote of members or disinterested directors or otherwise.

SECTION 4. Insurance. The Association shall maintain insurance to the extent of availability at commercial reasonable rates, at its expense, to protect itself and any director, officer, employee or agent of the Association or another corporation, partnership, joint venture, trust or other enterprise against any expense, liability or loss, whether or not the Association would have the power to indemnify such person against such expense, liability or loss under Illinois law.

SECTION 5. Expenses as a Witness. To the extent that any director, officer, employee or agent of the Association is by reason of such position, or a position with another entity at the request of the Association, a witness in any proceeding, he shall be indemnified against all costs and expenses actually and reasonably incurred by him or on his behalf in connection therewith.

SECTION 6. Notification. If the Association has paid indemnity or has advanced expenses under this Article XV to a director, officer, employee or agent, the Association shall report the indemnification or advance in writing to the members with or before the notice of the next meeting of the members.

SECTION 7. Effect of Amendment. Any amendment, repeal or modification of any provision of this Article XV by the members or the directors of the Association shall not adversely affect any right or protection of a director or officer of the Association existing at the time of such amendment, repeal or modification.

ARTICLE XVI: DISSOLUTION
Upon the dissolution of the Association, and after payment of all indebtedness of the Association, any remaining funds, investments and other assets of the Association shall be distributed to such organization or organizations which are then qualified as exempt from taxation under Section 501(c) 6 of the Internal Revenue Code of 1986, as amended for the corresponding provision of any future Internal Revenue Law.
of the United States). This distribution shall only occur if the purposes and objectives of such organization(s) are similar to the purposes and objectives of the Association, as may be determined by vote of the then voting members of the Association.

ARTICLE XVII: AMENDMENTS
These bylaws may be altered, amended, or repealed at the time of the annual meeting by a two-thirds vote of the membership present, provided that the amendment has been presented to the membership in writing at least 30 days prior to the time of the annual meeting.

ARTICLE XV, III: PARLIAMENTARY AUTHORITY
The deliberations of the Association, Council, and committees shall be governed by the parliamentary rules and usages contained in the then current edition of “Roberts Rules of Order, Newly Revised”, when not in conflict with the bylaws of the Association.
RELATIONSHIP DISCLOSURE INDEX
COMMERCIAL DISCLOSURE STATEMENTS OF COUNCIL MEMBERS AND PROGRAM PLANNERS

STSA would like to thank the following STSA leaders for planning the educational content of the STSA 63rd Annual Meeting. Unless otherwise noted, these STSA leaders have no relevant commercial relationships to disclose.

Andrea J. Carpenter: President, Program Committee, Postgraduate Committee
COMMERCIAL RELATIONSHIPS:

Faisal G. Bakaeen: Program Committee
COMMERCIAL RELATIONSHIPS: Consultant/Advisory Board: JACE Medical

John H. Calhoon: Program Committee, Postgraduate Committee

Paul Chai: Postgraduate Committee Chair, CME Committee

Robert J. Dabal: Postgraduate Committee

Elizabeth A. David: Program Committee

Melanie Edwards: Postgraduate Committee

Richard K. Freeman: Program Committee, Postgraduate Committee, CME Committee Chair
COMMERCIAL RELATIONSHIPS:

Charles B. Huddleston: Program Committee Chair, CME Committee

S. Adil Husain: Program Committee

Kirk Kanter: Postgraduate Committee

Richard L. Lee: Program Committee
COMMERCIAL RELATIONSHIPS: Consultant/Advisory Board: CryoLife

Scott A. LeMaire: Postgraduate Committee Chair, CME Committee

Daniel L. Miller: Program Committee, Postgraduate Committee

Himanshu J. Patel: Program Committee Chair, CME Committee
COMMERCIAL RELATIONSHIPS: Ownership Interest: WL Gore (co-patent holder), Consultant/Advisory Board: W. L. Gore, Medtronic, Terumo Cardiovascular Systems

Chad Stasik: Postgraduate Committee

COMMERCIAL RELATIONSHIPS OF ABSTRACT REVIEWERS

STSA would like to thank the following leaders for reviewing the abstracts submitted for consideration for presentation at the STSA 63rd Annual Meeting. Unless otherwise noted, the abstract reviewers have no relevant commercial relationships.

Paul Brown

Felix Fernandez
RELATIONSHIP DISCLOSURES FROM PRESENTERS

The following presenters have indicated, in accordance with the Accreditation Council for Continuing Medical Education Standards and the STSA Disclosure Policy, that they have a financial or other relationship with a healthcare-related business or other entity whose products or services may be discussed in, or directly affected in the marketplace by the educational program/product under consideration. Listed too are abstracts whose content describes the use of a device, product, or drug, that is not FDA approved, or the off-label use of an approved device, product, or drug.

Unless noted in this program book or verbally by the speakers, speakers have no relevant financial relationships to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing.
WEDNESDAY, NOVEMBER 9, 2016

**STSA/CTS NET SURGICAL MOTION PICTURES**

*Moderator Commercial Relationships*

**Helen Mari Merritt,** Nothing to Disclose

**Richard L. Lee,** Consultant/Advisory Board: CryoLife

1V. Robotic Repair of Mitral Commissural Endocarditis With a Bridging Patch Technique

**COMMERCIAL RELATIONSHIPS:** J. Scott Rankin: Ownership Interest: BioStable Science and Engineering, Consultant/Advisory Board: Amedus Corp, Atricure

4V. Combined Pulmonary Artery Sleeve Resection / Left Upper Lobectomy and Extended Resection of the Thoracic Aorta After TEVAR For T4 Lung Cancer

**COMMERCIAL RELATIONSHIPS:** Isaac George: Consultant/Advisory Board: Bolton Medical; Joshua R. Sonett: Consultant/Advisory Board: WebMD

THURSDAY, NOVEMBER 10, 2016

**POSTGRADUATE PROGRAM**

**GENERAL SESSION**

*Moderator Commercial Relationships*

**Scott A. LeMaire,** Other Research Support: PI Baxter Healthcare, Co-Investigator CytoSorbants, PI Vascutek Terumo, Co-Investigator W. L. Gore & Associates, Co-Investigator Medtronic, Co-Investigator Glaxo Smith Kline

**Paul J. Chai,** Nothing to Disclose

**Managing an Expanding ECMO Program**

**COMMERCIAL RELATIONSHIPS:** Joseph B. Zwischenberger: Ownership Interest: Maquet, W-Z Biotech, LLC

**Blood Conservation: Best Practices for Reducing Bleeding and Transfusion Requirements**

**COMMERCIAL RELATIONSHIPS:** Victor A. Ferraris: Consultant/Advisory Board: Acelity

**How I Teach It: Thoracoscopic Lobectomy**

**COMMERCIAL RELATIONSHIPS:** Joshua R. Sonett: Consultant/Advisory Board: WebMD

**ADULT CARDIAC BREAKOUT**

*Moderator Commercial Relationships*

**Anthony L. Estrera,** Consultant/Advisory Board: Gore (DSMB, Consulting), Speakers Bureau/Honoraria: Maquet

**Neal D. Kon,** Nothing to Disclose

**Trouble During TAVR: Prevention and Management**

**COMMERCIAL RELATIONSHIPS:** Vinod H. Thourani: Research Grant/PI: Edwards Lifesciences, Medtronic, St. Jude Medical, Boston Scientific; Consultant Advisory Board: Medtronic, Sorin Medical, Abbott Medical, Edwards Lifesciences

**GENERAL THORACIC BREAKOUT**

*Moderator Commercial Relationships*

**Melanie A. Edwards,** Nothing to Disclose

**Richard K. Freeman,** Nothing to Disclose

STSA 63rd Annual Meeting 383
Case Introduction: Should Hospital Policy Forbid Surgeons to Schedule Concurrent Cases in the Operating Room: Con

COMMERCIAL RELATIONSHIPS: Vinod H. Thourani: Research Grant/PI: Edwards Lifesciences, Medtronic, St. Jude Medical, Boston Scientific; Consultant Advisory Board: Medtronic, Sorin Medical, Abbott Medical, Edwards Lifesciences

THURSDAY NOVEMBER 10, 2016
FIRST SCIENTIFIC SESSION

1. Early Surgical Intervention in Patients With Mitral Valve Infective Endocarditis and Acute Stroke: Implications for Timing of Surgery
COMMERCIAL RELATIONSHIPS: James S. Gammie: Consultant/Advisory Board: Edwards Lifesciences; Ownership Interest: Harpoon Medical

2. Outcomes of Adult Extracorporeal Membrane Oxygenation With Outside Facility Transfer: A Regional Referral Center Experience
COMMERCIAL RELATIONSHIPS: Mani A. Daneshmand: Speakers Bureau Honoraria: Maquet; DISCUSSANT: Joseph B. Zwischenberger: Ownership Interest: Maquet (patent holder), W-Z Biotech, LLC

5. The Changing Spectrum of Tracheostomy Related and Post Intubation Tracheal Stenosis: Implications for Surgical Treatment

6. Contemporary Practice Patterns and Outcomes of Surgery for Acute Type A Aortic Dissection: An Analysis of a Multi-Institutional Regional STS Database

7. Determinants of Hospital Variation in Pneumonia Rates After Coronary Artery Bypass Grafting: An Analysis of 324,085 Consecutive CABG Patients
8. Improved Lymph Node Staging in Early Stage Non-Small Cell Lung Cancer in the National Cancer Database

COMMERCIAL RELATIONSHIPS: DISCUSSANT: Robert J. Cerfolio:
Consultant/Advisory Board: Baird, Community Health Service, Fruitstreet, Myriad, Intuitive, Ethicon, C-SATS, Bovie

FRIDAY, NOVEMBER 11, 2016

BASIC SCIENCE FORUM

Moderator Commercial Relationships
Min P. Kim, Nothing to Disclose
T. Brett Reece, Nothing to Disclose

2B. Ex Vivo Lung Perfusion Rehabilitates Sepsis-Induced Lung Injury
COMMERCIAL RELATIONSHIPS: DISCUSSANT: Joshua Sonett:
Consultant/Advisory Board: WebMD

4B. Erythropoietin Attenuation of Spinal Cord Ischemia Injury is cR-Receptor Dependent
COMMERCIAL RELATIONSHIPS: Joseph C. Cleveland: Research Grant: St. Jude Medical, HeartWare; DISCUSSANT: Scott LeMaire: Other Research Support: PI Baxter Healthcare, Co-Investigator CytoSorbants, PI Vascutek Terumo, Co-Investigator W. L. Gore & Associates, Co-Investigator Medtronic, Co-Investigator Glaxo Smith Kline

SECOND SCIENTIFIC SESSION

Moderator Commercial Relationships
Charles B. Huddelston, Nothing to Disclose
Himanshu J. Patel, COMMERCIAL RELATIONSHIPS: Ownership Interest: WL Gore (co-patent holder), Consultant/Advisory Board: W. L. Gore, Medtronic, Terumo Cardiovascular Systems

11. Variability in Integrated Cardiothoracic Surgery Training Program Curriculum
COMMERCIAL RELATIONSHIPS: DISCUSSANT: Richard L. Lee: Consultant/Advisory Board: CryoLife

12. Concomitant Atrial Fibrillation Ablation Remains Underutilized Despite No Additive Risk

15. Surgical Outcomes in Clinical Stage IIIA – N2 Positive, Older Lung Cancer Patients in The Society of Thoracic Surgeons Database
COMMERCIAL RELATIONSHIPS: Patricia Cowper: Research Grant: BMS, Tenax Therapeutics, Gilead, Lilly, AGA Medical, GE, AstraZeneca, Medtronic Inc.

COMMERCIAL RELATIONSHIPS: Tsuyoshi Kaneko: Speakers Bureau Honoraria: Edwards Lifescience

18. Contemporary Outcomes for Low-risk Surgical Aortic Valve Replacement: A Benchmark for Evaluating Transcatheter Aortic Valve Technology
COMMERCIAL RELATIONSHIPS: Alan Speir: Consultant/Advisory Board: Medtronic, Inc.; Gorav Ailawadi: Consultant/Advisory Board: Abbott Vascular, Edwards Lifesciences, St. Jude, Medtronic; Speakers Bureau/
THIRD SCIENTIFIC SESSION A
ADULT CARDIAC BREAKOUT

Moderator Commercial Relationships
Dawn S. Hui, Nothing to Disclose
Chad N. Stasik, Nothing to Disclose

19. Risk Factors for Late Aortic Valve Dysfunction Following the David V Valve Sparing Root Replacement
COMMERCIAL RELATIONSHIPS: Brad Leshnower: Consultant/Advisory Board: CryoLife, Inc.

20. Whole Body Perfusion Strategy for Aortic Arch Repair Under Moderate Hypothermia: Simultaneous Antegrade Cerebral Perfusion and Lower Body Perfusion

21. Moderate Hypothermia and Unilateral Selective Antegrade Cerebral Perfusion is a Safe Perfusion Strategy for Extended Arch Replacement in Patients with Acute Aortic Dissection
COMMERCIAL RELATIONSHIPS: Brad Leshnower: Consultant/Advisory Board: CryoLife, Inc.; DISCUSSANT: Anthony Estrera: Consultant/Advisory Board: Gore (DSMB, Consulting), Speakers Bureau/Honoraria: Maquet

22. Frozen Elephant Trunk is Not the “Bad Boy” Compared With the Traditional Elephant Trunk: Current Trends and Lessons Learned Using the Simplified US Version of the FET

23. Transcatheter Aortic Valve Implantation for Patients With Bicuspid Aortic Valves: Still a Contraindication?

24. Statewide Impact of Transcatheter Aortic Valve Replacement on Surgical Aortic Valve Replacement
THIRD SCIENTIFIC SESSION A
GENERAL THORACIC BREAKOUT

Moderator Commercial Relationships
Elizabeth A. David, Nothing to Disclose
Richard K. Freeman, Nothing to Disclose

25. Multi-institutional Validation of a Modified Thoracic Revised Cardiac Risk Index (m-ThRCRI) for Predicting Cardiac Complications Following Lung Resection

COMMERCIAL RELATIONSHIPS: Frank C. Detterbeck: Research Grant: Medela, Other Research Support: Olympus

26. Is Repeat Pulmonary Metastasectomy Indicated for Soft Tissue Sarcoma?


28. Evaluation of Esophageal Anastomotic Integrity With Serial Pleural Amylase Levels


THIRD SCIENTIFIC SESSION A
CONGENITAL BREAKOUT

Moderator Commercial Relationship
James D. St. Louis, Nothing to Disclose
Mark Plunkett, Nothing to Disclose

THIRD SCIENTIFIC SESSION B
ADULT CARDIAC BREAKOUT

Moderator Commercial Relationships
Faisal G. Bakaeen, Consultant/Advisory Board: JACE Medical
Bryan S. Helsel, Nothing to Disclose

37. Similar Outcomes in Diabetic Patients After CABG With Single ITA Plus Radial Artery Grafting & Bilateral ITA Grafting

COMMERCIAL RELATIONSHIPS: Eugene Blackstone: Research Grant: Edwards Lifesciences; Joseph Sabik: Consultant/Advisory Board: Medtronic, Sorin; Research Grant: Edwards Lifesciences, Abbott

38. Diagnosis and Surgical Management of Pericardial Constriction After Cardiac Surgery


39. Incidence, Risk Factors, and Outcomes of Conversion from Off-pump Coronary Artery Bypass Grafting to On-pump Coronary Artery Bypass Grafting: A Report from the STS Adult Cardiac National Database

40. Surgical Ablation of Atrial Fibrillation in the United States


THIRD SCIENTIFIC SESSION B
GENERAL THORACIC BREAKOUT

Moderator Commercial Relationships
Linda W. Martin, Nothing to Disclose
Basil Nasir, Consultant/Advisory Board: Ethicon Endo Surgery

41. Transcervical Extended Mediastinal Lymphadenectomy (TEMLA) – Experience from a North American Cancer Center

COMMERCIAL RELATIONSHIPS: Elisabeth Dexter: Employment: Up to Date

42. Transversus Abdominis Plane (TAP) Block Improves Perioperative Outcomes After Esophagectomy Compared to Thoracic Epidural (TE)

COMMERCIAL RELATIONSHIPS: Brian E. Louie: Consultant/Advisory Board: Torax Medical, Inc.; Research Grant: Torax Medical, Inc.

43. Office-Based Spirometry: A New Model of Care in Preoperative Assessment for Low-Risk Pulmonary Resections

COMMERCIAL RELATIONSHIPS: Traves D. Crabtree: Consultant/Advisory Board: Ethicon Endo Surgery

THIRD SCIENTIFIC SESSION B
CONGENITAL BREAKOUT

Moderator Commercial Relationships
Karla Christian, Nothing to Disclose
Kristine J. Guleserian, Nothing to Disclose

45. Medium-Term Outcomes After Implantation of Expanded-Polytetrafluoroethylene Valved Conduit (ePTFE VC) for Right Ventricular Outflow Tract

COMMERCIAL RELATIONSHIPS: DISCUSSANT: James A. Quintessenza:

SATURDAY, NOVEMBER 12, 2016
Cardiothoracic Coding and Reimbursement Update for 2017

Moderator Commercial Relationships
Jeffrey P. Jacobs, Nothing to Disclose

Cardiothoracic CPT Coding Changes
COMMERCIAL RELATIONSHIPS: Joseph C. Cleveland: Research Grant: St. Jude Medical, HeartWare
FOURTH SCIENTIFIC SESSION
ADULT CARDIAC BREAKOUT

Moderator Commercial Relationships
Tom C. Nguyen, Nothing to Disclose
Ourania Preventza, Consultant/Advisory Board: Medtronic, Gore

49. Midterm Results of Hybrid Arch Repair With Zone 0 Stent Graft Deployment
COMMERCIAL RELATIONSHIPS: Adam Beck: Consultant/Advisory Board: Medtronic, Inc., Cook Medical; Research Grant: W.L. Gore & Associates; Robert Feezor: Consultant/Advisory Board: Medtronic, Inc., Cook Medical; Research Grant: Cook Medical; Tomas Martin: Consultant/Advisory Board: Medtronic, Terumo, Johnson & Johnson

50. Transmyocardial Laser Revascularization (TMR) for Class IV Angina: 30-Day Outcomes from a Contemporary, Multi-Center Patient Registry
COMMERCIAL RELATIONSHIPS: V. Seenu Reddy: Consultant/Advisory Board: Cryolife

51. Intermediate Outcomes After Conservative Repair of Type A Aortic Dissection
COMMERCIAL RELATIONSHIPS: Michael E. Bowdish: Research Grant: Medtronic, HeartWare, Inc., Sunshine Heart, Inc.

FOURTH SCIENTIFIC SESSION
GENERAL THORACIC BREAKOUT

Moderator Commercial Relationships
Traves Crabtree, Consultant/Advisory Board: Ethicon Endo Surgery
DuyKhanh Ceppa, Nothing to Disclose

FOURTH SCIENTIFIC SESSION A
CONGENITAL BREAKOUT

Moderator Commercial Relationships
Jeffrey P. Jacobs, Nothing to Disclose
Randy Stevens, Nothing to Disclose

57. AvalonElite DLC Provides Reliable Total Cavopulmonary Assist in Failing Fontan Sheep Model Using Valved Extracardiac Conduit

FOURTH SCIENTIFIC SESSION A
TRANSPLANT BREAKOUT

Moderator Commercial Relationships
Chadrick R. Denlinger, Nothing to Disclose
Jay D. Pal, Consultant/Advisory Board: St. Jude, HeartWare

62. Donation After Cardiac Death Donors: A Single Center Experience
COMMERCIAL RELATIONSHIPS: Joshua R. Sonett: Consultant/Advisory Board: WebMD

63. Minimally Invasive Left Ventricular Assist Device (LVAD) Implantation Reduces Blood Product Utilization After Heart Transplant
COMMERCIAL RELATIONSHIPS: Simon Maltais: Consultant/Advisory Board: Heartware, Thoratec
HAROLD URSCHEL HISTORY LECTURESHP

Moderator Commercial Relationships
David R. Jones, Nothing to Disclose
S. Adil Husain, Nothing to Disclose

FOURTH SCIENTIFIC SESSION B

Moderator Commercial Relationships
Andrea J. Carpenter, Nothing to Disclose
Richard L. Prager, Nothing to Disclose

66. Individual Assessment of Frailty Parameters in High-And Extreme-Risk Patients Who Underwent Transcatheter Aortic Valve Replacement


69. Left Ventricular Outflow Tract Obstruction After Transcatheter Mitral Valve-in-Ring Implantation: A Word of Caution

COMMERCIAL RELATIONSHIPS: Charanjit Rihal: Research Grant: Abbott Vascular, Edwards Lifesciences

HOW TO DO IT

Hyperthermic Intrathoracic Chemotherapy for Pleural Malignancies


Axillary Artery Cannulation: Workhorse and Gold Standard

COMMERCIAL RELATIONSHIPS: Ourania Preventza:
Consultant/Advisory Board: Medtronic, Gore
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