39th ANNUAL MEETING
June 26-29, 2013
The Coeur d’Alene
Coeur d’Alene, Idaho

40th ANNUAL MEETING
June 25-28, 2014
The St. Regis Monarch Beach
Dana Point, California
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OFFICERS AND COUNCIL

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Boston, Massachusetts
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Craig J. Baker, Samson Fun Run
Joseph C. Cleveland, Jr., Golf Tournament
Richard I. Whyte, Tennis Tournament

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P. Michael McFadden (2013)
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Douglas E. Wood
Seattle, Washington

Representatives to the Thoracic Surgery Foundation for Research & Education
D. Craig Miller
Stanford, California

R. Scott Mitchell
Stanford, California
### SCHEDULE OF EVENTS

#### WEDNESDAY, June 27, 2012

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<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>9:00 am – 1:00 pm</td>
<td>Council Meeting</td>
<td>Protea</td>
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<tr>
<td>1:00 pm – 6:00 pm</td>
<td>Registration</td>
<td>Haleakala Gardens</td>
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<tr>
<td>1:00 pm – 6:00 pm</td>
<td>Speaker Ready Room</td>
<td>Silversword</td>
</tr>
<tr>
<td>7:00 pm – 9:00 pm</td>
<td>New Members/Welcome Reception</td>
<td>Chapel Lawn</td>
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<tr>
<td>7:00 pm – 9:00 pm</td>
<td>Kids &amp; Teens Reception (Ages 4–18)</td>
<td>Beach Courtyard</td>
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#### THURSDAY, June 28, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>6:00 am</td>
<td>Samson Fun Run</td>
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<td></td>
<td>Start at Group Check-In Desk</td>
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<tr>
<td>6:30 am – 7:50 am</td>
<td>Breakfast Session*</td>
<td>Plumeria</td>
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<tr>
<td></td>
<td>A Balanced Approach to Operative Services</td>
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<td></td>
<td>Performance Improvement Using Lean Methods</td>
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<tr>
<td>7:00 am – 8:00 am</td>
<td>Continental Breakfast</td>
<td>Haleakala 1</td>
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<tr>
<td>7:00 am – 11:00 am</td>
<td>Family Hospitality</td>
<td>Hibiscus</td>
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<tr>
<td>7:00 am – 1:30 pm</td>
<td>Registration</td>
<td>Haleakala Gardens</td>
</tr>
<tr>
<td>7:00 am – 12:00 pm</td>
<td>Exhibits</td>
<td>Haleakala 1</td>
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<tr>
<td>7:00 am – 12:30 pm</td>
<td>Speaker Ready Room</td>
<td>Silversword</td>
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<tr>
<td>8:00 am – 9:00 am</td>
<td>Scientific Session I</td>
<td>Haleakala 4 &amp; 5</td>
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<tr>
<td>9:00 am – 9:10 am.</td>
<td>New Member &amp; Samson Prize Finalists Introductions</td>
<td>Haleakala 4 &amp; 5</td>
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* Separate Subscription Required
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<tr>
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<tr>
<td>9:10 am – 9:55 am</td>
<td>Presidential Address</td>
<td>Haleakala 4 &amp; 5</td>
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<td>9:55 am – 10:20 am</td>
<td>Coffee Break, Visit Exhibits &amp; Posters</td>
<td>Haleakala 1</td>
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<tr>
<td>10:00 am – 11:00 am</td>
<td>Spouse Forum Session</td>
<td>Plumeria</td>
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<tr>
<td>10:00 am – 11:00 am</td>
<td>Scientific Session II</td>
<td>Haleakala 4 &amp; 5</td>
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<tr>
<td>11:40 am – 12:30 pm</td>
<td>Controversies in Thoracic Surgery</td>
<td>Haleakala 4 &amp; 5</td>
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<tr>
<td>12:30 pm – 1:30 pm</td>
<td>Invited Guest Speaker</td>
<td>Haleakala 4 &amp; 5</td>
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<tr>
<td>1:30 pm – 4:30 pm</td>
<td>Kayak &amp; Snorkel Tour*</td>
<td>Depart from Hotel Beach</td>
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<tr>
<td>1:45 pm – 5:00 pm</td>
<td>Ocean Cruise Tour*</td>
<td>Depart from front entrance of hotel</td>
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<tr>
<td>6:30 pm – 10:00 pm</td>
<td>Luau Theme Dinner</td>
<td>Molokini Garden</td>
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**FRIDAY, June 29, 2012**

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<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>6:00 am – 12:00 pm</td>
<td>Registration</td>
<td>Haleakala Gardens</td>
</tr>
<tr>
<td>6:00 am – 12:00 pm</td>
<td>Speaker Ready Room</td>
<td>Silversword</td>
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<tr>
<td>6:30 am – 7:50 am</td>
<td>Breakfast Session*</td>
<td>How to Set Up a Transcatheter Aortic Valve Replacement Program Plumeria</td>
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<tr>
<td>7:00 am – 11:00 am</td>
<td>Family Hospitality</td>
<td>Hibiscus</td>
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<tr>
<td>7:30 am – 8:00 am</td>
<td>Continental Breakfast</td>
<td>Haleakala 1</td>
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<tr>
<td>7:30 am – 12:00 pm</td>
<td>Exhibits</td>
<td>Haleakala 1</td>
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<tr>
<td>8:00 am – 8:50 am</td>
<td>Postgraduate Course</td>
<td>Haleakala 4 &amp; 5</td>
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* Separate Subscription Required
WESTERN THORACIC SURGICAL ASSOCIATION

8:50 am – 10:30 am  Scientific Session III
                     Haleakala 4 & 5
10:30 am – 11:00 am  Coffee Break, Visit Exhibits & Posters
                     Haleakala 1
11:00 am – 12:00 pm  Scientific Session IV
                     Haleakala 1
1:00 pm – 6:00 pm    Golf Tournament*
                     Wailea Gold Course, Wailea Golf Club; Depart from hotel front entrance
1:30 pm – 5:00 pm    Tennis Tournament*
                     Wailea Tennis Club; Depart from hotel front entrance
Free Evening

SATURDAY, June 30, 2012

6:00 am – 11:30 am  Speaker Ready Room
                     Silversword
6:00 am – 12:00 pm  Registration
                     Haleakala Gardens
6:30 am – 7:30 am   Continental Breakfast
                     Haleakala 1
6:30 am – 10:30 am  Exhibits
                     Haleakala 1
7:00 am – 8:15 am   Concurrent Forums
                     A) Adult Cardiac Session
                            Haleakala 4 & 5
                     B) General Thoracic Session
                            Ilima
                     C) Congenital Heart Disease Session
                            Plumeria
7:00 am – 11:00 am  Family Hospitality
                     Hibiscus
8:30 am – 9:50 am   Scientific Session V
                     Haleakala 4 & 5
9:50 am – 10:10 am  Coffee Break, Visit Exhibits & Posters
                     Haleakala 1
10:10 am – 11:10 am  Scientific Session VI
                     Haleakala 4 & 5
11:10 am – 12:00 pm  C. Walton Lillehei Point-Counterpoint
                     Haleakala 4 & 5

* Separate Subscription Required
12:00 pm – 12:30 pm  Business Meeting *(Members Only)*  
*Haleakala 4 & 5*

12:30 pm – 2:00 pm  Family Luncheon  
*Haleakala Gardens*

7:00 pm – 10:00 pm  Kids & Teens Banquet *(Ages 4–18)*  
*Tsunami*

7:00 pm – 11:00 pm  President’s Reception & Banquet  
Reception: *Haleakala Gardens*  
Banquet: *Haleakala 1*

**DRESS CODE:**
The dress code for the Annual Meeting is Resort Casual. Aloha shirts are fine. Jackets and ties are not required. The President’s Reception and Banquet, too is Resort Casual (for men, Aloha shirts and long pants).
ACCREDITATION
This activity has been planned and implemented in accordance with the Essential Areas and Policies of the Accreditation Council for Continuing Medical Education (ACCME) through the joint sponsorship of the American Association for Thoracic Surgery (AATS) and the Western Thoracic Surgical Association (WTSA). The AATS is accredited by the ACCME to provide continuing medical education for physicians.

The American Association for Thoracic Surgery designates this live activity for a maximum of **14.5 AMA PRA Category 1 Credit(s)**™. Physicians should only claim credit commensurate with the extent of their participation in the activity.

CME MISSION STATEMENT

**Purpose**
The Western Thoracic Surgical Association (WTSA) is committed to improving patient care and enhanced patient quality of life through the provision of state-of-the-art continuing medical education (CME) to its members and non-member attendees at its sole CME activity, its annual meeting. The overarching goal of the WTSA CME program is to provide a high quality CME activity (its annual meeting) that will address the professional practice gap of its physician and allied health learners by facilitating change in participants’ competence and performance.

**Content Areas**
The content areas of the WTSA’s CME program annual meeting include but are not limited to, acquired heart disease, thoracic oncologic issues, congenital heart disease, general thoracic disorders, pulmonary disorders, and adult cardiac disease. The scope of activities involves the body of knowledge and skills generally recognized and accepted by the profession and the specialty as within the basic medical/surgical sciences, surgical specialties, the discipline of clinical medicine, and providing healthcare to the public.

**Target Audience**
In the context of WTSA’s role as a regional surgical membership association, the target audiences of the WTSA’s CME program are its current members, as well as a potential member base including physicians and other healthcare professionals involved in the diagnosis and treatment of cardiothoracic disease. These include, among others, general thoracic surgeons, cardiothoracic surgeons,
interventional radiologists, cardiologists, and cardiothoracic anesthesiologists, as well as allied healthcare professionals who may benefit from team learning activities. The WTSA reaches throughout the western United States and the western provinces of Canada in its attempt to make the most current information available to as wide a medical/physician/surgical audience as possible.

**Types of Activities Provided**
Through its sole CME activity, the annual meeting, the WTSA provides topic based abstract sessions, a postgraduate course, a controversies in cardiothoracic surgery panel discussion, and a point/counterpoint debate session all of which foster audience participation through a designated question and answer period subsequent to the presentation. In addition, highly specialized techniques, protocols, and findings are offered in each of the three subspecialties of adult cardiac surgery, general thoracic surgery, and congenital heart disease through individual breakfast sessions, moderated poster sessions, and/or concurrent brief communications symposia offered during the course of the annual meeting.

**Expected Results**
The success of the CME mission is measured by the extent to which participants in the WTSA annual meeting have gained an enhanced understanding of the latest techniques and current research specifically related to adult cardiac surgery, general thoracic surgery, and congenital heart disease, and have incorporated these lessons learned into their practice environment. Furthermore, through these changes and individual practice environments, it is expected that positive changes in physician/surgeons competence and performance in limited instances will be accomplished. The overarching expected result of the WTSA's CME mission is improved patient care and enhanced patient quality of life through advanced medical education of the association’s membership and active participants in its CME program, the annual meeting.

**OBJECTIVE**
The Annual Meeting of the Western Thoracic Surgical Association is designed to provide two-and-a-half days of comprehensive educational experience for WTSA members and guest physicians in the field of thoracic and cardiovascular surgery. It is the Association’s intent to bring together the leading surgeon scientists in these specialties to freely and openly discuss their latest clinical and research efforts.
This year's program begins on Thursday morning with a new breakfast session entitled “A Balanced Approach to Operative Services Performance Improvement Using Lean Methods” given by Lynn Martin. The program then continues with a half-day scientific plenary session of original papers and the Presidential Address by Robert C. Robbins, and concludes with the highly successful “Controversies in Thoracic Surgery”, which will address whether “General Thoracic Surgery Is Best Taught in an I6 Program”.

Friday morning begins with another breakfast session, featuring recognized leader Michael J. Mack addressing “How to Set Up a Transcatheter Aortic Valve Replacement Program”. The scientific program continues with the annual Postgraduate Course, sponsored by an educational grant from the White Memorial Medical Center and Foundation Lyman A. Brewer, III, Fund, and a scientific plenary session of original papers.

The Saturday scientific program begins with concurrent moderated forums of shorter-form oral presentations addressing a far ranging field of topics in each of the three subspecialties. The plenary science continues with additional original papers and concludes with the C. Walton Lillehei Point/Counter-Point Session. The debate this year will focus on “Open Aortic Valve Replacement vs. Transcatheter Aortic Valve Replacement in the Low-Risk Patient”.

At the conclusion of the Annual Meeting, participants should have an enhanced understanding of the latest techniques and current research specifically related to the fields of adult cardiac, general thoracic, and congenital heart disease clinical surgery, experimental surgery and related sciences, surgical education, and the socioeconomic aspects of surgical care. Through the open discussion periods for each of the six plenary Scientific Sessions, the Controversies in Thoracic Surgery session, the two Breakfast sessions, the Postgraduate Course, the Concurrent Forums on Adult Cardiac, General Thoracic and Congenital Heart Disease, and the Point/Counterpoint session, participants will have the opportunity to hear the pros and cons of each paper and/or debate presented to gain an overall perspective of their current practices and utilize results presented to select appropriate surgical procedures and interventions for their own patients and integrate state-of-the-art knowledge into their current practice and/or research.
LEARNING OBJECTIVES
At the conclusion of this session, participants will be able to:

- Discuss current investigations and novel approaches in the management of adult cardiac, general thoracic and congenital heart disease patients suffering from an array of surgical conditions relating to the heart, lungs, organs of the thorax, and other airway/circulation diseases;

- Evaluate current basic science investigations relating to advances in the treatment and management of cardiothoracic and/or congenital heart disease patients and conditions;

- Analyze current investigative studies in clinical outcomes for patients with surgical cardiothoracic and/or congenital heart disease disorders or pathologies.

DISCLOSURE STATEMENT
It is the policy of the American Association for Thoracic Surgery, as the accredited provider of this live activity, that any individual who is involved in planning, presenting or is an author on a program designated for *AMA Physician’s Recognition Award Category 1 Credit™* must disclose any financial interest or other relationship (grant, research support, consultant, etc.) that individual has with any manufacturer(s) of any commercial product(s) that may be discussed in the individual’s presentation. This information is disclosed to the audience prior to an activity. The AATS has procedures in place if a conflict of interest should arise. In addition, faculty members are asked to disclose when any discussion of unapproved use of pharmaceutical or medical device occurs. Disclosures listed on pages 266–270 have been managed to the Associate’s satisfaction.

For further information on the Accreditation Council for Continuing Medical Education (ACCME) Standards of Commercial Support, please visit www.accme.org.
GENERAL INFORMATION

REGISTRATION
The Registration Desk will be located in the Haleakala Gardens during the following hours:

- Wednesday, June 27th: 1:00 pm – 6:00 pm
- Thursday, June 28th: 7:00 am – 1:30 pm
- Friday, June 29th: 6:00 am – 12:00 pm
- Saturday, June 30th: 6:00 am – 12:00 pm

SPEAKER READY ROOM
The Speaker Ready Room will be located in the Silversword Room, behind the Haleakala Ballroom. Presenting authors are requested to turn in their PowerPoint slides to the technician in the Speaker Ready Room at least 30 minutes prior to the opening of the session at which they are to present (presentation slides can be turned in as early as Wednesday, June 27th). All presentations must be submitted in PowerPoint format only.

BREAKFAST SESSIONS
Breakfast sessions are scheduled for Thursday and Friday morning, from 6:30 am – 7:50 am. There is a separate registration fee of $60 per person:

- Thursday, June 28
  A Balanced Approach to Operative Services Performance Improvement Using Lean Methods**
  Lynn D. Martin
  Plumeria

- Friday, June 29
  How to Set Up a Transcatheter Aortic Valve Replacement Program**
  Michael J. Mack
  Plumeria

SPOUSE FORUM SESSION
*New for 2012* All registered spouses are welcome to attend this new session on “Having the Relationships You Want: Understanding the Psychology of Relationships” which will be led by Jamie Ungerleider, MSW-LCSW, PhD. In this session spouses will be provided an opportunity to develop greater

** Separate Subscription Required
awareness of the dynamics in important relationships, as well as, tools for managing them. Specifically, the session will explore the relationship we have with ourselves, as well as, with spouses, children, parents and colleagues. Time will be allotted for questions. Child care will also be provided and only available for the one hour duration of the session.

EXHIBITS
Commercial Exhibits are located in Haleakala 1 and open during the following hours:

- Thursday, June 28: 7:00 am – 12:00 pm
- Friday, June 29: 7:30 am – 12:00 pm
- Saturday, June 30: 6:30 am – 10:30 am

Continental Breakfast is available for all registered physicians in the Exhibit Hall during the following hours:

- Thursday, June 28: 7:00 am – 8:00 am
- Friday, June 29: 7:30 am – 8:00 am
- Saturday, June 30: 6:30 am – 7:30 am

Coffee and other beverages will be available during scheduled breaks.

HOSPITALITY SUITE
A hospitality suite is available in the Hibiscus Room for all registered spouses, guests, and family members during the following hours:

- Thursday, June 28: 7:00 am – 11:00 am
- Friday, June 29: 7:00 am – 11:00 am
- Saturday, June 30: 7:00 am – 11:00 am

Breakfast is available from 7:00 am – 10:00 am each day; coffee and other beverages are available during all hospitality hours.

- 7:00 am – 8:00 am: Continental Breakfast Served
- 8:00 am – 10:00 am: Full Breakfast Served
- 10:00 am – 11:00 am: Snacks & Beverages Served
BADGE IDENTIFICATION

Member and Spouse Abstract Card  Cream
Guest Physician and Spouse Black  Blue
Allied Personnel Green
Exhibitor Orange

INCLUDED IN THE REGISTRATION FEE

Included in the registration fee are the New Members/ Welcome Reception on Wednesday evening, the Thursday morning Samson Fun Run, the Luau Theme Dinner on Thursday evening, the Saturday Family Luncheon, the President’s Reception and Banquet on Saturday evening, and daily continental breakfasts (served in the Exhibit Hall for meeting attendees and in the Hospitality Suite, located in the Hibiscus Room, for family members). Supervised Kids & Teens Receptions, for ages 4–18, will provide dynamic, entertaining, and safe programs during Wednesday’s New Members/ Welcome Reception and Saturday’s President’s Banquet. Please remember that individual tickets for events are not offered; full registration is required.

NEW MEMBERS/WELCOME RECEPTION

Wednesday, June 27  7:00 pm – 9:00 pm

Join the WTSA in welcoming its new members at the Chapel Lawn. Children ages 4–18 are invited to their own Kids & Teens Welcome Reception, to be held concurrently at the Beach Courtyard. Games and arts and crafts will be among the entertainment offered for kids, along with dinner. Please note that all children must be registered for the meeting to attend this function.

SAMSON FUN RUN

Thursday, June 28  6:00 am

The morning 5K Fun Run will begin at the Group Check-in Desk. All participants will receive an official Samson Fun Run T-shirt at the finish line. Prizes will be presented at the Saturday luncheon.
LUAU THEME DINNER

Thursday, June 28

6:30 pm – 10:00 pm

The Thursday night Luau will be held on the Molokini Lawn at the Grand Wailea. With Maui’s ocean on one side and a saltwater lagoon on another, this spacious and versatile lawn area surrounded by Tiki torches, imu pits and the dramatic lava rock walls are a few touches that create an authentic Hawaiian ambience for all Luau guests.

Experience the richness of a Hawaiian feast like never before. With lavish theatrics and state-of-the-art production, Hawaiian Myths and Legends presented by IONA Contemporary Dance Theatre will connect you to the culture of the islands for a night you will never forget. All registered guests, spouses and children are welcome to attend. Dress is resort style.

SATURDAY LUNCHEON

Saturday, June 30

12:30 pm – 2:00 pm

Join registered physicians, spouses, guests, and family members for this outdoor luncheon at the Haleakala Gardens and applaud award winners from the Samson Fun Run and Golf and Tennis Tournaments. Please note that all children must be registered for the meeting to attend this function.

PRESIDENT’S RECEPTION AND BANQUET

Saturday, June 30

7:00 pm – 11:00 pm

The 38th Annual Meeting will conclude with the Presidential Reception and Banquet in the Haleakala Gardens and the Haleakala Ballroom 1. You won’t want to miss the Jimmy Mac Band, a local Maui group that will keep the room dancing for hours!

Family members aged 4–18 will be in for their own fun evening during the concurrent Kids & Teens Banquet located in Tsunami. Please note that all children must be registered for the meeting to attend this function.
GOLF/TENNIS TOURNAMENTS

(Separate Subscription Required)

GOLF TOURNAMENT
Wailea Gold Course, Wailea Golf Club

Friday, June 29 1:00 pm

This year’s golf tournament will take place on the Gold Course, one of the most beloved Grand Wailea golf courses. The home course of The Champions Skins Game from 2001 to 2007, the 7,078-yard Wailea Gold is the most challenging of Wailea’s trio, with a rugged and masterful design that takes advantage of the terrain’s natural undulations. But four to six tee boxes on every hole also make it a suitable track for virtually every player.

Created by architect Robert Trent Jones II, the Gold was honored by both Golf Magazine and Golf Digest as one of the country’s ten best new resort courses when it opened in 1994. It has also been recognized by the Maui Historical Society for its preservation of prehistoric lava rock walls during construction, and hailed as one of the world’s best designed courses by the readers of Conde Nast Traveler in the magazine’s first golf resorts poll.

Called a “thinking player’s course,” the Gold offers a true test of one’s golf skills. But the most difficult hazards on it are the distracting island views. In one round, you can enjoy spectacular vistas of the ocean, Molokini islet, ancient lava rock walls, coconut trees and sparkling white bunkers.

Pre-registration is required with indication of handicap.

$230 per person includes transportation to the course, greens fees, box lunch, cart and prizes.

Golfers will need to meet at the front entrance of the hotel at 12:30 pm and a dedicated WTSA shuttle will bring them over to the Gold Course. Club rentals and balls are available at the pro shop.
Tennis Tournament
Wailea Tennis Club
Friday, June 29 1:30 pm

Delight in the eleven-court complex of our expansive Maui tennis resort. Located less than a mile from the hotel, the state-of-the-art facility features immaculate Plexipave courts. Enjoy a fully stocked pro shop. Purchase the latest in equipment, apparel and accessories. Its staff of professionals is available for clinics, lessons and game-matching services.

Pre-registration is required with indication of level of play.

A professional will be on hand to conduct a pre-tournament warm-up clinic at 1:30 pm.

$50 per person includes Court Rental, sports snacks and beverages, tennis balls, court fees, gratuities, transportation to the tennis club, and prizes.

Child Care Services
The Grand Wailea’s Camp Grande is a fun, spacious, and friendly mini-resort for kids 5 to 12 years old!

The 20,000-square-foot facility is designed to accommodate the whim of children and their parents. The Grand Wailea also offers daily poolside activities, providing entertainment for all ages. Visit the Grand Wailea website at www.grandwailea.com for details on camp facilities, programs, workshops, schedules, and guidelines. To reach Camp Grande, call toll free 800-888-6100, menu option 6.

Babysitting (ages 6 months to 4 years)
Babysitting services may be arranged by calling The Nanny Connection at (808) 875-4777; at least 24-hours’ notice is kindly requested to facilitate child-care arrangements.
OPTIONAL TOURS/ACTIVITIES

KAYAK & SNORKEL TOUR
Leaves from the Hotel Beach

Thursday, June 28 1:30 pm – 4:30 pm
Registration Required

Cost: $80.00

Itinerary and Highlights:
A 3 hour snorkel and kayak adventure for everyone! Enjoy Maui’s scenic coastline from the sea. The tour features beautiful gardens of live coral and coves that house exotic tropical fish and endangered Green Sea Turtles. The excursion is led by an Eco-guide who adds insight into Maui’s hidden world beneath the sea. Snorkel gear, life jackets, drinks and snacks are included. Single or double kayaks are available.

Includes: Guide, transportation, drinks and snacks, gratuities.

OCEAN CRUISE TOUR
Transportation to depart from the Front Entrance of the Hotel

Thursday, June 28 1:45 pm – 5:00 pm
Registration Required

Cost: $60.00

Enjoy this sightseeing excursion along the Maui coastline to take in the sheer beauty of the Island of Maui. The Maui Magic is sure to create a lasting memory with friends and family!

Includes: Open bar of beer, wine, sodas, juice, iced tea, and water.

Lunch is not provided. You are allowed to bring aboard your own snacks.

ADDITIONAL ACTIVITIES
With so much to see and do, the Grand Wailea Concierge Services will be there to help you make the most of your precious time. Whether for sightseeing, dining reservations, child care, or tour and activity reservations, the concierge will gladly assist you to make your stay a memorable experience.

Be sure to utilize the concierge services by contacting them at 800-888-6100 or by visiting them directly.
ACKNOWLEDGMENTS

The Western Thoracic Surgical Association wishes to thank the following companies and organizations for their educational and marketing support of the 38th Annual Meeting:

EDUCATIONAL GRANTS (Confirmed through May 31, 2012)

Medtronic, Inc. — Silver Level
St. Jude Medical for their support of the Lillehei Point/Counterpoint
White Memorial Medical Center and Foundation – Lyman A. Brewer, III, Fund for their support of the Postgraduate Course
Medtronic, Inc. for their support of the Donald B. Doty Education Award
Baxter Healthcare — Educational Grant Support

MARKETING SUPPORT (Confirmed through May 31, 2012)

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EXHIBIT SUPPORT (Confirmed through May 31, 2012)

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Vitalcor Inc.
Wexler Surgical
GUIDELINES FOR SPEAKERS AND DISCUSSANTS

The Program Committee has determined that no slides are to be included in either the invited discussion or spontaneous discussion.

1. Scientific Session speakers will be allowed ten minutes for their presentations, and primary discussants will be allowed two minutes. Concurrent Forum speakers will be allowed five minutes for their presentations.

2. Speakers are requested to present their PowerPoint Presentations in the Speaker Ready Room located in the **Silversword Room**, at least 30 minutes prior to the opening of the session at which they are to present (presentation slides can be turned in as early as Wednesday, June 27th. All presentations must be submitted in PowerPoint format only. Speakers with a disclosure will be asked to state the nature of their disclosure prior to the presentation. No personal laptops will be allowed at the podium.

3. Discussion of Papers: Only members of the Association and invited guests have the privilege of discussing papers. Non members may discuss a paper at the invitation of a member. All discussants should register with the Moderators in the science room (Haleakala 4 & 5) prior to the opening of the session during which the paper is to be presented. All discussions will be presented from floor microphones.

4. In publication, it is customary to group discussions together on a series of papers. Transcription of the discussions will be forwarded to discussants for review and correction. Any delay in the return of corrected discussions means that publication of all papers on the subject will be held up. Such a delay is manifestly unfair to those who are conscientious in the prompt submission of their remarks. Unreasonable delay will preclude publication.
PROGRAM OUTLINE

WEDNESDAY, JUNE 27, 2012

1:00 pm – 6:00 pm  REGISTRATION, Haleakala Gardens
1:00 pm – 6:00 pm  SPEAKER READY ROOM, Silversword
7:00 pm – 9:00 pm  NEW MEMBERS/WELCOME RECEPTION, Chapel Lawn
7:00 pm – 9:00 pm  KIDS & TEENS RECEPTION, Beach Courtyard

THURSDAY, JUNE 28, 2012

6:00 am  SAMSON FUN RUN, Start at Group Check-In Desk
6:30 am – 7:50 am  BREAKFAST SESSION**

Plumeria
A Balanced Approach to Operative Services
Performance Improvement Using Lean Methods
Lynn D. Martin

7:00 am – 8:00 am  CONTINENTAL BREAKFAST, Haleakala 1
7:00 am – 11:00 am  FAMILY HOSPITALITY, Hibiscus
7:00 am – 8:00 am  Continental Breakfast Served
8:00 am – 10:00 am  Full Breakfast Served
10:00 am – 11:00 am  Snacks & Beverages Served

7:00 am – 1:30 pm  REGISTRATION, Haleakala Gardens
7:00 am – 12:30 pm  SPEAKER READY ROOM, Silversword
7:00 am – 12:00 pm  EXHIBITS, Haleakala 1

** Separate Subscription Required
8:00 am – 9:00 am  **SCIENTIFIC SESSION I**

-Haleakala 4 & 5-

**Moderators:** Robbin R. Cohen  
Robert C. Robbins

(10 minutes presentation, 10 minutes discussion)

1. **Hybrid Proximal Surgery Plus Adjunctive Retrograde Endovascular Repair in Acute DeBakey Type I Dissection: Superior Outcomes to Conventional Surgical Repair**

Sophie C. Hofferberth¹, Andrew E. Newcomb¹, Zain Khalpey², Michael Y. Yii¹, Kelvin K. Yap³, Peter T. Foley³, Alexander Rosalion¹, Ian K. Nixon¹, Peter J. Mossop³

¹St. Vincent’s Hospital, Department of Cardiac Surgery, Melbourne, Australia; ²Brigham and Women’s Hospital, Department of Cardiac Surgery, Boston, MA; ³St. Vincent’s Hospital, Department of Medical Imaging, Melbourne, Australia

**DISCUSSANT:** R. SCOTT MITCHELL

2. **Impact of T Status and N Status on Outcomes After Thoracoscopic Lobectomy for Lung Cancer**

Nestor Villamizar, Marcus Darrabie, Jennifer Hanna, Mark Onaitis, David Harpole, Betty Tong, Thomas D’Amico, **Mark Berry**

*Duke University, Durham, NC*

**DISCUSSANT:** JOSEPH B. SHRAGER

3. **Contemporary Patterns of Surgery and Outcomes for Aortic Coarctation**

*Ross M. Ungerleider¹, *Karl F. Welke², Yoshio Ootaki¹, Sara Pasquali³, Jeff Jacobs⁴, Derek Williams¹, Michael Quartermain¹

¹Wake Forest University, Winston Salem, NC; ²Seattle Children’s Hospital, Seattle, WA; ³Duke University, Durham, NC; ⁴All Children’s Hospital, St. Petersburg, FL

**DISCUSSANT:** GORDON A. COHEN

9:00 am – 9:10 am  **INTRODUCTION OF NEW MEMBERS AND RESIDENT ESSAY FINALISTS, Haleakala 4 & 5**

* WTSA Member
9:10 am – 9:55 am  **PRESIDENTIAL ADDRESS**

_Haleakala 4 & 5_

Introduced By: John C. Chen

*Change You Can Count On*

Robert C. Robbins

9:55 am – 10:20 am  **COFFEE BREAK, VISIT EXHIBITS, Haleakala 1**

10:00 am – 11:00 am  **SPOUSE FORUM SESSION**

_Plumeria_

*Having the Relationships You Want: Understanding the Psychology of Relationships*

Jamie Ungerleider

10:20 am – 11:40 am  **SCIENTIFIC SESSION II**

_Haleakala 4 & 5_

Moderators: Michael P. Fischbein
Mark T. Metzdorff

*(10 minutes presentation, 10 minutes discussion)*

4.  **Early Outcome of Folding Mitral Valve Repair Technique Without Resection for Mitral Valve Prolapse**

_Hiroyuki Tsukui_, Nobuhiro Umehara, Hiroyuki Saito, Satoshi Saito, Kenji Yamazaki

_Tokyo Women’s Medical University, Tokyo, Japan_

**DISCUSSANT: D. CRAIG MILLER**

5.  **Contemporary Experience with Aortic Valve Replacement in Children**

_Muhammad S. Khan_, Andres X. Samayoa, Christopher J. Petit, Charles D. Fraser, Jr.

_Texas Children’s Hospital, Baylor College of Medicine, Houston, TX_

**DISCUSSANT: TARA B. KARAMLOU**
Stanford Hospitals and Clinics, Stanford, CA
DISCUSSANT: JOSEPH C. CLEVELAND

+7. Surgical Treatment of a Second Metachronous Non-Small Cell Lung Cancer (NSCLC)
Masatsugu Hamaji1, K. Robert Shen2, Stephen D. Cassivi2, Mark S. Allen2, Francis C. Nichols2, Claude Deschamps2, Dennis A. Wigle2
1Brigham and Women’s Hospital, Boston, MA; 2Mayo Clinic, Rochester, MN
DISCUSSANT: PAUL H. SCHIPPER

11:40 am – 12:30 pm CONTROVERSIES IN THORACIC SURGERY
Haleakala 4 & 5
General Thoracic Surgery Is Best Taught in a I6 Program
Moderator: John D. Mitchell
Pro: Michael S. Mulligan
Con: Joseph B. Shrager

12:30 pm INVITED GUEST SPEAKER, Haleakala 4 & 5
Leading When Change Counts
Mark Emmert, NCAA President

1:30 pm ADJOURN

1:30 pm – 4:30 pm KAYAK & SNORKEL TOUR**, Depart from hotel beach

1:45 pm – 5:00 pm OCEAN CRUISE TOUR**, Depart from front entrance of hotel

6:30 pm – 10:00 pm LUAU THEME DINNER, Molokini Garden

* Samson Resident Prize Essay
* WTSA Member
** Separate Subscription Required
## FRIDAY, JUNE 29, 2012

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<tr>
<th>Time</th>
<th>Activity</th>
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<tr>
<td>6:00 am – 12:00 pm</td>
<td><strong>REGISTRATION, Haleakala Gardens</strong></td>
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<tr>
<td>6:00 am – 12:00 pm</td>
<td><strong>SPEAKER READY ROOM, Silversword</strong></td>
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<td>6:30 am – 7:50 am</td>
<td><strong>BREAKFAST SESSION</strong></td>
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<tr>
<td>Plumeria</td>
<td>How to Set Up a Transcatheter Aortic Valve</td>
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<td>Replacement Program</td>
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<td>Michael J. Mack</td>
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<td>7:00 am – 11:00 am</td>
<td><strong>FAMILY HOSPITALITY, Hibiscus</strong></td>
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<td>10:00 am – 11:00 am Snacks &amp; Beverages Served</td>
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<td>7:30 am – 8:00 am</td>
<td><strong>CONTINENTAL BREAKFAST, VISIT EXHIBITS, Haleakala 1</strong></td>
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<td>7:30 am – 12:00 pm</td>
<td><strong>EXHIBITS, Haleakala 1</strong></td>
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<td>8:00 am – 8:50 am</td>
<td><strong>POSTGRADUATE COURSE</strong></td>
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<tr>
<td>Haleakala 4 &amp; 5</td>
<td>Sponsored by: White Memorial Medical Center and Foundation – Lyman A. Brewer, Ill, Fund</td>
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<td>Paging Dr. Moore, STAT</td>
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<td>Arnold Milstein</td>
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<td>Stanford University, San Francisco, CA</td>
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** Separate Subscription Required
8:50 am – 10:30 am  **SCIENTIFIC SESSION III**

Haleakala 4 & 5

Moderators: John C. Chen
Gordon A. Cohen

(10 minutes presentation, 10 minutes discussion)

+8. **Routine Left Atrial Appendage Ligation in All Open Heart Surgery to Prevent Postoperative Cerebrovascular Accident**
   **Ryan Kim¹**, Norbert Baumgartner², John Clements¹
   ¹Synergy Medical Education Alliance, Saginaw, MI;
   ²Michigan CardioVascular Institute, Saginaw, MI

   **DISCUSSANT: DAVID A. FULLERTON**

9. **Surgical and Neurological Outcomes After Left Thoracoscopic Robot-Enhanced Thymectomy in 100 Consecutive Myasthenia Gravis Patients**
   **Giuseppe Marulli¹**, Marco Schiavon¹, Francesco Di Chiara¹, Antonella Bugana¹, Alessandro Rebusso¹, Egle Perissinotto², Fiorella Calabrese³, Federico Rea¹
   ¹Thoracic Surgery – University of Padova, Padova, Italy;
   ²Biostatistics – University of Padova, Padova, Italy;
   ³Pathology – University of Padova, Padova, Italy

   **DISCUSSANT: MITHRAN S. SUKUMAR**

10. **Prioritization of Quality Improvement in Pediatric Cardiac Surgery**
    **Pirooz Eghtesady¹**, Anoop K. Brar¹, Matthew Hall²
    ¹Washington University School of Medicine, St. Louis, MO; ²Child Health Corporation of America, Shawnee Mission, KS

    **DISCUSSANT: JAMES JAGGERS**

+ Samson Resident Prize Essay
11. Ambulatory ECMO and Artificial Lung Technology as a Bridge to Pulmonary Transplant  
*Charles Hoopes*¹, *Jasleen Kukreja*²  
¹University of Kentucky, Lexington, KY; ²University of California San Francisco, San Francisco, CA  
DISCUSSANT: MICHAEL S. MULLIGAN

12. A Prospective Study of Growth and Rupture Risk of Small-to-Moderate Size Ascending Aortic Aneurysms  
Sarah Geisbuesch, Angelina Stefanovic, Deborah Schray, Irina Oyfe, Hung-Mo Lin, Gabriele Di Luozzo, *Randall B Griepp  
Mount Sinai Medical Center, New York, NY  
DISCUSSANT: MICHAEL P. FISCHBEIN

10:30 am – 11:00 am COFFEE BREAK, VISIT EXHIBITS, Haleakala 1

11:00 am – 12:00 pm SCIENTIFIC SESSION IV  
Haleakala 4 & 5  
(10 minutes presentation, 10 minutes discussion)  
Moderators: John D. Mitchell  
Anthony P. Furnary

13. Effect of Cytokine Hemoadsorption on Brain-Death Induced Ventricular Dysfunction in a Porcine Model  
Krasimira M. Mikhova¹, Krystal M. Jones¹, Michael LaFlamme¹, John A. Kellum²,  
*Michael S. Mulligan¹, *Edward D. Verrier¹,  
David G. Rabkin¹  
¹University of Washington Medical Center, Seattle, WA; ²University of Pittsburgh School of Medicine, Pittsburgh, PA  
DISCUSSANT: ABBAS ARDEHALI

* WTSA Member
+14. The Use of Routine CT Surveillance in the Follow-Up Care of Early Stage Lung Cancer Survivors
Feiran Lou, Peter Bach, Valerie W. Rusch, James Huang
Memorial Sloan-Kettering Cancer Center, New York, NY
DISCUSSANT: SEAN C. GRONDIN

+15. Quantitative Evaluation of Change in Co-Existen Mitral Regurgitation After Aortic Valve Replacement
David J. Kaczorowski, Jessica L. Howard,
John W. MacArthur, Dale Kobrin, Y. Joseph Woo
University of Pennsylvania, Philadelphia, PA
DISCUSSANT: GABRIEL S. ALDEA

12:00 pm ADJOURN

1:00 pm GOLF TOURNAMENT**, Wailea Gold Course, Wailea Golf Club; Depart from hotel front entrance

1:30 pm TENNIS TOURNAMENT**, Wailea Tennis Club; Depart from hotel front entrance

EVENING — FREE

+ Samson Resident Prize Essay
** Separate Subscription Required
SATURDAY, JUNE 30, 2012

6:00 am – 11:30 am  **SPEAKER READY ROOM, Silversword**

6:00 am – 12:00 pm  **REGISTRATION, Haleakala Gardens**

6:30 am – 7:30 am  **CONTINENTAL BREAKFAST, Haleakala 1**

6:30 am – 10:30 pm  **EXHIBITS, Haleakala 1**

7:00 am – 8:45 am  **CONCURRENT FORUMS**

(5 minutes presentation, 3 minutes discussion)

ADULT CARDIAC

Haleakala 4 & 5

Moderators: David A. Fullerton
            J. Scott Millikan

**CF1. Current Outcomes of Isolated Reoperative CABG in the United States: Analysis of the STS Adult Cardiac Surgery Database**
Ravi K. Ghanta¹, Tsuyoshi Kaneko¹, Shubin Sheng², Sary F. Aranki¹

¹Brigham and Women’s Hospital, Boston, MA;
²Outcomes Research and Assessment Group Duke Clinical Research Institute, Durham, NC

**CF2. One Thousand Minimally Invasive Mitral Valve Operations Over a 15-Year Time Period: Early and Late Results**

Brigham and Women’s Hospital, Boston, MA

* WTSA Member
CF3. **Plasma Biomarkers for Distinguishing Etiological Subtypes of Thoracic Aortic Aneurysm Disease**
*John S. Ikonomidis¹, Charlotte R. Ivey¹, Jason B. Wheeler¹, Adam W. Akerman¹, Allison Rice¹, Risha K. Patel¹, Robert E. Stroud¹, Asad A. Shah², Chad G. Hughes², Giovanni Ferrari³, Jeffrey A. Jones¹
¹Medical University of South Carolina, Charleston, SC; ²Duke University School of Medicine, Durham, NC; ³University of Pennsylvania School of Medicine, Philadelphia, PA

CF4. **Imaging of Vascular Remodeling Following Simulated Thoracoabdominal Aneurysm Repair**
Sarah Geisbuesch, Deborah Schray, Moritz S. Bischoff, Hung-Mo Lin, Gabriele Di Luozzo, *Randall B. Griepp
Mount Sinai Medical Center, New York, NY

CF5. **Incremental Risk of Cox-Maze IV Procedure for Patients with Atrial Fibrillation and Mitral Valve Disease Undergoing Mitral Valve Surgery**
Lindsey Saint, Hersh Maniar, Ralph Damiano, Jr., Marc Moon, Michael Pasque, Scott Silvestry, Phillip Cuculich, Tracey Guthrie, Jennifer Lawton
Washington University, Saint Louis, MO

CF6. **Surgical Ablation of Atrial Fibrillation: Trends and Outcomes in North America Including Stand Alone Procedures On and Off Bypass**
Niv Ad¹, Rakesh M. Suri², Shubin Sheng³, Linda Henry¹, James S. Gammie⁴
¹Inova Heart and Vascular Institute, Falls Church, VA; ²Mayo Clinic, Rochester, MN; ³Duke Clinical Research Institute, Durham, NC; ⁴Division of Cardiac Surgery, University of Maryland Medical Center, Baltimore, MD

* WTSA Member
CF7. Atorvastatin Increases Oxidative Stress and Modulates Angiogenesis in a Porcine Model of Metabolic Syndrome
Nassrene Y. Elmadhun, Antonio D. Lassaletta, Louis M. Chu, Jun Feng, Yuhong Liu, Frank W. Sellke
Division of Cardiothoracic Surgery, Cardiovascular Research Center, Warren Alpert School of Medicine, Brown University, Providence, RI

CF8. Pulmonary Hypertension Is Associated with Worse Early and Late Outcomes After Aortic Valve Replacement: Implications for TAVR
Eric E. Roselli, Anas Abdel Azim, Penny L. Houghtaling, Wael A. Jaber, Eugene H. Blackstone
Cleveland Clinic, Cleveland, OH

CF9. Radiation Induces Osteogenesis in Human Aortic Valve Interstitial Cells
University of Colorado School of Medicine, Aurora, CO

CF10. Post-Cardiac Transplant Survival in the Current Era in Patients Receiving Continuous-Flow LVADs
Forum Kamdar, Kenneth Liao, Peter Eckman, Monica Colvin-Adams, Sara Shumway, Ranjit John
University of Minnesota, Minneapolis, MN

CF11. Mathematically-Engineered Stromal Cell-Derived Factor 1 Alpha Stem Cell Cytokine Analogue Enhances Mechanical Properties of Infarcted Myocardium
John W. MacArthur, Jr., Alen Trubelja, David P. Beason, William Hiesinger, Pavan Atluri, Y. Joseph Woo
University of Pennsylvania, Philadelphia, PA

* WTSA Member
CF12. Reliability of Porcine Versus Pericardial Bioprosthetic Valves

*Anthony P. Furnary1, *Gary L. Grunkemeier2, YingXing Wu2, Lian Wang2, *Albert Starr3

1Starr-Wood Cardiac Surgery Group, St. Vincent Hospital & Medical Center, Portland, OR; 2Medical Data Research Center, Providence Health & Services, Portland, OR; 3Division of Cardiovascular Medicine, Oregon Health Sciences University, Portland, OR

CF13. Propensity Score Adjusted Comparison of Minimally Invasive Versus Sternotomy Approaches to Isolated Mitral Valve Repair


University of Pennsylvania, Philadelphia, PA

GENERAL THORACIC

Ilima

Moderators: Sean C. Grondin
Paul H. Schipper


Betty C. Tong1, Andrzej S. Kosinski1, William R. Burfeind, Jr.2, Mark W. Onaitis1, Matthew G. Hartwig1, Mark F. Berry1, David H. Harpole, Jr.1, Thomas A. D’Amico1

1Duke University, Durham, NC; 2St. Luke’s Health Network, Bethlehem, PA

* WTSA Member
CF15. Predictors of Morbidity and Mortality After Repair of Giant Paraesophageal Hernias
Nikiforos Ballian, James D. Luketich, Manisha Shende, Daniel Winger, Blair A. Jobe, Benny Weksler, Matthew J. Schuchert, Rodney J. Landreneau, Katie S. Nason
*University of Pittsburgh Medical Center, Pittsburgh, PA

CF16. The Impact of Barrett’s Surveillance on Esophageal Preservation, Tumor Stage, and Survival with Esophageal Adenocarcinoma
Kimberly S. Grant, *Steven R. DeMeester, Shahin Ayazi, Michael Hermansson, Joerg Zehetner, Daniel Oh, Jeffrey Hagen
*University of Southern California Keck School of Medicine, Los Angeles, CA

CF17. The Impact of Neoadjuvant Chemoradiotherapy on Tumor pathology, Perioperative Outcomes and Survival in Stage II and III Esophageal Cancer
Sheraz R. Markar, *Donald E. Low
*Virginia Mason Medical Center, Seattle, WA

CF18. Src Kinase Inhibition Reverses P27/Kip1 Mislocalization and Reduces Growth of Pre-Neoplastic Barrett’s Esophagus Cell Lines
Aaron J. Fowler¹, Valerie M. Felton¹, Amanda L. Richer¹, Kimberly M. Paquette², Nhan L. Tran², *Ross M. Bremner¹, Landon J. Inge¹
¹Heart and Lung Institute, St. Joseph’s Hospital and Medical Center, Phoenix, AZ; ²Translation Genomics Research Institute, Phoenix, AZ

CF19. Corkscrew Stenosis: Defining and Preventing a New Complication of Percutaneous Dilatational Tracheostomy (PDT)
*St. Joseph’s Hospital and Medical Center, Phoenix, AZ

* WTSA Member
CF20. Minimally Invasive Repair of Pectus Excavatum in Adult Patients: An Early Experience Using a Modified Nuss Technique
Marianne V. Merritt1, *Dawn E. Jaroszewski1, Lisa E. McMahon2, Irene T. Ma1, Jesse J. Lackey1, David M. Notrica2
1Mayo Clinic, Phoenix, AZ; 2Pediatric Surgeons of Phoenix, Phoenix, AZ

CF21. Treatment of Early Stage Lung Cancer in High Risk Patients: Comparison of Prospective Clinical Trials Utilizing Stereotactic Body Radiation Therapy (RTOG 0236), Sublobar Resection (ACOSOG Z4032), and Radiofrequency Ablation (ACOSOG Z4033)
Traves D. Crabtree1, Varun Puri1, Robert Timmerman2, Jeffrey D. Bradley1, Hiran Fernando3, Paul Decker4, Rebecca Paulus5, Bryan F. Meyers1
1Washington University School of Medicine, Saint Louis, MO; 2University of Texas Southwestern Medical Center, Dallas, TX; 3Boston Medical Center, Boston, MA; 4Mayo Clinic, Rochester, MN; 5American College of Radiology, Philadelphia, PA

Michael I. Ebright, Gregory A. Russo, Avneesh Gupta, Rathan Subramaniam, Hiran C. Fernando, Lisa A. Kachnic
Boston University School of Medicine, Boston, MA

* WTSA Member
CF23. Lung Reconditioning Ex Vivo with the Novel Vivoline® System in Clinical Lung Transplantation
Andreas Wallinder¹, Sven-Erik Ricksten², Gerdt Riise³, Martin Silverborn¹, Hans Liden¹, Christoffer Hansson¹, Göran Dellgren⁴
¹Department Cardiothoracic Surgery, Sahlgrenska University Hospital, Gothenburg, Sweden; ²Department Cardiothoracic Anesthesia and Intensive Care, Sahlgrenska University Hospital, Gothenburg, Sweden; ³Transplant Institute, Sahlgrenska University Hospital, Gothenburg, Sweden; ⁴Sahlgrenska University Hospital, Gothenburg, Sweden

CF24. Intraoperative Hyperthermic Chemotherapy Perfusion for Malignant Pleural Mesothelioma: A Basic Science Evaluation
*Robert B. Cameron, Dongmei Hou, David Geffen
UCLA School of Medicine, Los Angeles, CA

CF25. Secretory Phospholipase A2 Ila Modulates Growth in KRas Mutant Lung Cancer Cells
Jessica Yu, Howard Li, Xianzhong Meng,
*David A. Fullerton, Raphael A. Nemenoff,
*John D. Mitchell, *Michael J. Weyant
University of Colorado, Aurora, CO

CF26. A Prospective Randomized Clinical Trial Evaluating the Optimal Method for Chest Tube Removal
*Robert J. Cerfolio, Ayesha S. Bryant
University of Alabama at Birmingham, Birmingham, AL

* WTSA Member
CF27. Fontan Fenestration Closure Is Not Associated with Improved Event-Free Survival
Bartlomiej R. Imielski¹, *Ronald K. Woods², Kathleen A. Mussatto², Pippa M. Simpson¹, Yumei Cao¹, James S. Tweddell²
¹Medical College of Wisconsin, Milwaukee, WI; ²Children’s Hospital of Wisconsin, Milwaukee, WI

CF28. Two-Ventricle Repairs in the Unbalanced AV Canal Defect Spectrum with Mid-Term Follow-Up
John E. Foker, James M. Berry, Brian A. Harvey, Lee A. Pyles
University of Minnesota, Minneapolis, MN

CF29. Surgical Reconstruction of Peripheral Pulmonary Artery Stenosis In Williams and Alagille Syndrome
Stanford University School of Medicine, Stanford, CA

CF30. Differential Responses of the Right Ventricle to Abnormal Loading Conditions In Vivo: Possible Pathophysiologic Mechanisms
*Anthony Azakie, Jeffrey Fineman, Youping He
UCSF, San Francisco, CA

* WTSA Member
CF31. Late Functional Outcome of Atrioventricular Valve and Right Ventricular Outflow Tract in Patients with Tetralogy of Fallot with Atrioventricular Septal Defect: A 20-year Single Center Experience
Yasuhiro Kotani, Devin Chetan, Luc Mertens, John Coles, Christopher Caldarone, Glen Van Arsdell, Osami Honjo
The Hospital for Sick Children, Toronto, ON, Canada

CF32. Neurodevelopmental Outcomes Following Infant Cardiac Surgery: Can Intermittent Perfusion Extend the Safe Duration of Deep Hypothermic Circulatory Arrest?
Erica Sood, Julie Simons, Ryan Davies, Christian Pizarro
Nemours/Alfred I. duPont Hospital for Children, Wilmington, DE

CF33. Fate of Right Ventricular and Valve Performance Following Early Bidirectional Glenn After Norwood Operation: Impact of Shunt Strategy Controlled for Hypoplastic Left Heart Syndrome Anatomical Subtype
Anastasios C. Polimenakos, Chawki F. El Zein, Michel N. Ilbawi
Rush University Medical Center, Advocate Hope Children’s Hospital, Chicago, IL

CF34. Contemporary Cost and Mortality of Pediatric ECMO Is Lower at Large High Volume Hospitals: An Argument for Regionalization Based on 7.3 Million Cases
Seattle Children’s Hospital, Seattle, WA

* WTSA Member
CF35. Pulmonary Artery Interventions After Norwood Procedure: Does Type or Position of the Shunt Predict Need for Intervention?  
Children's Hospital Colorado, University of Colorado, Aurora, CO

CF36. Late Outcome of Repair of Congenital Coronary Artery Fistulae—A Word of Caution  
Mayo Clinic, Rochester, MN

CF37. Composite Risk Factors Predict Survival After Transplantation for Congenital Heart Disease  
Minoo N. Kavarana, Andrew Savage, Robert O. Connell, Catherine Rubinstein, Jennifer Flynn-Reeves, Kishor Joshi, Martha Stroud, *John S. Ikonomidis, Scott M. Bradley  
Medical University of South Carolina, Charleston, SC

CF38. Is Additional Pulsatile Pulmonary Blood Flow Beneficial to Patients with Bidirectional Glenn?  
Sunita J. Ferns, Chawki ElZein, Kanwar Multani, Imran Sajan, Sujata Subramanian, Anastasios Polimenakos, Michel N. Ilbawi  
The Heart Institute for Children, Oak Lawn, IL

CF39. Tricuspid Valve Repair Improves Right Ventricular and Tricuspid Valve Remodeling in Patients with Hypoplastic Left Heart Syndrome  
Shinya Ugaki, Nee Khoo, David Ross, *Ivan Rebeyka, Ian Adatia  
Stollery Children's Hospital, University of Alberta, Edmonton, AB, Canada

* WTSA Member
<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>7:00 am – 11:00 am</td>
<td><strong>FAMILY HOSPITALITY, Hibiscus</strong>&lt;br&gt;7:00 am – 8:00 am Continental Breakfast Served&lt;br&gt;8:00 am – 10:00 am Full Breakfast Served&lt;br&gt;10:00 am – 11:00 am Snacks &amp; Beverages Served</td>
</tr>
<tr>
<td>8:45 am – 9:30 am</td>
<td><strong>COFFEE BREAK, VISIT EXHIBITS, Haleakala 1</strong></td>
</tr>
<tr>
<td>9:30 am – 11:10 am</td>
<td><strong>SCIENTIFIC SESSION V</strong>&lt;br&gt;Haleakala 4 &amp; 5&lt;br&gt;Moderators: Ross M. Bremner, Thomas A. Burdon&lt;br&gt;(10 minutes presentation, 10 minutes discussion)</td>
</tr>
</tbody>
</table>

16. **Cardiothoracic Surgery Physician Assistant Home Visit Program**<br>**John P. Nabagiez**, Masood A. Shariff, Renee A. Aboushi, Igor Borodyansky, Natasha Povar, Kouroush T. Asgarian, William Molloy, Joseph T. McGinn, Jr.<br>*Staten Island University Hospital, Staten Island, NY*<br>**DISCUSSANT: ANTHONY P. FURNARY**

+17. **Clinical Predictors of Pathologic Complete Response to Chemoradiotherapy in Esophageal Squamous Cell Carcinoma: A Potential Tool to Stratify Patients to Expectant Observation Versus Surgical Resection**<br>**Daniela Molena**, Huan H. Sun, Abdul S. Badr, Inderpal S. Sarkaria, Prasad S. Adusumilli, Manjit S. Bains, Valerie W. Rusch, Nabil P. Rizk<br>*Memorial Sloan Kettering Cancer Center, New York, NY*<br>**DISCUSSANT: STEVEN R. DEMEESTER**

+ **Samson Resident Prize Essay**
+18. **Tissue-Based Coronary Surgery Simulation: Medical Student Deliberate Practice Can Achieve Equivalency to Senior Surgery Residents**

Jamii B. St. Julien, Jonathan C. Nesbitt, Tarek S. Absi, Rashid M. Ahmad, Eric L. Grogan, Jorge M. Balaguer
Vanderbilt University, Nashville, TN

DISCUSSANT: JAMES F. FANN

19. **Progression of Neoaortic Annulus and Root Diameters and Aortic Regurgitation Following the Modified Ross-Konno Procedure**

*Bahaaldin Alsoufi*, Zohair Al-Halees*, Cedric Manlhiot*, Mamdouh Al-Ahmadi*, Majid Al-Fayyadh*, Brian McCrindle†, Bahaa Fadel†
1King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia; 2Hospital for Sick Children and University of Toronto, Toronto, ON, Canada

DISCUSSANT: IVAN M. REBEYKA

+20. **No Dissection Technique Is Safe for Re-Operative Aortic Valve Replacements with a Patent Left Internal Thoracic Artery Graft**

Brigham and Women’s Hospital, Boston, MA

DISCUSSANT: RICHARD J. SHEMIN

+ Samson Resident Prize Essay

* WTSA Member
11:10 am – 12:00 pm  **C. WALTON LILLEHEI**  
**POINT/COUNTERPOINT SESSION**  
Haleakala 4 & 5  
Open Aortic Valve Replacement Versus Transcatheter Aortic Valve Replacement in the Low-Risk Patient  
Moderator: Robert C. Robbins
Open: Anthony P. Furnary
TAVR: William F. Fearon

12:00 pm – 12:30 pm **ANNUAL BUSINESS MEETING** (Members Only), Haleakala 4 & 5

12:30 pm – 2:00 pm **FAMILY LUNCHEON**, Haleakala Garden

7:00 pm – 10:00 pm **KIDS & TEENS BANQUET**, Tsunami

7:00 pm – 11:00 pm **PRESIDENT’S RECEPTION AND BANQUET**  
Reception: Haleakala Gardens
Banquet: Haleakala 1
# FULL SCIENTIFIC PROGRAM

## WEDNESDAY, JUNE 27, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>1:00 pm – 6:00 pm</td>
<td>REGISTRATION, Haleakala Gardens</td>
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<tr>
<td>1:00 pm – 6:00 pm</td>
<td>SPEAKER READY ROOM, Silversword</td>
</tr>
<tr>
<td>7:00 pm – 9:00 pm</td>
<td>NEW MEMBERS/WELCOME RECEPTION, Chapel Lawn</td>
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<tr>
<td>7:00 pm – 9:00 pm</td>
<td>KIDS &amp; TEENS RECEPTION, Beach Courtyard</td>
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## THURSDAY, JUNE 28, 2012

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<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>6:00 am</td>
<td>SAMSON FUN RUN, Start at Group Check-In Desk</td>
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<tr>
<td>6:30 am – 7:50 am</td>
<td>BREAKFAST SESSION**</td>
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<tr>
<td></td>
<td>Plumeria</td>
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<td></td>
<td>A Balanced Approach to Operative Services</td>
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<td></td>
<td>Performance Improvement Using Lean Methods</td>
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<td></td>
<td>Lynn D. Martin</td>
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<tr>
<td>7:00 am – 8:00 am</td>
<td>CONTINENTAL BREAKFAST, Haleakala 1</td>
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<tr>
<td>7:00 am – 11:00 am</td>
<td>FAMILY HOSPITALITY, Hibiscus</td>
</tr>
<tr>
<td></td>
<td>7:00 am – 8:00 am        Continental Breakfast Served</td>
</tr>
<tr>
<td></td>
<td>8:00 am – 10:00 am       Full Breakfast Served</td>
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<tr>
<td></td>
<td>10:00 am – 11:00 am      Snacks &amp; Beverages Served</td>
</tr>
<tr>
<td>7:00 am – 1:30 pm</td>
<td>REGISTRATION, Haleakala Gardens</td>
</tr>
<tr>
<td>7:00 am – 12:30 pm</td>
<td>SPEAKER READY ROOM, Silversword</td>
</tr>
<tr>
<td>7:00 am – 12:00 pm</td>
<td>EXHIBITS, Haleakala 1</td>
</tr>
</tbody>
</table>

** Separate Subscription Required
8:00 am – 9:00 am  **SCIENTIFIC SESSION I**

**Haleakala 4 & 5**

**Moderators:** Robbin R. Cohen  
Robert C. Robbins  

*(10 minutes presentation, 10 minutes discussion)*

**1. Hybrid Proximal Surgery Plus Adjunctive Retrograde Endovascular Repair in Acute DeBakey Type I Dissection: Superior Outcomes to Conventional Surgical Repair**

**Sophie C. Hofferberth**¹, Andrew E. Newcomb¹,  
Zain Khalpey², Michael Y. Yii¹, Kelvin K. Yap³,  
Peter T. Foley³, Alexander Rosaljon¹, Ian K. Nixon¹,  
Peter J. Mossop³  
¹St. Vincent’s Hospital, Department of Cardiac Surgery,  
Melbourne, Australia; ²Brigham and Women’s Hospital,  
Department of Cardiac Surgery, Boston, MA; ³St.  
Vincent’s Hospital, Department of Medical Imaging,  
Melbourne, Australia

**DISCUSSANT:** R. SCOTT MITCHELL

**INTRODUCTION:** Conventional surgical repair of acute DeBakey I aortic dissection consists of ascending aortic resection, aortic root repair or replacement, and variable aortic arch replacement. This strategy leaves most patients with a residual “type B” dissection and substantial risk of developing acute and remote phase complications; including malperfusion sequelae preoperatively and late distal aortic aneurysm formation and rupture. This report tests whether proximal surgery with adjunctive retrograde stent-grafting plus distal bare metal stenting of the descending thoracoabdominal aorta in acute DeBakey Type I dissection decreases future distal aortic related complications compared to conventional open surgical repair.

**METHODS:** Between December 2003 and December 2011, 61 consecutive patients with acute Type A aortic dissection were treated surgically at our tertiary referral centre. Of these, 37 were DeBakey Type I dissections: 18 patients (Group 1) underwent standard open repair, while 19 (Group 2) underwent proximal surgical repair with adjunctive retrograde stent-grafting plus distal bare metal stenting of the descending thoracoabdominal aorta at the time of primary surgical intervention. Fisher’s exact test and Student’s T-Test was performed to compare perioperative and late clinical outcomes between the two groups.
RESULTS: Mean follow up time was 41 months for Group 1 and 59 months for Group 2 ($p = 0.11$). Patients were comparable for baseline characteristics, including incidence of preoperative malperfusion syndromes (Group 1 = 9, Group 2 = 8, $p = 0.23$). Intraoperative characteristics were similar, with no difference in cardiopulmonary bypass time ($p = 0.13$) or duration of deep hypothermic arrest ($p = 0.38$). Postoperatively, 4 (22%) Group 1 patients had malperfusion syndromes, compared to 0 Group 2 patients ($p = 0.04$). Postoperative stroke rates were 3(19%) in Group 1 versus 1 (5%) in Group 2 ($p = $ not significant [NS]). Overall hospital mortality was 11% (n = 2) for group 1 versus 5% (n = 1) for Group 2. At latest follow up, 6 (38%) Group 1 versus 0 Group 2 subjects developed thoracoabdominal aneurysms and/or required secondary distal aortic reintervention ($p = 0.006$).

CONCLUSIONS: This hybrid approach of conventional surgery with adjunctive retrograde stent-grafting plus distal bare metal stenting of the descending thoracoabdominal aorta gives favorable short-term outcomes and decreases late distal aortic complications compared with conventional surgical repair for acute DeBakey type I aortic dissection. This study provides important evidence to support further prospective investigation of this procedural approach to improve management of acute DeBakey I dissection.
OBJECTIVES: A prospective, multi-institutional study demonstrated the feasibility of thoracoscopic lobectomy for suspected stage I peripheral lung cancers <3 cm in size. We tested the hypothesis that performing thoracoscopic lobectomy is safe and effective in patients with lung cancers that were larger, more central, or had clinically positive nodal disease.

METHODS: All patients who underwent attempted thoracoscopic lobectomy for primary lung cancer between 6/1999 and 10/2010 at a single institution were reviewed. Morbidity included any perioperative complication as defined by the STS database. A model for morbidity including published preoperative risk factors as well as tumor size (>3 cm vs ≤3 cm), tumor location (central vs peripheral), and clinical N status (N1–N3 vs N0) was developed by multivariable logistic regression.

RESULTS: Of 1195 thoracoscopic lobectomies performed during the study period, 916 met the study criteria: 329 for peripheral, clinical N0 tumors ≤3 cm in size and 504 for tumors that were central, clinical node positive, or >3 cm in size; tumor location could not be documented for 83 patients (Table 1). Conversions to thoracotomy occurred in 36 patients (4%) and conversion rate was not higher for tumors >3 cm (p = 0.89) or for central tumors (p = 0.3) but was increased for patients with clinically node positive disease [11 conversions in 153 clinical N1–N3 patients (7.2%) vs 25 conversions in 763 clinical N0 patients (3.3%), p = 0.03]. Overall operative mortality was 1.6% (14 patients) and morbidity was 32% (296 patients). The most common complications were atrial arrhythmia (128 patients, 14%), need for chest tube more than 5 days (107 patients, 12%) and atelectasis requiring bronchoscopy (54 patients, 6%). Although patients with larger tumors (p = 0.006) and central tumors (p = 0.01) had increased complications by univariate analysis, tumor size >3 cm (p = 0.15) and central location (p = 0.5) did not significantly predict overall morbidity in multivariable analysis. Clinical node status did not predict increased complications by univariate or multivariate analysis. Significant predictors of morbidity in multivariable analysis were increasing age, decreasing FEV1, prior chemotherapy, and congestive heart failure (Table 2).

CONCLUSIONS: Thoracoscopic lobectomy for lung cancers that are central, clinically node positive, or larger than 3 cm does not have increased morbidity compared to peripheral, clinical N0 cancers that are smaller than 3 cm, though cancers that are clinically node positive are associated with a higher rate of conversion to thoracotomy.
<table>
<thead>
<tr>
<th></th>
<th>All Patients (n = 916)</th>
<th>Clinical N0</th>
<th>Clinical N1–N3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Central, ≤3 cm (n = 165)</td>
<td>Peripheral, ≤3 cm (n = 329)</td>
<td>Central, &gt;3 cm (n = 112)</td>
</tr>
<tr>
<td>Age</td>
<td>67 (21–93)</td>
<td>67 (21–87)</td>
<td>69 (40–83)</td>
</tr>
<tr>
<td>FEV1</td>
<td>74 ± 20</td>
<td>74 ± 20</td>
<td>72 ± 19</td>
</tr>
<tr>
<td>DLCO</td>
<td>77 ± 21</td>
<td>75 ± 22</td>
<td>75 ± 23</td>
</tr>
<tr>
<td>Prior Chemotherapy</td>
<td>60 (6%)</td>
<td>9 (3%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Prior Radiation</td>
<td>48 (5%)</td>
<td>14 (4%)</td>
<td>3 (4%)</td>
</tr>
<tr>
<td>Perioperative Mortality</td>
<td>14 (1.6%)</td>
<td>4 (1%)</td>
<td>2 (2%)</td>
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<tr>
<td>Conversion</td>
<td>36 (4%)</td>
<td>11 (3%)</td>
<td>1 (1%)</td>
</tr>
<tr>
<td>Overall Morbidity</td>
<td>296 (32%)</td>
<td>85 (26%)</td>
<td>32 (40%)</td>
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Table 2: Multivariate Risk Model for Complications

<table>
<thead>
<tr>
<th></th>
<th>Univariate p-Value</th>
<th>Multivariate Analysis</th>
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<th></th>
<th>p-Value</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Odds Ratio</td>
<td>95% Confidence Interval</td>
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<tr>
<td>Age (per 1 year increase)</td>
<td>&lt;0.0001</td>
<td>1.054</td>
<td>1.033–1.076</td>
<td>&lt;0.001</td>
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<tr>
<td>FEV1 (per 1% increase)</td>
<td>&lt;0.0001</td>
<td>0.976</td>
<td>0.967–0.986</td>
<td>&lt;0.001</td>
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<tr>
<td>Prior Chemotherapy</td>
<td>0.02</td>
<td>2.453</td>
<td>1.161–5.185</td>
<td>0.02</td>
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<tr>
<td>Congestive Heart Failure</td>
<td>0.003</td>
<td>2.174</td>
<td>1.036–4.562</td>
<td>0.04</td>
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<tr>
<td>DLCO (per 1% decrease)</td>
<td>&lt;0.0001</td>
<td></td>
<td></td>
<td>0.054</td>
<td></td>
</tr>
<tr>
<td>Tumor Size (&gt;3 cm vs ≤3 cm)</td>
<td>0.006</td>
<td></td>
<td></td>
<td>0.15</td>
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<tr>
<td>Smoking History</td>
<td>0.002</td>
<td></td>
<td></td>
<td>0.3</td>
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<tr>
<td>Tumor Location (Central vs Peripheral)</td>
<td>0.01</td>
<td></td>
<td></td>
<td>0.5</td>
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</tbody>
</table>
3. Contemporary Patterns of Surgery and Outcomes for Aortic Coarctation
*Ross M. Ungerleider1, *Karl F. Welke2, Yoshio Ootaki1, Sara Pasquali3, Jeff Jacobs4, Derek Williams1, Michael Quartermain1
1Wake Forest University, Winston Salem, NC; 2Seattle Children’s Hospital, Seattle, WA; 3Duke University, Durham, NC; 4All Children’s Hospital, St. Petersburg, FL
DISCUSSANT: GORDON A. COHEN

OBJECTIVES: Coarctation of the aorta has had reported mortality rates ranging from 7% –13% (in neonates) depending on the absence or presence of a VSD (CHSS study (1994)). The incidence of postoperative paraplegia for patients of all ages has been quoted at 0.4% since the 1970’s, and the rates for other significant complications, especially in young patients, are not known. This study was undertaken to describe the contemporary patterns of presentation, surgery and outcome for coarctation of the aorta.

METHODS: Between 2006–2011, 95 centers contributed information to the STS Congenital Heart Surgery Database on patients undergoing repair of aortic coarctation. Our analysis includes 3983 patients having repair of coarctation without (3870_Group C) or with (113_Group C-VSD) a concomitant VSD repair.

RESULTS: For Group C, age at surgery was: neonates (<30 days age) _1939 pts. (50.9%); infants (>30 days–1 year) _1072 pts (27.5%); children (>1 year–12 years) _684 pts. (17.2%); adolescents (>12 years–18 years) _128 pts. (3.2%); and adults (>18 years) _47 pts. (1.2%). For Group C-VSD, all repairs were performed in the first year of life: neonates 88 (77.9%), and infants 25 (22.1%). Overall, 5.26.9% of patients presented in shock and 14.922.7% required mechanical ventilation prior to surgery. (22.5% C vs. 27.9% C-VSD). 85.3% of all patients were treated with primary repair and excision of ductal tissue: end-to-end (30.5%), extended end-to-end (54.8%). Subclavian flap (3.9%) and patch aortoplasty (4.7%) were used less frequently. 324 C patients underwent repair using CPB (8.4%). Overall hospital mortality was 1.4% (1.4% C vs. 1.8% C-VSD). 27.4% of patients were coded as having a postoperative complication (26.6% C vs. 56.6% C-VSD). Of note is the incidence of chylothorax (2.5% C; 5.3% C-VSD), renal failure (0.2% C; 1.8% C-VSD), recurrent laryngeal nerve injury (2.0% C; 7.1% C-VSD), paralyzed hemidiaphragm (0.5% C; 0% C-VSD), unplanned reoperation (1.6% C; 2.7% C-VSD), and spinal cord injury (0–% in 879 patients since this complication field was added to the STS dataset in 2010). Median postoperative length of stay was 5.0 days (4.0–9.0 days) (C) and 11.0 days (7.0–20.0 days) C-VSD.

* WTSA Member
CONCLUSION: In the current era, surgery for aortic coarctation is performed primarily in neonates and infants, many of who are critically ill (presenting in shock or requiring mechanical ventilation). Despite this challenging population, outcomes continue to improve and hospital mortality is lower than previously reported, with most surgeons preferring end-to-end repairs (without CPB unless there is a concomitant VSD). These data are important when comparing surgical repair of coarctation to other interventional modalities. With surgery, major complications are low and likelihood of spinal cord injury in neonates and infants may be less than previously reported.
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<tr>
<td>9:00 am – 9:10 am</td>
<td><strong>INTRODUCTION OF NEW MEMBERS AND RESIDENT ESSAY FINALISTS, Haleakala 4 &amp; 5</strong></td>
<td></td>
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<tr>
<td>9:10 am – 9:55 am</td>
<td><strong>PRESIDENTIAL ADDRESS</strong></td>
<td>Haleakala 4 &amp; 5</td>
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<tr>
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<td><em>Introduced By: John C. Chen</em></td>
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<td></td>
<td><strong>Change You Can Count On</strong></td>
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<td><em>Robert C. Robbins</em></td>
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<tr>
<td>9:55 am – 10:20 am</td>
<td><strong>COFFEE BREAK, VISIT EXHIBITS, Haleakala 1</strong></td>
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<td>10:00 am – 11:00 am</td>
<td><strong>SPOUSE FORUM SESSION</strong></td>
<td>Plumeria</td>
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<td></td>
<td><em>Having the Relationships You Want: Understanding the Psychology of Relationships</em></td>
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<td></td>
<td><em>Jamie Ungerleider</em></td>
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**NOTES**
4. Early Outcome of Folding Mitral Valve Repair Technique Without Resection for Mitral Valve Prolapse

Hiroyuki Tsukui, Nobuhiko Umehara, Hiroyuki Saito, Satoshi Saito, Kenji Yamazaki
Tokyo Women’s Medical University, Tokyo, Japan

DISCUSSANT: D. CRAIG MILLER

OBJECTIVES: Triangular or quadrangular resection represents the gold standard for treatment of mitral valve regurgitation (MR) with prolapse. However, resection is irreversible and involves time-consuming leaflet cutting and reapproximation, and artificial chordae reconstruction. Folding mitral valve repair (FMVR) is a nonresectional technique with inversion of the prolapsed segment into the left ventricle. This study evaluated the effectiveness of this technique.

METHODS: Mitral ring annuloplasty sutures were placed and retracted to expose the mitral valve. The prolapsed segment was inverted into the left ventricle vertically. A pilot suture with a 5-0 monofilament polypropylene was placed at the free edge of the leaflet. After confirming no MR with saline pressure test, additional sutures were placed toward the annulus. If the test still showed MR, the suture was removed and repositioned. Usually, annular plication was applied to the same segment to facilitate leaflet approximation. Ring annuloplasty was performed in all patients except those with active infectious endocarditis (IE). The repaired mitral valve was evaluated by echocardiography before discharge.

RESULTS: Sixty patients (male: 37, mean age: 62.4 years old) underwent FMVP from January 2007 to September 2011. Thirty-eight (63%) patients had moderate and 18 (30%) had severe MR preoperatively. Seven patients had IE (healed: 6, active: 1). FMVR was performed to P3 in 19 patients, P2 in 14, A3 in 7, A1 in 6, posteromedial commissure (PMC) in 4, P1 in 3, A1+P1, A2+A3, A2+A3+P3, A3+PMC, P2+P3, P3+PMC, and anterolateral commissure in 1. Concomitant procedures were arrhythmia correction surgery in 23, tricuspid valve repair in 14 (ring annuloplasty: 13, De Vega: 1), CABG in 5 and aortic valve replacement in 3. Mean cardiopulmonary bypass and cross clamp time was 148 and 90 minutes, respectively. No patient had systolic anterior motion after bypass. All patients were discharged and are still alive. Postoperative echocardiography revealed no to trivial MR in 48, and mild MR in 12 before discharge. No patient required reoperation for recurrent MR.

CONCLUSIONS: FMVP is a rapid and easily fine-tuned technique with a pilot suture, which can be easily removed and repositioned if unsatisfactory. This reversibility is a significant advantage compared with resection technique. This technique can be applied to anterior leaflet pathology as well in selected patients. Long-term follow-up is necessary to assess the durability of this technique.
re-intubation (2.9% vs. 4.3%, \(p = 0.03\)) was higher in group C compared to group O respectively. There were fewer red blood cell (52.1% vs. 58.7%, \(p < 0.0001\)) and plasma transfusions (24.9% vs. 40.5%, \(p < 0.0001\)) in group C compared to group O patients. Cause of ICU death and the independent risk factors for in-hospital mortality were similar in both groups.

CONCLUSIONS: In this large single center dedicated adult cardiac surgery ICU no difference in ICU or hospital mortality was observed, whether management was led by cardiac surgeons or certified intensivists. Length of stay, re-admissions and re-intubations were less in an “open” structured ICU. The intensivist managed cardiac ICU is associated with reduced blood product transfusions.
5. Contemporary Experience with Aortic Valve Replacement in Children
Muhammad S. Khan, Andres X. Samayoa, Christopher J. Petit, Charles D. Fraser, Jr.
Texas Children’s Hospital, Baylor College of Medicine, Houston, TX
DISCUSSANT: TARA B. KARAMLOU

OBJECTIVES: Aortic valve replacement (AVR) in children involves complex decisions particularly in very small patients. Currently, there is no consensus on the best valve option for a child. The objective of this review was to analyze the contemporary experience of AVR in a children’s hospital.

METHODS: A retrospective review of outcomes for patients that underwent an AVR at age ≤18 years between June 1995 and June 2011 was carried out.

RESULTS: There were 174 AVR performed on 148 patients. The median age at AVR was 8.9 (4 d–18 y). Valves implanted included 68 autografts, 63 homografts, 34 mechanical and 9 bioprosthetic valves. Autografts and homografts were used more frequently in younger children (Median 6.6 y, 4 d–16.6 y) while mechanical and bioprosthetics were more frequently used for older children (Median 15 y, 2–18 y). 77 (52%) patients had stenosis, 58 (39%) had insufficiency and 13 (9%) had both stenosis and insufficiency. The median left ventricle end diastolic (LVEDD) and systolic dimension (LVESD) z-score for patients with insufficiency were 3.2 (−4.2 to 6.8) and 1.4 (−4.3 to 6.9) respectively. The median LVEDD and LVESD z-score for patients with stenosis were 2.3 (−3.7 to 9.1) and 0.6 (−6.7 to 11.2) respectively. 51 (35%) patients had a balloon valvuloplasty prior to the primary AVR. 23 (16%) patients required a second AVR and 3 (2%) required a third AVR. Hospital mortality was 4% (6) with 6 late deaths. 9 of the deaths were in infants; 6 of these patients received a homograft while 3 had an autograft. Of the 6 hospital deaths 5 had Shone’s syndrome and 1 had velocardiofacial syndrome. The median follow up for all patients was 4.6 y, 4 d–15 y. Homografts had the highest rate of aortic valve reintervention (p < 0.0001). Patients having a homograft valve replacement (p = 0.0005) and those younger age at replacement (p < 0.0001) were more likely to have an intervention or death post-AVR. Overall valve survival was 89% at 1 year and 75% at 5 years while patient survival was 94% at 1 year and 92% at 5 years.
**Table 1:** Patient Characteristics with Different Type of Aortic Valve Replacements

<table>
<thead>
<tr>
<th></th>
<th>Autografts (n = 57)</th>
<th>Homografts (n = 56)</th>
<th>Mechanical (n = 29)</th>
<th>Bioprosthetic (n=9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Median Age (Range) yrs</strong></td>
<td>6.5 (6 d–16.6 y)</td>
<td>3.7 (4 d–14.7 y)</td>
<td>14.6 (2.1–17.8)</td>
<td>16.1 (5.5–18 y)</td>
</tr>
<tr>
<td><strong>Median Weight (Range) kgs</strong></td>
<td>21.2 (3.4–96.1)</td>
<td>24 (2–96.3)</td>
<td>51.6 (10.1–109.3)</td>
<td>62.4 (20–73.1)</td>
</tr>
<tr>
<td><strong>Median Size (Range) mm</strong></td>
<td>----</td>
<td>16 (7–26)</td>
<td>22 (17–29)</td>
<td>21 (19–27)</td>
</tr>
<tr>
<td><strong>Aortic Valve Freedom from Reintervention (%)</strong></td>
<td>95%</td>
<td>64%</td>
<td>96%</td>
<td>100%</td>
</tr>
<tr>
<td><strong>Discharge Mortality (%)</strong></td>
<td>2 (3.5)</td>
<td>4 (7)</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**CONCLUSIONS:** Homograft valve replacements in children appear to have a high risk of death or reintervention. Autograft and mechanical valves have a better rate of freedom from reintervention and patient survival than homografts on midterm follow up.
**OBJECTIVES:** High levels of preformed anti-human leukocyte antigen antibodies as assessed by the Panel Reactive Antibody (PRA) activity test predict worse outcomes following orthotopic heart transplant (OHT). Many institutions employ protocols to desensitize patients prior to transplant. No study has assessed the impact of a reduction in PRA activity on graft survival after OHT.

**METHODS:** Adults undergoing OHT in the United Network for Organ Sharing (UNOS) database (10/1987-6/2004) were stratified by whether a substantial decline (absolute reduction ≥20%) from peak to most recent PRA activity level occurred prior to OHT. We limited our analysis to patients transplanted on or before 6/2004 given that less than 20% of patients transplanted since 6/2004 have a peak PRA level documented in the UNOS database. Propensity-matching adjusted for pre-transplant differences on 27 pre-transplant recipient and donor variables. Survival from time of transplant was assessed using Kaplan-Meier analysis. Cox proportional hazards regression determined predictors of survival.

**RESULTS:** Baseline characteristics of the 27,206 patients identified are shown in Table 1. Propensity score analysis matched 962 patients with a significant reduction in PRA activity with 962 patients without any reduction in PRA activity (Table 1). Small but significant differences remained in only 3 of 26 non-PRA pre-transplant variables following propensity-matching. Figure 1 shows a Kaplan-Meier survival analysis of propensity-matched patients with and without a significant reduction in PRA levels, demonstrating a 9% absolute reduction in the incidence of graft dysfunction or death at 10 years. Cox proportional hazards modeling identified 14 independent predictors of graft dysfunction or death (Table 2). A significant reduction in PRA activity was found to be protective of graft dysfunction or death (hazards ratio: 0.89, confidence interval: [0.80-0.98], p = 0.01).
Table 1: Comparison of Pre-Transplant Patient Characteristics in Propensity-Matched Cohort

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Non-Missing Data (n = 27206)</th>
<th>Unadjusted Analysis Peak PRA Same as Most Recent PRA (n = 22536)</th>
<th>Unadjusted Analysis Modest Reduction in PRA (1–19%) (n = 3449)</th>
<th>Unadjusted Analysis Substantial Reduction in PRA (≥20%) (n = 1221)</th>
<th>P-Value</th>
<th>Propensity-Matched Analysis Peak PRA Same as Most Recent PRA (n = 962)</th>
<th>Propensity-Matched Analysis Substantial Reduction in PRA (≥20%) (n = 962)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at transplant</td>
<td>27198 (99.9)</td>
<td>51.6 (±11.2)</td>
<td>51.1 (±11.3)</td>
<td>50.6 (≥11.5)</td>
<td>&lt;0.001</td>
<td>50.7 (±11.5)</td>
<td>50.6 (±11.6)</td>
<td>0.81</td>
</tr>
<tr>
<td>Race (％ African American)</td>
<td>27206 (100)</td>
<td>2555 (11.3)</td>
<td>400 (11.6)</td>
<td>165 (13.5)</td>
<td>0.07</td>
<td>143 (14.9)</td>
<td>132 (13.7)</td>
<td>0.47</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>26730 (98.3)</td>
<td>474 (2.1)</td>
<td>55 (1.6)</td>
<td>20 (1.7)</td>
<td>0.09</td>
<td>23 (2.5)</td>
<td>15 (1.6)</td>
<td>0.19</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>23507 (86.4)</td>
<td>25.7 (±4.7)</td>
<td>25.9 (±15.0)</td>
<td>26.2 (±15.6)</td>
<td>&lt;0.001</td>
<td>26.3 (±7.0)</td>
<td>26.2 (±5.0)</td>
<td>0.74</td>
</tr>
<tr>
<td>Status 1A</td>
<td>25834 (95.0)</td>
<td>2500 (11.7)</td>
<td>442 (13.6)</td>
<td>207 (17.8)</td>
<td>&lt;0.001</td>
<td>165 (18.0)</td>
<td>162 (17.6)</td>
<td>0.82</td>
</tr>
<tr>
<td>Creatinine clearance (ml/min)</td>
<td>18786 (69.1)</td>
<td>77.6 (±38.3)</td>
<td>78.9 (±35.5)</td>
<td>77.4 (±37.8)</td>
<td>0.32</td>
<td>77.2 (±36.5)</td>
<td>76.5 (±36.9)</td>
<td>0.69</td>
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</tbody>
</table>

Continued
Table 1: Comparison of Pre-Transplant Patient Characteristics in Propensity-Matched Cohort (continued)

<table>
<thead>
<tr>
<th></th>
<th>Non-Missing Data (n = 27206)</th>
<th>Unadjusted Analysis Peak PRA Same as Most Recent PRA (n = 22536)</th>
<th>Unadjusted Analysis Modest Reduction in PRA (1–19%) (n = 3449)</th>
<th>Unadjusted Analysis Substantial Reduction in PRA (≥20%) (n = 1221)</th>
<th>P-Value</th>
<th>Propensity-Matched Analysis Peak PRA Same as Most Recent PRA (n = 962)</th>
<th>Propensity-Matched Analysis Substantial Reduction in PRA (≥20%) (n = 962)</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peak Panel Reactive Antibody</td>
<td>27206 (100)</td>
<td>3.1 (±12.1)</td>
<td>11.9 (±18.1)</td>
<td>56.2 (±26.5)</td>
<td>&lt;0.001</td>
<td>51.5 (±28.0)</td>
<td>51.9 (±26.0)</td>
<td>0.74</td>
</tr>
<tr>
<td>Most recent Panel Reactive Antibody</td>
<td>27206 (100)</td>
<td>3.1 (±12.1)</td>
<td>5.8 (±16.7)</td>
<td>10.0 (±16.9)</td>
<td>&lt;0.001</td>
<td>51.5 (±28.0)</td>
<td>9.1 (±16.1)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Propensity score</td>
<td>27206 (100)</td>
<td>0.026 (±0.086)</td>
<td>0.055 (±0.142)</td>
<td>0.366 (±0.301)</td>
<td>&lt;0.001</td>
<td>0.313 (±0.290)</td>
<td>0.319 (±0.291)</td>
<td>0.63</td>
</tr>
</tbody>
</table>
Table 2: Cox Proportional Hazards Model of Independent Predictors of Graft Dysfunction or Death

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Multivariable Hazard Ratio (CI)</th>
<th>P Value</th>
<th>Univariable Hazard Ratio (CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substantial (≥20%) absolute reduction in PRA activity</td>
<td>0.89 (0.80–0.98)</td>
<td>0.01</td>
<td>1.08 (1.00–1.17)</td>
<td>0.05</td>
</tr>
<tr>
<td>Year of transplant</td>
<td>0.975 (0.970–0.979)</td>
<td>&lt;0.001</td>
<td>0.984 (0.980–0.988)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Peak PRA activity level</td>
<td>1.004 (1.003–1.005)</td>
<td>&lt;0.001</td>
<td>1.003 (1.002–1.004)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Waitlist status 1a</td>
<td>1.10 (1.03–1.17)</td>
<td>0.004</td>
<td>1.02 (0.96–1.08)</td>
<td>0.47</td>
</tr>
<tr>
<td>Congenital heart disease</td>
<td>1.21 (1.07–1.37)</td>
<td>0.003</td>
<td>0.90 (0.80–1.02)</td>
<td>0.10</td>
</tr>
<tr>
<td>Requires dialysis after listing</td>
<td>1.24 (1.10–1.39)</td>
<td>&lt;0.001</td>
<td>1.34 (1.20–1.50)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>African American race</td>
<td>1.39 (1.33–1.46)</td>
<td>&lt;0.001</td>
<td>1.31 (1.25–1.37)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ventilator support</td>
<td>1.57 (1.44–1.72)</td>
<td>&lt;0.001</td>
<td>1.67 (1.53–1.82)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Extra corporeal membrane oxygenation support</td>
<td>1.77 (1.23–2.55)</td>
<td>0.002</td>
<td>2.06 (1.44–2.94)</td>
<td>&lt;0.002</td>
</tr>
</tbody>
</table>
CONCLUSIONS: Patients with a substantial reduction in PRA activity levels have considerably improved graft survival compared to those with no PRA reduction. Efforts to reduce PRA activity levels pre-OHT should be undertaken for patients with high PRA levels prior to OHT.
OBJECTIVES: To clarify the perioperative and oncologic outcome of pulmonary resection for a second metachronous non-small cell lung cancer (NSCLC) following resection of an initial NSCLC.

METHODS: Through retrospective chart review 161 patients were identified as having undergone pulmonary resection for a second metachronous NSCLC between January 2000 and December 2009. There were 88 men and 73 women with a median age of 70 (range 34 to 88) years. Operative morbidity, mortality and relevant factors for morbidity were analyzed with chi-square test or Fisher’s exact test and Mann-Whitney test. Survival following resection of a second metachronous NSCLC was analyzed with Kaplan-Meier and Cox proportional hazard method.

RESULTS: The median interval between the initial and metachronous NSCLC resection was 42.7 months (range 7-205 months). Resection of the initial NSCLC was with lobectomy in 126 patients (78.3%), sublobar resection in 28 (17.4%), and pneumonectomy in 7 (4.3%). Resection of the metachronous NSCLC was with lobectomy in 36 (22.4%), sublobar resection in 124 (77%), and completion pneumonectomy in 1 (0.6%). The metachronous lesions included 119 (73.9%) adenocarcinomas and 41 (25.5%) squamous cell carcinomas and were the same histology as the original cancer in 123 (76.4%), while 38 (23.6%) were different. There was no operative mortality and postoperative complications occurred in 47 (29%) patients. In multivariate analysis, ipsilateral operation (p = 0.0002) and a lower preoperative FEV1% predicted (p = 0.0035) were significant risk factors for postoperative complications. Five-year survival rates after pulmonary resection of the initial and second metachronous NSCLC were 87.4% and 60.8%, respectively. Significant negative long-term prognostic factors for survival following resection of a metachronous NSCLC in multivariate analysis were tumor size > 2 cm (p = 0.0001) and a different histology from the initial NSCLC (p = 0.030). Metastatic nodal disease (p = 0.19) or a sublobar resection (p = 0.17) were not significant negative prognostic factors.

CONCLUSIONS: Surgical treatment of a second metachronous NSCLC can be undertaken with five-year expected survival rates of 60%. Selection of patients with tumors 2 cm or smaller and with the same histology as the initial NSCLC will lead to better survival following resection. For a metachronous NSCLC, sublobar resection is acceptable when anatomically possible.

+ Samson Resident Prize Essay
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>11:40 am – 12:30 pm</td>
<td><strong>CONTROVERSIES IN THORACIC SURGERY</strong></td>
<td>Haleakala 4 &amp; 5</td>
</tr>
<tr>
<td></td>
<td>General Thoracic Surgery Is Best Taught in a 16 Program</td>
<td></td>
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<tr>
<td></td>
<td>Moderator: John D. Mitchell</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pro: Michael S. Mulligan</td>
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<td></td>
<td>Con: Joseph B. Shrager</td>
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<tr>
<td>12:30 pm</td>
<td><strong>INVITED GUEST SPEAKER, Haleakala 4 &amp; 5</strong></td>
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<td></td>
<td>Leading When Change Counts</td>
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</tr>
<tr>
<td></td>
<td>Mark Emmert, NCAA President</td>
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<tr>
<td>1:30 pm</td>
<td><strong>ADJOURN</strong></td>
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<tr>
<td>1:30 pm – 4:30 pm</td>
<td><strong>KAYAK &amp; SNORKEL TOUR</strong>, Depart from hotel beach</td>
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<tr>
<td>1:45 pm – 5:00 pm</td>
<td><strong>OCEAN CRUISE TOUR</strong>, Depart from front entrance of hotel</td>
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<tr>
<td>6:30 pm – 10:00 pm</td>
<td><strong>LUAU THEME DINNER</strong>, Molokini Garden</td>
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</tbody>
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**NOTES**

**Separate Subscription Required**
### FRIDAY, JUNE 29, 2012

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6:00 am – 12:00 pm</td>
<td><strong>REGISTRATION, Haleakala Gardens</strong></td>
</tr>
<tr>
<td>6:00 am – 12:00 pm</td>
<td><strong>SPEAKER READY ROOM, Silversword</strong></td>
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<tr>
<td>6:30 am – 7:50 am</td>
<td><strong>BREAKFAST SESSION</strong></td>
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<td></td>
<td><em>Plumeria</em></td>
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<tr>
<td></td>
<td><strong>How to Set Up a Transcatheter Aortic Valve Replacement Program</strong></td>
</tr>
<tr>
<td></td>
<td>Michael J. Mack</td>
</tr>
<tr>
<td>7:00 am – 11:00 am</td>
<td><strong>FAMILY HOSPITALITY, Hibiscus</strong></td>
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<td>7:00 am – 8:00 am</td>
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<tr>
<td></td>
<td>Continental Breakfast Served</td>
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<tr>
<td></td>
<td>8:00 am – 10:00 am</td>
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<tr>
<td></td>
<td>Full Breakfast Served</td>
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<tr>
<td></td>
<td>10:00 am – 11:00 am</td>
</tr>
<tr>
<td></td>
<td>Snacks &amp; Beverages Served</td>
</tr>
<tr>
<td>7:30 am – 8:00 am</td>
<td><strong>CONTINENTAL BREAKFAST, VISIT EXHIBITS, Haleakala 1</strong></td>
</tr>
<tr>
<td>7:30 am – 12:00 pm</td>
<td><strong>EXHIBITS, Haleakala 1</strong></td>
</tr>
<tr>
<td>8:00 am – 8:50 am</td>
<td><strong>POSTGRADUATE COURSE</strong></td>
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<td></td>
<td><em>Haleakala 4 &amp; 5</em></td>
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<tr>
<td></td>
<td><strong>Sponsored by: White Memorial Medical Center and Foundation – Lyman A. Brewer, Ill, Fund</strong></td>
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<tr>
<td></td>
<td><strong>Paging Dr. Moore, STAT</strong></td>
</tr>
<tr>
<td></td>
<td>Arnold Milstein</td>
</tr>
<tr>
<td></td>
<td>Stanford University, San Francisco, CA</td>
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</tbody>
</table>

** Separate Subscription Required
Routine Left Atrial Appendage Ligation in All Open Heart Surgery to Prevent Postoperative Cerebrovascular Accident

Ryan Kim¹, Norbert Baumgartner², John Clements¹

¹Synergy Medical Education Alliance, Saginaw, MI;
²Michigan CardioVascular Institute, Saginaw, MI

DISCUSSANT: DAVID A. FULLERTON

OBJECTIVES: The aim of the study is to determine whether routine left atrial appendage (LAA) ligation in all open heart surgery would reduce the risk of postoperative cerebrovascular accident (postop CVA) in patients who develop postoperative atrial fibrillation (postop AF).

METHODS: IRB approved, case-control, retrospective chart review of all patients who underwent open heart surgery with one surgeon during January 01, 2001 to December 31, 2010. CHADS2 score and criteria were collected preoperatively, and incidence of postop AF and postop CVA is followed until postoperative day 30.

RESULTS: A total of 2,078 patients underwent open heart surgery during this time period, and only 11 patients were excluded by the exclusion criteria. Study 1: Based on the routine procedure implementation date, non-routine LAA ligation (historic control, n = 589) and routine LAA ligation (test, n = 1,478) were established. In these groups, 0.1% (4) and 94.8% (1,401) received LAA ligation in the historic control and the test group, respectively. The occurrence of postop AF was higher in the test group, 23.4% (346) compared to the historic control, 16.8% (99). Among these patients who experienced postop AF, there was less postop CVA in the test group, 0.3% (7), than in the historic control, 7.1% (7), (p = 0.000). The patients with postop CVA in the historic control were more likely to have had postop AF (OR = 12.8, 95% C.I. = 2.8 to 55, p = 0.001), whereas, there were no significant predictors for postop CVA in the test group. Study 2: The procedure itself is evaluated in the total population, with LAA ligation (n = 1,405) and without LAA ligation (n = 662). Similar to the study 1, patient with LAA ligation had a higher occurrence of postop AF (23.0% vs. 59.0%).
18.4\%) and less incidence of postop CVA (0.3\% vs. 5.7\%, \( p = 0.000 \)). There were no significant predictors for postop CVA in the group with LAA ligation, however, the patients with postop CVA in the group without LAA ligation were more likely to have experienced postop AF (OR = 11.0, 95\% CI = 2.6 to 46.8, \( p = 0.001 \)).

**CONCLUSIONS:** Although postop AF remains as a common complication of open heart surgery, there was a significant decrease of postop CVA occurrence since routine LAA ligation was implemented to the practice. Based on our study, routine LAA ligation in all open heart surgery should be considered in attempt to prevent postop CVA.
9. Surgical and Neurological Outcomes After Left Thoracoscopic Robot-Enhanced Thymectomy in 100 Consecutive Myasthenia Gravis Patients

Giuseppe Marulli¹, Marco Schiavon¹, Francesco Di Chiara¹, Antonella Bugana¹, Alessandro Rebusso¹, Egle Perissinotto², Fiorella Calabrese³, Federico Rea¹

¹Thoracic Surgery – University of Padova, Padova, Italy; ²Biostatistics – University of Padova, Padova, Italy; ³Pathology – University of Padova, Padova, Italy

DISCUSSANT: MITHRAN S. SUKUMAR

OBJECTIVES: Thymectomy is a well defined therapeutic option in addition to medical treatment for patients with myasthenia gravis (MG); however controversies still exist about surgical approach, indication and timing for surgery. We reviewed our 9-years experience reporting surgical and neurological results after robot-assisted thoracoscopic thymectomy in MG patients.

METHODS: Between 2002 and 2010, 100 patients (74 females and 26 males; median age 37 years) underwent left-sided thoracoscopic thymectomy using the “da Vinci” robotic system. MGFA classification was adopted for pre- and post-operative evaluation. Preoperative MGFA class was : I in 10%, II in 35%, III in 39% and IV in 16%.

RESULTS: Median operative time was 120 (60–300) minutes. No deaths or intraoperative complications occurred. Postoperative complications were observed in 6 (6%) patients (3 bleeding requiring blood transfusions, 1 chylothorax, 1 fever and 1 myasthenic crisis). Median hospital stay was 3 days (range 2–14 days). Histologic analysis revealed 76 (76%) hyperplasia, 7 (7%) atrophy, 8 (8%) small thymomas and 9 (9%) normal thymus; ectopic thymic tissue was found in 26 (26%) patients. Clinical follow-up on 90 patients with at least 12 months of observation showed a 5-year probability of remission and global improvement of 30.3% and 89.6%. Remission was significantly associated with absence of AbAchR (p = 0.03), while a trend to better remission rate was seen in patients with less than 1 year onset of symptoms (p = 0.16) and pre-operative I-II MGFA class (p = 0.13).

CONCLUSIONS: Robot-assisted thoracoscopic thymectomy is a safe and effective procedure. We observed a neurological benefit in a high rate (90%) of patients. A better clinical outcome was obtained in patients with AbAchR negative, short onset of symptoms and early MGFA class.
10. Prioritization of Quality Improvement in Pediatric Cardiac Surgery
Pirooz Eghtesady¹, Anoop K. Brar¹, Matthew Hall²
¹Washington University School of Medicine, St. Louis, MO; ²Child Health Corporation of America, Shawnee Mission, KS

DISCUSSANT: JAMES JAGGERS

OBJECTIVES: Current risk stratification algorithms do not adequately describe the relative contribution of quality measures such as overall morbidity, intensive care stay, and readmissions, particularly in the setting of procedures with low mortality. In this study we obtained outcome data related to commonly performed procedures in pediatric cardiac surgery with the goal of developing a prioritization scheme for targeting quality improvement efforts.

METHODS: We analyzed data from 2003–2010 available in the Pediatric Health Information Systems (PHIS) database that provides national discharge data including demographics, diagnosis and procedures. After application of hospital level and patient level exclusion criteria 35,132 pediatric surgical cases were selected for further analysis from 35 contributing hospitals. Thirty-two commonly performed procedures (RACHS 1–4) were then identified for further analysis. These were assessed according to the following outcome measures: excess mortality, excess and variability in intensive care unit (ICU) and total hospital length of stay (LOS) and 30-day readmission rates. Each procedure was ranked relative to others based on the prior outcome measures. We then devised a prioritization scheme based on sum of all rankings.

RESULTS: The distribution of cases based on RACHS categories was 15.2% category 1 (n = 5,349), 42.1% category 2 (n = 14,774), 36.0% category 3 (n = 12,640), 6.7% category 4 (n = 2,369). A small number of operations accounted for a disproportionate share of morbidity and mortality. There were significant differences within each RACHS category for excess LOS and readmission rates, leading to substantial differences in overall impact of various procedures, particularly when adjusted for frequency of encounter. The coefficient of variation for LOS, a reflection of the extremes in LOS, had no relationship to the RACHS classification. In particular, repair of primum ASD (RACHS 2) was associated with the highest variation in the observed hospital LOS while the arterial switch procedure (RACHS) had the lowest variation. ICU LOS variability accounted for ~25 to 60% of overall hospital LOS without any direct correlation to the RACHS complexity. A few procedures accounted for the substantial burden of readmissions. The top ten procedures are shown in the Figure on the following page; System to PA shunting procedure had the highest ranking (i.e., priority) relative to others.
CONCLUSIONS: Our data suggest that quality improvement measures directed at a few procedures could have potentially significant impact for improving outcomes in pediatric cardiac surgery.
11. Ambulatory ECMO and Artificial Lung Technology as a Bridge to Pulmonary Transplant

*Charles Hoopes*, *Jasleen Kukreja*

1University of Kentucky, Lexington, KY; 2University of California San Francisco, San Francisco, CA

**DISCUSSANT: MICHAEL S. MULLIGAN**

**OBJECTIVES:** Acute clinical deterioration preceding death is a common observation in patients with end stage lung disease. Management of these patients remains complex and several retrospective studies suggest that intubation and subsequent ICU care are inappropriate given the universally poor outcome. Extracorporeal life support for patients with end stage lung disease has also received limited attention because of the presumed inability to either recover function or proceed to definitive therapy with transplantation.

**METHODS:** We have now transplanted thirty patients from mechanical artificial lung support. Application of ECMO/ECLS has evolved from “salvage” peripheral VA ECMO for respiratory and RV failure to “elective” cannulation to facilitate ambulation and prevent progressive end organ injury. Current technologies allowing ambulatory ECMO as a bridge to pulmonary transplant include dual lumen VV ECMO for progressive hypoxia/hypercarbia (Avalon catheter for “walking ECMO”) or “central cannulation” using available VAD technologies to provide “ambulatory right heart bypass” (PA to LA) and “walking cardiopulmonary bypass” (RA to Ao) in patients requiring combined heart-lung transplant. Hybrid procedures, using combined atrial septostomy and VV ECMO, have successfully bridged patients with medically refractory RV failure and pulmonary veno-occlusive disease to transplant.

**RESULTS:** All “bridged” patients have been discharged to home. Mean survival time of “bridged” patients is 27 months (range 94 days to 70 months) with current two-year survival exceeding 90%. Based on predicted SRTR acuity observed outcomes exceed statistical expectation. Duration of mechanical support ranged from two to 52 days (mean 19 days). Lung allocation scores (LAS) demonstrate that each of these patients would have been prioritized within the respective UNOS region making lungs almost immediately available if the LAS system were regionalized and extended beyond the local OPO. Mean hospital costs for patients bridged to transplant was 562K.

**CONCLUSIONS:** These observations challenge current assumptions about the management of selected patients with end stage lung disease and suggest that “salvage transplant” is both technically feasible and logistically viable. Widespread adoption of artificial lung technology in lung transplant will require design of clinical trials that establish the most effective circumstances in which to use these technologies. Discussion of a clinical trial and reconsideration of current allocation policy is warranted.

* WTSA Member
**12. A Prospective Study of Growth and Rupture Risk of Small-to-Moderate Size Ascending Aortic Aneurysms**

**Sarah Geisbuesch, Angelina Stefanovic, Deborah Schray, Irina Oyfe, Hung-Mo Lin, Gabriele Di Luozzo, *Randall B Griepp**

*Mount Sinai Medical Center, New York, NY*

**DISCUSSANT: MICHAEL P. FISCHBEIN**

**OBJECTIVES:** The natural history of small-to-moderate size ascending aortic aneurysms is poorly understood. We have developed a method to precisely, objectively, and reproducibly measure ascending aortic volume based on gated contrast CT scans, and used it to study this patient population.

**METHODS:** From 2009 to 2011 234 patients referred for management of small-to-moderate size aneurysms who did not have compelling indications for operation had measurement(s) of ascending and total aortic volume. 66 emergency room patients without ascending aortic pathology who had similar scans served as a reference group. Of the 234 surveillance patients, 167 had more than one scan, allowing measurement of growth rates. A total of 974 patient years was monitored. None of the patients experienced rupture, dissection, or death. Four of the patients in the surveillance group ultimately underwent operation; during this interval, 273 other patients underwent elective ascending aortic operations in our institution upon initial presentation.

**RESULTS:** Ascending aortic volume as well as the ratio of ascending aortic volume to total aortic volume differed significantly for surveillance and reference groups: 133 ± 39 cc vs 78 ± 25 cc (Figure 1) and 38 ± 8% vs 29 ± 4% (p < .001 for both comparisons). Aortic diameters measured at the sinotubular junction and mid ascending aorta were 4.1 ± .6 and 4.6 ± .6 cm for the surveillance group, and 3.0 ± .4 and 3.2 ± .4 cm for the reference group. The increase in volume for the surveillance group was 0.94 cc/year (0.72%/year; p < .008 for null hypothesis of no growth) for the ascending aorta and -0.04 cc/year for the remainder of the aorta (p = NS). An extensive analysis of the influence of possible risk factors on ascending aortic growth rate in the surveillance patients revealed only the use of antithrombotic medication (aspirin, clopidogrel, or warfarin) to be possibly significant, Table 1.

**CONCLUSIONS:** CT volume measurements of the aorta provide an objective method of ascertaining aortic size and monitoring expansion. Patients with small-to-moderate size ascending aortic aneurysms who are carefully followed and managed appropriately—including use of antihypertensive medications and beta-blocking agents—have a slow rate of aneurysm growth and a very small risk of rupture.

* WTSA Member
Table 1: Possible Predictors of Ascending Aortic Growth Rate (CC/Yr)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Frequency (%) or Mean value</th>
<th>p-value (univariate analysis)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male sex</td>
<td>71%</td>
<td>0.08</td>
</tr>
<tr>
<td>Age</td>
<td>64 years</td>
<td>0.92</td>
</tr>
<tr>
<td>BMI</td>
<td>29 kg/m²</td>
<td>0.33</td>
</tr>
<tr>
<td>History of hypertension</td>
<td>82%</td>
<td>0.69</td>
</tr>
<tr>
<td>History of hyperlipidemia</td>
<td>43%</td>
<td>0.49</td>
</tr>
<tr>
<td>Ever smoked</td>
<td>31%</td>
<td>0.26</td>
</tr>
<tr>
<td>Family history</td>
<td>22%</td>
<td>0.34</td>
</tr>
<tr>
<td>Bicuspid aortic valve</td>
<td>20%</td>
<td>0.37</td>
</tr>
<tr>
<td>Systolic blood pressure</td>
<td>122 mmHg</td>
<td>0.19</td>
</tr>
<tr>
<td>Volume ascending aorta</td>
<td>131 cc</td>
<td>0.43</td>
</tr>
<tr>
<td>Volume of total aorta</td>
<td>350 cc</td>
<td>0.32</td>
</tr>
<tr>
<td>Volume ratio: aortic/total</td>
<td>38%</td>
<td>0.72</td>
</tr>
<tr>
<td>Antihypertensive medication</td>
<td>95%</td>
<td>0.84</td>
</tr>
<tr>
<td>Beta blocker</td>
<td>60%</td>
<td>0.97</td>
</tr>
<tr>
<td>Lipid-lowering medication</td>
<td>47%</td>
<td>0.51</td>
</tr>
<tr>
<td>Anti-thrombotic medication</td>
<td>57%</td>
<td>0.05*</td>
</tr>
</tbody>
</table>

* also significant in multivariate analysis

Figure 1: Volumes of ascending aorta in surveillance and reference group.
10:30 am – 11:00 am  COFFEE BREAK, VISIT EXHIBITS, Haleakala 1

NOTES
13. Effect of Cytokine Hemoadsorption on Brain-Death Induced Ventricular Dysfunction in a Porcine Model
Krasimira M. Mikhova\textsuperscript{1}, Krystal M. Jones\textsuperscript{1},
Michael LaFlamme\textsuperscript{1}, John A. Kellum\textsuperscript{2},
*Michael S. Mulligan\textsuperscript{1}, *Edward D. Verrier\textsuperscript{1},
David G. Rabkin\textsuperscript{1}
\textsuperscript{1}University of Washington Medical Center, Seattle, WA; \textsuperscript{2}University of Pittsburgh School of Medicine, Pittsburgh, PA
DISCUSSANT: ABBAS ARDEHALI

OBJECTIVES: Up to 20\% of potential donors are ineligible for cardiac procurement due to the effect of brain-death pathophysiology on cardiac function. Although the mechanism by which brain-death induces cardiac injury remains elusive, accumulating evidence suggests that cytokines play an important role. Therefore, to expand the donor pool by rehabilitating hearts injured by brain-death, we tested the hypothesis that hemoadsorption of cytokines attenuates brain-death induced ventricular dysfunction.

METHODS: Sixteen Yorkshire pigs (50–60 kg) underwent median sternotomy and instrumentation with a left ventricular conductance catheter and micromanometer. Preload-recruitable stroke-work (PRSW) and serum samples were measured at baseline and at hourly intervals for six hours after either the induction of brain-death by inflation of a subdural balloon (Brain-death, n = 6) or sham operation (Control, n = 4). In a third group (Brain-death + HA, n = 6), three hours after induction of brain-death, animals were systemically heparinized and placed on an extracorporeal circuit containing a cytokine-adsorption device (CytoSorbents Inc., Monmouth Junction, NJ) for the remaining three hours (Figure 1). Hearts were then arrested with crystalloid cardioplegia. Postmortem studies included determination of myocardial water content (MWC) and histology for myocyte injury. Plasma IL-6, TNF and IL-10 concentrations were determined using the quantitative sandwich enzyme immunoassay technique.

* WTSA Member
RESULTS: Compared to Controls, PRSW was significantly reduced in Brain-death animals four hours after the induction of brain-death and was 50% of baseline by 5 hours. In Brain-death + HA animals PRSW was relatively preserved at 80–85% of baseline at similar time points and was not significantly changed vs. Controls (Figure 2). Four hours after brain-death, TNF and IL-6 expression were highest in Brain-death, lowest in Controls and intermediate in Brain-death + HA (Figures 3 a&b). A similar trend was observed with MWC (Figure 4). IL-10 was only detectable in Controls. Preliminary histologic analysis demonstrated contraction band necrosis in 2/3 Brain-dead animals, 0/2 Brain-dead + HA animals and 1/2 Control animals (Figure 5).

**Figure 1: Experimental Timeline**

- **Groups**
  - Control (n=4)
  - Brain-death (n=6)
  - Brain-death + Hemoadsorption (n=6)

- **Timeline**
  - 1.5 hr
  - 2 hrs
  - 3 hrs (BD + 1)
  - 4 hrs (BD + 2)
  - 5 hrs (BD + 3)
  - 6 hrs (BD + 4)
  - 7 hrs (BD + 5)
  - 8 hrs (BD + 6)

- **Events**
  - Instrumentation & baseline PRSW and cytokine data
  - Induction of brain-death (or sham operation in Control group)
  - Determination of PRSW and serum sample for cytokine analysis
  - Cytokine hemoadsorption (Brain-death + HA group)
  - Hearts arrested with biopsies taken for histology and MWC determination

**BD = brain-death**

**PRSW = preload recruitable stroke work**

**HA = hemoadsorption**

**Figure 2: Effect of cytokine hemoadsorption on brain death-induced ventricular dysfunction**

- **Graph**
  - PRSW (% of baseline)
  - Hours after brain death (or sham)

- **Legend**
  - Control (n=4)
  - Brain Death (n=6)
  - Brain Death + HA (n=6)

- **Statistical Analysis**
  - *p < 0.05 vs. Brain Death, one-way ANOVA
Figure 3a: Effect of cytokine hemoadsorption on TNF expression

No statistically significant differences (ANOVA)

Figure 3b: Effect of cytokine hemoadsorption on IL-6 expression

No statistically significant differences (ANOVA)
CONCLUSIONS: Preliminary data indicate that hemoadsorption of cytokines using an extracorporeal circuit in an open-chest porcine model attenuates brain-death induced ventricular dysfunction. Further study is required to determine the significance of the relationship between cytokine expression and ventricular function.
OBJECTIVES: After definitive treatment for early stage lung cancer, patients remain at risk for recurrence and metachronous cancers. Currently there is no consensus on the optimal strategy for surveillance after curative resection of non-small cell lung cancer (NSCLC). Although recent trials have validated the use of computed tomography (CT) scans in screening high-risk individuals for lung cancer, the role of routine CT imaging postoperatively for surveillance in lung cancer survivors has not been well defined. The purpose of this study was to examine the efficacy of routine CT surveillance in early stage lung cancer survivors.

METHODS: We reviewed the outcomes of consecutive patients who underwent curative resections between 2004 and 2009 for early stage (pathological stage I or II) NSCLC. Patients who had undergone neoadjuvant therapy were excluded. All subjects underwent surveillance with routine chest/upper abdomen CT scans. Data on recurrence and second lung primary cancers, diagnostic modalities, treatment, and outcomes were abstracted from medical records. Recurrences and new primary cancers were distinguished according to the Martini-Melamed criteria.

RESULTS: During the study period, 1278 consecutive patients with early stage NSCLC underwent resection, and recurrences developed in 252 (19.7%) patients while second primary lung cancers were diagnosed in 89 (7%). The majority of metachronous lung cancers (83, 93%) were identified through scheduled routine CT scanning, however, only 61% of recurrences were detected by the same modality. 36% of recurrences (n = 90) were diagnosed outside of routine scheduled follow-up, most often due to interval development of symptoms. The majority of recurrences (75%) involved distant metastases. During the first 48 months after surgery, the risk of recurrence ranged from 6.6–9.7% per person-year, but decreased to 2% thereafter. Conversely, metachronous lung cancer occurred at a rate ranging from 2.7–6.5% per person-year after post-operative year one, and this did not diminish over time. 82 (92%) second lung cancers were stage I at diagnosis and 54 (61%) of these patients subsequently underwent surgical resection. The 3-year overall survival from the time of metachronous lung cancer diagnosis was 67%. False positive surveillance CT results led 327 patients (26%) to undergo further diagnostic testing, with 60 (4.7%) undergoing additional invasive procedures. Incidental non-pulmonary malignancies were also detected by CT in 14 (1%) patients. Non-fatal complications occurred in 4 patients (1.2% of false positives) as a result of invasive testing arising from false positive surveillance CT scans. The sensitivity and specificity of CT surveillance for detection of new events (either recurrence or second lung primary cancer) are 0.70 and 0.65, respectively.
CONCLUSIONS: Among early stage lung cancer survivors, over one in four may experience a recurrence or metachronous cancer. Routine surveillance CT scans in early stage NSCLC survivors detects most early stage second primary lung cancers but may be less sensitive for recurrences. The risk for recurrence for early stage NSCLC survivors does not diminish significantly for up to 4 years after resection, and vigilance in surveillance should be maintained through this interval.
OBJECTIVES: Management of intermediate degrees of functional mitral regurgitation (MR) during aortic valve replacement (AVR) remains controversial. We sought to quantitatively evaluate the degree of reduction of mitral regurgitation in patients undergoing aortic valve intervention.

METHODS: We retrospectively analyzed data on demographic, intraoperative, and echocardiographic data on 802 patients that underwent intervention on the aortic valve (AVR or aortic root replacement) with or without intervention on the mitral valve (repair or replacement). 578 patients underwent AVR or aortic root replacement without intervention on the mitral valve. We excluded 88 patients with severe aortic insufficiency, 3 patients that underwent ventricular assist device placement at the time of AVR, 4 patients that underwent prior mitral valve replacement, and 21 patients with incomplete data yielding 462 patients for analysis. MR was graded quantitatively as follows: none = 0, trace = 1, mild = 2, moderate = 3, severe = 4. Intermediate degrees were assigned half of a degree (for example, mild to moderate = 2.5). Change in the degree of MR for each patient was determined by subtracting the grade of pre-operative MR from the degree of post-operative MR.

RESULTS: Of the 462 patients, 63 had no MR. 289 patients had at least mild MR. MR improved in 139 (48.1%), worsened in 47 (16.3%), and was unchanged in 103 (35.6%) after AVR or root replacement. Based on the scoring system outlined above, net downgrading of MR was –126.5 degrees for this entire cohort of 289 patients (0.438 degrees per patient). Of these 289 patients with at least mild MR, data on preoperative mean aortic gradient was available in 274. 63 patients had gradients ranging from 56 to 99 mmHg and MR improved in 31 (49.2%) after AVR or root replacement. 69 patients had gradients ranging from 45 to 55 mmHg and MR improved in 34 (49.3%) of these patients. 69 patients had gradients ranging from 34 to 44 and MR improved in 34 (49.3%). 73 patients had gradients ranging from 5 to 33 and MR improved in 32 (43.8%) in this group of patients.

CONCLUSIONS: Reduction in MR after relief of aortic outflow tract obstruction is modest at best. Further, the magnitude of the pre-operative gradient across the aortic valve of has little influence on the degree of reduction in MR. These observations argue in favor of an aggressive approach to addressing MR at the time aortic valve intervention.

+ Samson Resident Prize Essay
12:00 pm  ADJOURN

1:00 pm  **GOLF TOURNAMENT**, Wailea Gold Course, Wailea Golf Club; Depart from hotel front entrance

1:30 pm  **TENNIS TOURNAMENT**, Wailea Tennis Club; Depart from hotel front entrance

EVENING — FREE

NOTES

** Separate Subscription Required
SATURDAY, JUNE 30, 2012

6:00 am – 11:30 am  **SPEAKER READY ROOM, Silversword**

6:00 am – 12:00 pm  **REGISTRATION, Haleakala Gardens**

6:30 am – 7:30 am  **CONTINENTAL BREAKFAST, Haleakala 1**

6:30 am – 10:30 pm  **EXHIBITS, Haleakala 1**

7:00 am – 8:45 am  **CONCURRENT FORUMS**
(5 minutes presentation, 3 minutes discussion)

ADULT CARDIAC

Haleakala 4 & 5

Moderators: David A. Fullerton
J. Scott Millikan

**CF1. Current Outcomes of Isolated Reoperative CABG in the United States: Analysis of the STS Adult Cardiac Surgery Database**

Ravi K. Ghanta¹, Tsuyoshi Kaneko¹, Shubin Sheng², Sary F. Aranki¹

¹Brigham and Women’s Hospital, Boston, MA; ²Outcomes Research and Assessment Group Duke Clinical Research Institute, Durham, NC

**OBJECTIVE:** Few studies have evaluated the contemporary outcomes following reoperative CABG. This study evaluates the current characteristics and outcomes for patients undergoing isolated reoperative CABG in the United States at Society of Thoracic Surgeons (STS) participating institutions.

**METHODS:** From 1999–2008, 76346 patients underwent isolated reoperative CABG at STS participating institutions. Demographics, operative characteristics, and postoperative outcomes were assessed and compared over the study period.

**RESULTS:** There was a 37% reduction in the annual number of isolated reoperative CABG surgeries from 1999 (n = 9790) to 2008 (n = 6154). This decrease in overall reoperative CABG volume occurred despite the number of STS participating institutions increasing from 375 in 1999 to 831 in 2008. As a percentage of overall CABG volume, reoperative CABG dropped from 6.4% in 1999 to 3.7% in 2008. There was no significant difference in age and gender over the period. There was a significant decrease in the incidence of smoking but a higher incidence of other comorbidities...
such as increased weight, diabetes, hypercholesterolemia, and previous stroke. Patients undergoing reoperative CABG also now present more frequently with left main disease. In 2008, patients also presented more frequently for urgent or emergent surgery and often had a higher number of distal anastomoses performed with a corresponding lower median cardiopulmonary bypass time compared to patients treated in 1999. There was a 40% reduction in mortality throughout the study period from 6.8% to 4.0%. Additionally, there was a 44% reduction in the incidence of postoperative stroke from 2.2% to 1.3% throughout the study period.

<table>
<thead>
<tr>
<th>Demographics</th>
<th>1999 (n = 9790)</th>
<th>2008 (n = 6154)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>68 (61, 74)</td>
<td>67 (61, 74)</td>
<td>0.51</td>
</tr>
<tr>
<td>Male Gender</td>
<td>80%</td>
<td>78%</td>
<td>0.31</td>
</tr>
<tr>
<td>White Race</td>
<td>95%</td>
<td>90%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>84 (73, 94)</td>
<td>86 (76, 99)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>BSA</td>
<td>1.97 (1.84, 2.10)</td>
<td>2.01 (1.86, 2.16)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>History of Smoking</td>
<td>62%</td>
<td>22%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Diabetes</td>
<td>30%</td>
<td>42%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Hypercholesterolemia</td>
<td>65%</td>
<td>92%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>5%</td>
<td>2%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Preoperative Dialysis</td>
<td>1%</td>
<td>2%</td>
<td>0.019</td>
</tr>
<tr>
<td>Hypertension</td>
<td>72%</td>
<td>90%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Previous CVA</td>
<td>6%</td>
<td>8%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Left main disease &gt; 50%</td>
<td>25%</td>
<td>34%</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Procedure Status</td>
<td></td>
<td></td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Elective</td>
<td>64%</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Urgent</td>
<td>32%</td>
<td>47%</td>
<td></td>
</tr>
<tr>
<td>Emergent</td>
<td>4%</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Emergent Salvage</td>
<td>0.5%</td>
<td>0.2%</td>
<td></td>
</tr>
<tr>
<td>Perfusion Time</td>
<td>120 (92, 154)</td>
<td>113 (85, 146)</td>
<td>0.02</td>
</tr>
<tr>
<td>Postoperative Stroke</td>
<td>2.2%</td>
<td>1.3%</td>
<td>0.004</td>
</tr>
<tr>
<td>Mortality</td>
<td>6.8%</td>
<td>4.0%</td>
<td>0.007</td>
</tr>
</tbody>
</table>

**CONCLUSIONS:** Isolated reoperative CABG is being performed with less frequency but in patients with more medical morbidities. Operative mortality and stroke rates have significantly decreased.
OBJECTIVE: This study evaluates a single institution’s early and late outcomes with minimally invasive mitral valve surgery over a 15-year time period in a large patient cohort.

METHODS: A retrospective review of prospectively entered data from August 1996 to November 2011 determined 1,000 patients to have undergone minimally invasive mitral valve surgery (median follow up 7 years). Mitral valve repairs and replacements were performed in 923 and 77 patients respectively. Mean age was 57±13 years. The cohort was 40.8% women. Myxomatous degenerative disease was the predominant disease process (84.2%). A lower ministernotomy through a 6 to 8 cm skin incision was the predominant surgical approach (751 patients). Parasternal (201 patients), right thoracotomy (43 patients) and upper ministernotomy (5 patients) approaches were also utilized. Time to reoperation and reoperation free survival curves were performed using Kaplan-Meier methods.

RESULTS: There were 8 operative deaths (0.8%). Perioperative morbidity includes 25 cerebrovascular events (2.5%), 19 reoperations for bleeding (1.9%), 14 permanent pacemakers (1.4%), 9 deep sternal wound infections (0.9%) and 3 aortic dissections (0.3%). Blood transfusions were required in 297 patients (29.7%). There were 44 failed mitral valve repairs necessitating reoperation (44/923 = 4.8%) and 1 mitral valve re-replacement for atroventricular groove disruption. Of the 44 failed mitral valve repairs, 9 valves were re-repaired (9/44 = 20%) while the remaining 35 valves necessitated valve replacement (35/44 = 80%). There were 106 late deaths (10.6%). The 5, 10 and 15-year freedom from reoperation for mitral valve repair was 96%, 95% and 92% (Figure 1). Freedom from reoperation or death for mitral valve repair over the same time period was 90%, 81% and 74% (Figure 2). For mitral valve replacement freedom from reoperation or death at 5, 10 and 15-years was 88%, 73% and 60% (Figure 2).
**Figure 1:** Freedom from reoperation for minimally invasive mitral surgery.

**Figure 2:** Freedom from reoperation and death for minimally invasive mitral surgery.

**CONCLUSION:** Minimally invasive mitral valve operations are safe and effective. Late follow-up with these techniques reveals excellent long-term durability and survival.
CF3. Plasma Biomarkers for Distinguishing Etiological Subtypes of Thoracic Aortic Aneurysm Disease  
*John S. Ikonomidis¹, Charlotte R. Ivey¹, Jason B. Wheeler¹, Adam W. Akerman¹, Allison Rice¹, Risha K. Patel¹, Robert E. Stroud¹, Asad A. Shah², Chad G. Hughes², Giovanni Ferrari³, Jeffrey A. Jones¹  
¹Medical University of South Carolina, Charleston, SC; ²Duke University School of Medicine, Durham, NC; ³University of Pennsylvania School of Medicine, Philadelphia, PA

OBJECTIVES: Thoracic aortic aneurysms (TAAs) develop through an asymptomatic process resulting in gross dilatation that progresses to rupture if left undetected and untreated. If detected, TAA patients are followed over time until the risk of rupture outweighs the risk of surgical repair. Current methodologies for tracking TAA size are limited to expensive computed tomography or magnetic resonance imaging, as no acceptable population screening tools are currently available. Previous studies from this laboratory and others have identified differential protein profiles for the matrix metalloproteinases (MMPs) and their endogenous tissue inhibitors (TIMPs), in ascending TAA tissue from patients with bicuspid aortic valves (BAV), versus patients with idiopathic degenerative disease and a tricuspid aortic valve (TAV). Additionally, altered microRNA expression levels have also been reported in TAAs as compared to normal aortic tissue. The objective of the present study was to identify circulating factors within the plasma that could serve as potential biomarkers for distinguishing etiological subtypes of aneurysm disease.

METHODS: Ascending TAA tissue and plasma specimens were obtained from BAV (n = 29) and TAV (n = 24) patients at the time of surgical resection. The protein abundance of key MMPs (−1, −2, −3, −8, −9) and TIMPs (−1, −2, −3, −4), and microRNAs (−1,−21, −29a, −133a, −143, −145) was examined using a multi-analyte protein profiling system or by quantitative PCR, respectively. Results were compared to normal aortic tissue and plasma obtained from patients without aortic disease (n = 9).

RESULTS: Unique tissue and plasma profiles were identified for each TAA etiology (summary of significant changes; figure). MMP-1 was increased in BAV plasma, while it was decreased in TAV plasma. MMP-3 did not change in BAV plasma, but deceased in TAV plasma. TIMP-3 decreased in BAV plasma and did not change in TAV plasma. MicroRNA-133a decreased in BAV plasma, and did not change in TAV plasma. Together, the unique plasma signature for BAV patients would include increased MMP-1, decreased TIMP-3, and decreased microRNA-133a, while the unique plasma signature for TAV patients would include decreased MMP-3, and decreased microRNA-29a, respectively when compared to plasma from referent control patients without aortic disease.

* WTSA Member
CONCLUSIONS: Taken together these unique data demonstrate differential plasma profiles of MMPs, TIMPs, and microRNAs in ascending TAA specimens from patients with BAV versus TAV aneurysms. These results suggest that circulating biomarkers may be useful in personalized medicine strategies to distinguish between etiological subtypes of TAAs in patients with aneurysm disease, and may form the foundation for a broader platform of biomarkers capable of detecting the presence of TAA using a simple blood test.
OBJECTIVES: A better understanding of the response of the spinal cord blood supply to segmental artery (SA) sacrifice should help minimize the risk of paraplegia following both open and endovascular repair of thoracoabdominal aortic aneurysms (TAAA).

METHODS: 12 female juvenile Yorkshire pigs (25kg, range 23–28) were randomized into three groups and perfused with a barium-latex solution. In group 1 (control), pigs had infusion without previous intervention. Pigs in group 2 were infused 48 hours after surgical ligation of all SAs (T4-L5) under mild hypothermia (32°C), and those in group 3 at 120 hours after the same procedure. Functional outcome was evaluated using a modified Tarlov score. To visualize the spinal cord blood supply, post-mortem CT scanning of the entire pig was undertaken after evisceration and freezing, using a 256-slice MDCT scanner at 140kV and 250 mAS, with a slice thickness of 0.67 mm and an increment of 0.3 mm. 3D reconstructions enabled overall comparisons and measurement of vessel diameters. Measurements of grey values within predefined areas were undertaken to quantify the increase in vessel density.

RESULTS: Perioperative mean arterial pressure for SA ligation was 90 ± 7 mmHg in group 2 and 85 ± 6 mmHg in group 3. The average number of SAs ligated was 14.5 ± 0.7: all ligated SAs remained patent, filling retrograde to the ligature site. Paraplegia occurred in 38% of operated pigs, consistent with previous blood flow and pressure studies in the same model. A significant increase in the mean diameter of the anterior spinal artery (ASA) compared with control values was evident after SA sacrifice (p = 0.002 for 48 h and 120 h), Table 1. The internal thoracic and iliolumbar arteries also increased in diameter, albeit without achieving statistical significance in these small groups. The 11/12 intercostal arteries that originate from ligated segmental arteries showed significant increase in size after 48 hours (p = 0.040) and at 120 hours (p = 0.027). Quantitative assessment showed a significant increase in vessel density 48h after ligation of SAs (p = 0.045). An impressive increase in the density of smaller collateral vessels can be seen on CT scans 120 hours postoperatively, Figure 1.
Table 1. Mean Diameter of Vessels

<table>
<thead>
<tr>
<th></th>
<th>group 1 (control)</th>
<th>group 2</th>
<th>group 1</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior spinal artery (ASA)</td>
<td>0.29 ± 0.04</td>
<td>0.46 ± 0.05</td>
<td>0.44 ± 0.04</td>
<td>0.002 (1 vs 2) 0.002 (1 vs 3)</td>
</tr>
<tr>
<td>Internal thoracic artery (ITA)</td>
<td>1.50 ± 0.03</td>
<td>1.53 ± 0.17</td>
<td>1.81 ± 0.33</td>
<td>0.24 (1 vs 2) 0.41 (1 vs 3)</td>
</tr>
<tr>
<td>Intercostal arteries (IC)</td>
<td>0.81 ± 0.05</td>
<td>0.87 ± 0.07</td>
<td>0.89 ± 0.10</td>
<td>0.040 (1 vs 2) 0.027 (1 vs 3)</td>
</tr>
<tr>
<td>Iliolumbar artery (IL)</td>
<td>1.36 ± 0.18</td>
<td>1.36 ± 0.25</td>
<td>1.40 ± 0.36</td>
<td>0.94 (1 vs 2) 0.79 (1 vs 3)</td>
</tr>
</tbody>
</table>

**Figure 1**: Vessel density.

**CONCLUSIONS**: Remodeling of the blood supply to the spinal cord is evident at 48 and 120 hours after extensive SA sacrifice: there is striking recruitment and dilatation of the ASA, the lower thoracic SAs, and probably the internal thoracic and iliolumbar as well as additional small, unnamed vessels. Exploitation of this vascular remodeling process is likely to prove invaluable in the quest to eliminate paraplegia after TAAA repair.
CF5. **Incremental Risk of Cox-Maze IV Procedure for Patients with Atrial Fibrillation and Mitral Valve Disease Undergoing Mitral Valve Surgery**  
*Lindsey Saint*, Hersh Maniar, Ralph Damiano, Jr., Marc Moon, Michael Pasque, Scott Silvestry, Phillip Cuculich, Tracey Guthrie, Jennifer Lawton  
*Washington University, Saint Louis, MO*

**OBJECTIVES:** Over 50% of concomitant atrial fibrillation (AF) surgery is offered in the setting of mitral valve (MV) surgery with little known regarding the extent of the associated additional risk. There are no risk models currently available for concomitant arrhythmia surgery. The purpose of this study was to quantify the additional risk of performing the Cox-Maze IV (CMIV) procedure for patients undergoing MV surgery.

**METHODS:** Patients with severe MV disease and history of preoperative AF (n = 222) underwent MV surgery only (n = 105) or in conjunction with a CMIV procedure (n = 117). Preoperative conditions, perioperative features, and postoperative outcomes between groups were compared. Operative mortality for the MV procedure alone was predicted for each group using the Society of Thoracic Surgeons (STS) perioperative risk calculator. The risk attributed to the added CMIV procedure was calculated by comparing the predicted mortality rate of an isolated MV procedure and the actual mortality rate of MV+CMIV.

**RESULTS:** For patients who did not receive CMIV, the STS-predicted and actual postoperative mortality was 5.6% and 4.8%, respectively. For patients receiving MV + CMIV, the STS-predicted postoperative mortality of the MV procedure was 2.7%, compared with an actual mortality of 2.6%. The increased comorbidities in the MV surgery group included DM, COPD, CRI, and history of previous CVA, or CABG (table). Freedom from AF for the MV + CMIV group was 84% at 12 months.

<table>
<thead>
<tr>
<th></th>
<th>MV Only (%)</th>
<th>MV + CMIV (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diabetes</td>
<td>25% (26/105)</td>
<td>14% (16/117)</td>
<td>0.04</td>
</tr>
<tr>
<td>COPD</td>
<td>38% (40/105)</td>
<td>21% (25/117)</td>
<td>0.008</td>
</tr>
<tr>
<td>CRI</td>
<td>11% (12/105)</td>
<td>2% (2/117)</td>
<td>0.004</td>
</tr>
<tr>
<td>Prior CVA</td>
<td>18% (19/105)</td>
<td>6% (7/117)</td>
<td>0.006</td>
</tr>
<tr>
<td>Prior CABG</td>
<td>18% (19/105)</td>
<td>3% (4/117)</td>
<td>0.001</td>
</tr>
<tr>
<td>Cardiopulmonary Bypass Time (min)</td>
<td>124</td>
<td>184</td>
<td>0.001</td>
</tr>
<tr>
<td>Cross Clamp Time (min)</td>
<td>79</td>
<td>93</td>
<td>0.05</td>
</tr>
<tr>
<td>Postoperative Permanent Pacemaker</td>
<td>0% (0/105)</td>
<td>7% (8/117)</td>
<td>0.02</td>
</tr>
</tbody>
</table>
CONCLUSIONS: For patients with AF and severe MV disease undergoing MV surgery, the decision to offer a concomitant CMIV procedure is influenced by underlying comorbid conditions. Nonetheless, in selected lower-risk patients, the addition of CMIV did not significantly affect the procedural mortality. While rates of pacemaker implantation were higher for patients who received CMIV, the high rates of arrhythmia-free survival in CMIV group likely outweigh these risks.
OBJECTIVES: Despite a growing awareness of the clinical significance of atrial fibrillation (AF) along with several prospective and observational studies demonstrating the safety and efficacy of surgical ablation, AF ablation is variably performed among patients with AF undergoing cardiac surgery. Using the Society of Thoracic Surgeons Adult Cardiac Surgery Database (STS ACSD) we examined the national trends in surgical ablation for AF and the perioperative outcomes following stand alone surgical ablation of AF.

METHODS: From 2005 through 2010, a total of 91,780 surgical AF ablations were performed including 4,893 (5.3%) stand-alone and 86,887 (94.7%) concomitant procedures (Figure). The outcomes of 956 propensity-matched pairs of patients (pts) having “on” versus “off” CPB stand-alone ablation were examined.

RESULTS: Over the duration of the study, the percentage of pts undergoing major cardiac operations with a diagnosis of preoperative AF increased from 11.3% to 13.9%. Overall 44% of pts with AF were surgically ablated with a decline from 48% to 42% during the course of the study. Stand-alone AF operations increased from 4.3% to 6.2% of all AF operations from 2005 to 2010 (Figure). Among the stand-alone population, the mean age was 60.43 years, 80% were men and 78% (3,806/4,893) of the cases performed off-CPB. The “on” CPB group had higher rates of pulmonary disease (P < 0.001), diabetes (P = 0.002), CHF (P < 0.001), history of stroke (P = 0.029) and prior cardiac surgery (P < 0.001). The operative mortality (0.78%) stroke rate (0.69%,) with no differences between groups after propensity matching (p = 0.14 and p = 0.09), respectively). Better outcomes were noted in the “off” CPB group for reoperation for bleeding (2.51% vs 1.04%, P = 0.016), renal failure (1.25% vs 0.31%, P = 0.02) and length of stay (6 vs 4 days, P = 0.001). The rate of new pacemaker implantation was higher for the “off” CPB group (P = 0.028).
CONCLUSIONS: Nationally the prevalence of AF in patients having cardiac surgery has increased, as has the number of stand-alone surgical ablations performed, however, the percent of concomitant procedure declined during the study period. Stand alone surgical ablation of AF is safe whether performed “on” or “off” CPB and known to have a higher success rate than catheter ablation. Therefore surgical ablation should be considered as an alternative to percutaneous ablation in patients with lone AF.
OBJECTIVES: HMG-CoA reductase inhibitors (statins) are commonly prescribed to patients with cardiovascular disease. Prior studies have demonstrated that statins have a dose dependent effect on myocardial angiogenesis; however the effect of statin treatment in the context of metabolic syndrome is unclear. The purpose of this study was to evaluate the effect of atorvastatin on oxidative stress and angiogenesis in ischemic myocardium in a clinically relevant procine model of metabolic syndrome.

METHODS: Sixteen Ossabaw pigs were fed either a hypercaloric/hypercholesterolemic diet alone (OHC, n = 8) alone or a hypercaloric/hypercholesterolemic diet supplemented with atorvastatin (1.5 mg/kg daily) (OHCS, n = 8) for 14 weeks. Chronic myocardial ischemia was induced by ameroid constrictor placement around the circumflex artery. After 6 months of diet initiation, myocardial perfusion was measured in the ischemic territory with isotope-labeled microspheres injected into the left atrium at rest and demand pacing at 150 beats per minute. The heart was harvested for analysis of perfusion, microvessel relaxation, protein expression, and oxidative stress.

RESULTS: OHC and OHCS groups had similar endothelium-dependent microvessel relaxation to adenosine diphosphate and endothelium-independent relaxation to sodium nitroprusside. Myocardial perfusion in the ischemic territory was significantly reduced in the OHCS group (0.38 ± 0.10 vs. 0.71 ± 0.10 ml/min/g p = 0.04) with demand pacing and unchanged at rest (0.56 ± 0.07 vs. 0.61 ± 0.07 ml/min/g p = 0.62) compared to OHC (see Figure). Atorvastatin treatment increased total myocardial protein oxidation compared to OHC (1.39 ± 0.16 p = 0.04). Conversely, markers of oxidative stress including NOX2, RAC1, myeloperoxidase, SOD1, SOD2, and SOD3 were not statistically different. Protein expression of ENOS, pENOS (Ser 1177), VEGF and angioatin were all up-regulated in the OHCS group compared to OHC. Phosphorylated AKT was down-regulated in the OHCS group compared to OHC (see Table).
CONCLUSIONS: Atorvastatin treatment in a swine model of metabolic syndrome is associated with increased myocardial oxidative stress and decreased perfusion in ischemic myocardium. Although there is up-regulation of proangiogenic protein VEGF, there was up-regulation of antiangiogenic protein angiostatin, and down-regulation of proangiogenic proteins pAKT (Ser 473), pAKT (Thr 308) and VEGFR2. These results suggest that atorvastatin alters angiogenesis in the presence of ischemia and metabolic syndrome.
**CF8. Pulmonary Hypertension Is Associated with Worse Early and Late Outcomes After Aortic Valve Replacement: Implications for TAVR**

Eric E. Roselli, Anas Abdel Azim, Penny L. Houghtaling, Wael A. Jaber, Eugene H. Blackstone

*Cleveland Clinic, Cleveland, OH*

**OBJECTIVES:** To 1) assess the prevalence of pulmonary hypertension (PHT) in patients undergoing aortic valve replacement (AVR) for severe aortic stenosis, and 2) analyze its effect on early and late outcomes.

**METHODS:** From 1/1996 to 7/2010, 4,372 patients underwent primary AVR with or without coronary artery bypass for severe aortic stenosis. Right ventricular systolic pressure (RVSP), a surrogate for PHT, was estimated echocardiographically in 2,385 and analyzed as a continuous variable; these patients constitute the study group. Data were analyzed using multivariable regression validated with bootstrap bagging and hazard function methodology from a prospectively collected database with active follow-up for a total of 10,218 patient-years (mean 4.3 ± 3.4) to assess survival and 3,716 echocardiograms to assess follow-up RVSP.

**RESULTS:** Median RVSP was 41 mmHg (range 10–104, 15th/85th percentiles 31/56) and remained steady in number of patients and PHT severity over time. Patients with higher RVSP were older, more symptomatic, more likely female, had more comorbidities, and were more likely to have tricuspid or mitral valve dysfunction. Hospital mortality was progressively higher with elevated RVSP (0.9% for 611 patients with RVSP <35 mmHg, 1.9% for 1,199 with RVSP 35–50 mmHg, and 3.1% for 575 with RVSP >50 mmHg). Higher RVSP was also associated with renal ($P < .0001$) and respiratory ($P < .0001$) failure, sepsis ($P = .01$), and prolonged length of stay ($P < .0001$). Early and long-term survival was progressively lower in patients with higher RVSP ($P < .0001$; Figure). RVSP on average did not recover to normal levels after AVR (Figure).

**CONCLUSIONS:** Most patients undergoing primary AVR have at least moderate PHT, the severity of which is associated with higher hospital mortality, serious complications, and worse long-term survival. PHT severity should be included in risk assessment for patients being evaluated for aortic valve intervention.
**OBJECTIVE:** The use of radiation to treat malignancies in the chest or chest wall has been shown to cause cardiac valve calcification, including calcific aortic stenosis. However, the mechanisms are unknown. Aortic valve interstitial cells (AVICs) have been implicated in the pathogenesis of aortic stenosis. When stimulated by specific mechanisms, AVICs have been shown to change from the phenotype of a myofibroblast to that of an osteoblast-like cell. We therefore hypothesized that irradiation of human AVICs induces an osteogenic phenotype. In isolated human AVICs, our purpose was to determine the effect of irradiation on the production of osteogenic factors: (a) bone morphogenetic protein-2 (BMP-2), a protein necessary for bone formation (b) osteopontin (OPN), which is important in bone remodeling (c) alkaline phosphatase (ALP), an enzyme important in bone mineralization and (d) the transcription factor Runx2, which is necessary for bone formation.

**METHODS:** Human AVICs were isolated from normal aortic valves obtained from explanted hearts of patients undergoing cardiac transplantation (n = 4) and grown in culture. Once the cells had grown to confluence, they were irradiated using a cesium-137 irradiator for 5.7 minutes at a total dose of 10Gy. Cell lysis was performed at 24 hours following irradiation. Cell lysates were analyzed via immunoblot and densitometry for BMP-2, OPN, ALP and Runx2. Statistics were by t-test. P < 0.05 was significant.

**RESULTS:** Radiation induced an osteogenic phenotype in human AVICs. As shown in the table below, irradiation induced significantly increased production of the osteogenic factors BMP-2, OPN, ALP, and Runx2.

<table>
<thead>
<tr>
<th>Osteogenic Factor</th>
<th>Control (Normalized Ratio)</th>
<th>24 Hours After Irradiation ± SEM (Normalized Ratio)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMP-2</td>
<td>1</td>
<td>1.70 ± 0.03*</td>
</tr>
<tr>
<td>OPN</td>
<td>1</td>
<td>7.25 ± 0.31*</td>
</tr>
<tr>
<td>ALP</td>
<td>1</td>
<td>2.76 ± 0.37*</td>
</tr>
<tr>
<td>Runx2</td>
<td>1</td>
<td>2.05 ± 0.36*</td>
</tr>
</tbody>
</table>

*p < 0.05

*WTSA Member*
CONCLUSIONS: Radiation induces an osteogenic phenotype in human AVICs. The irradiated cells had significantly increased expression of the osteogenic factors BMP-2, OPN, ALP and Runx2. These data offer mechanistic insight into the pathogenesis of radiation-induced valvular heart disease.
OBJECTIVES: Continuous-flow left ventricular assist devices (LVADs) have become the standard of care for heart failure patients requiring mechanical support. However, data on long-term post-transplant survival in these patients are limited. We sought to evaluate the impact of continuous flow LVADs on post-cardiac transplant survival in the current era.

METHODS: All patients who received a continuous-flow LVAD as bridge-to-transplant therapy (BTT) at a single center between June 2005 and September 2011 were evaluated.

RESULTS: Of the 167 patients who received a continuous flow LVAD as BTT, 77 (46.1%) underwent cardiac transplantation, 27 died prior to transplantation (16.1%), and 63 (37.7%) remain listed for transplant and are still on LVAD support. Among transplanted patients, mean age was 54.5 ± 11.9 years, 57% had an ischemic etiology and 19.5% were female. The overall mean duration of LVAD support prior to transplant was 310 ± 227 days (range 67–1230 days). Mean duration of LVAD support did not change in patients who received an LVAD in the early period of the study (between 2005 and 2008, n = 58) vs those patients who received an LVAD later (between 2009 and 2011, n = 19, 306 vs 320 days, p = NS). In addition, there was no difference in survival in those patients supported with an LVAD for less than 180 days compared to greater than 180 days prior to transplant (p = NS). Actuarial survival post-transplant at 30 days, 1, 3, and 5 years by Kaplan-Meier analysis was 98.7%, 93.0% 91.1% and 88.0%, respectively.

CONCLUSIONS: The short and long-term post-transplant survival in patients bridged with a continuous flow LVAD in the current era is excellent. Further, the duration of LVAD support does not impact post-transplant survival. The hemodynamic benefits of ventricular unloading with continuous-flow LVADs in addition to their durability and reduced patient morbidity contributes to improved post-transplant survival.
CF11. Mathematically-Engineered Stromal Cell-derived Factor 1alpha Stem Cell Cytokine Analogue Enhances Mechanical Properties Of Infarcted Myocardium

John W MacArthur, Jr., Alen Trubelja, David P Beason, William Hiesinger, Pavan Atluri, Y. Joseph Woo
University of Pennsylvania, Philadelphia, PA

OBJECTIVES: The biomechanical response to a myocardial infarction consists of ventricular remodeling that leads to dilation, loss of contractile function, and ultimately heart failure. During the early phase of ischemia, the pressure generated by the unaffected myocardium subjects the infarcted tissue to passive overstretching, which can cause abnormal stress patterns. We have designed a neovascularogenic chemokine, an engineered stromal cell derived factor 1alpha analogue(ESA) and have shown efficacy in stimulating repair after MI. In this study we sought to show that intramyocardial injection of ESA improves the mechanical properties of the heart post-infarction.

METHODS: Adult male Wistar rats (n=18) were divided into three groups. 5 rats underwent sham surgery with no coronary artery ligation and an apical myocardial infarction was surgically induced in the remaining 13 rats via ligation of the left anterior descending coronary artery. These rats had either saline (0.1cc, n=5) or ESA (6µg/kg, n=8) injected into the myocardium at 4 predetermined spots around the borderzone of the infarct. All rats received subcutaneous GM-CSF (40µg/kg). Echocardiograms were performed preoperatively and before the terminal surgery. After 4 weeks the hearts were explanted and longitudinally sectioned from the apex to the aortic valve, which included the infarcted myocardium. PTFE pledgets were sutured to the ends of the muscle strips. Uniaxial tensile testing was completed using an Instron 5543 Microtester with a 5N load cell and custom grips. 0.05N pre-load was applied, and samples underwent 20 cycles of pre-conditioning followed by a ramp to failure at 0.1% per second. The strain was evaluated using speckle tracking and the Vic 2D 2009 imaging system.

RESULTS: Compared to the saline control group at 4 weeks, the ESA injected hearts had higher ejection fractions (72% ± 10 vs. 61% ± 5, p= 0.02) smaller end-diastolic left ventricular internal dimensions (0.696cm ± 0.064 vs. 0.870cm ± 0.038, p= 0.00004) and the longitudinal peak strain was less (0.425 vs. 0.949, p= 0.01). Peak strain for the non-infarct group was 0.195, indicating ESA injection results in increased stiffness and preserved ventricular function in infarcted myocardium.

CONCLUSIONS: Direct injection of a mathematically-designed, synthesized form of stromal cell derived factor 1alpha was found to alter the biomechanical response to MI by a reduction in the longitudinal peak strain of the left ventricle. ESA improved the mechanical properties in the post-infarct heart and limited ventricular remodeling, outcomes which are paramount to preventing ischemic heart failure.
CF12. Reliability of Porcine Versus Pericardial Bioprosthetic Valves

*Anthony P. Furnary1, *Gary L. Grunkemeier2, YingXing Wu2, Lian Wang2, *Albert Starr3

1Starr-Wood Cardiac Surgery Group, St. Vincent Hospital & Medical Center, Portland, OR; 2Medical Data Research Center, Providence Health & Services, Portland, OR; 3Division of Cardiovascular Medicine, Oregon Health Sciences University, Portland, OR

OBJECTIVES: To compare the durability of porcine vs. pericardial aortic and mitral valves, with regard to the probability and mode of valve explant.

METHODS: We began implanting Carpentier-Edwards (CE) porcine valves in 1974 and CE pericardial valves in 1991. All patients have been enrolled in a yearly prospective follow-up service using mailed questionnaires and telephone backup. Our endpoints in this study are valve explantation for any reason, and for structural valve deterioration (SVD). We used the cumulative incidence function (CIF) and Fine/Gray multivariable competing risks regression (CRR) for estimation and analysis of patient-oriented durability. CIF is appropriate for valve explant, since the competing endpoint of death precludes future explant.

RESULTS: As of 2010, we had (A) 470 CE porcine and (B) 2355 CE pericardial isolated aortic valve (AV) operative survivors and (C) 157 CE porcine and (D) 155 CE pericardial isolated mitral valve (MV) operative survivors. Total/maximum follow-up years in these 4 groups were 3,477/24, 11,506/18, 853/22 and 656/11, respectively. The CIF (SE) for valve explant was 7.4 (1.3)%, 7.9 (1.2)%, 21.6 (3.7)% at 15 years and 8.2% (3.7%) at 10 years, for groups A–D, respectively (Figure). The corresponding values for SVD explants were 4.1 (1.0)%, 4.6 (0.9)%, 16.3 (3.3)% and 5.1% (3.2%). For AV, there was a slight (hazard ratio = .89) but nonsignificant protective effect of the pericardial valve for valve explant, using a CRR which included age, gender, valve size and lipid-lowering drug use. For MV, there was an almost significant (p = 0.07) protective (hazard ratio = .61) effect of the pericardial valve using CRR. In the CRRs for both positions, older age (p < 0.001) was a highly significant (p < 0.001) protective factor, and for AV lipid drug was significantly (p < 0.05) protective. Of the SVD explants for which the mode of failure was known, the ratio of leaflet tear/calcific-fibrotic findings were: 12/5, 11/22, 11/10 and 0/1 for groups A–D, respectively.

* WTSA Member
CONCLUSIONS: By CRR, the pericardial valve has a lower probability of explant in both positions, almost significant in MV. The probability (CIF) of any explant by 15 years is about 8% for both AV bioprostheses, and about 4% for SVD only. The mode of SVD is predominantly leaflet tear for porcine and calcific/fibrotic for pericardial.
CF13.  Propensity Score Adjusted Comparison of Minimally Invasive Versus Sternotomy Approaches to Isolated Mitral Valve Repair
University of Pennsylvania, Philadelphia, PA

OBJECTIVE: Mitral valve repair can be performed at low risk through median sternotomy. As minimally invasive approaches to mitral valve surgery are increasingly employed, and mitral valve repair has extended to the asymptomatic population, it is essential that the surgical approach not compromise clinical outcome for improved cosmesis. The purpose of this study was to compare the outcomes of mitral valve repair performed through minimally invasive approach (MICS) versus median sternotomy (open).

METHODS: Between January 2002 and October 2011, 1,024 isolated mitral valve repairs were performed in our health system (455 open, 556 MICS). To account for selection bias, a logistic regression model was generated and propensity scores calculated to predict selection to an open or MICS approach. Propensity score adjustment yielded 1,006 patients in comparable groups, and major outcomes of interest included major postoperative complications, hospital length of stay, and long-term survival.

RESULTS: The mean age, gender, body mass index, and left ventricular ejection fraction were similar between the two groups; however, prior to propensity adjustment, sternotomy patients were more likely to be asymptomatic (51% open vs. 35% MICS, p = 0.002), diabetic (12% vs. 6%, p = 0.005), or in congestive heart failure (65% vs. 45%, p < 0.001). A significantly greater proportion of MICS patients required complex repair strategies (62% vs. 80%, p < 0.001). Both cross-clamp time (76 vs. 104 minutes, p < 0.001) and cardiopulmonary bypass time (103 vs. 140 minutes, p < 0.001) were longer in the MICS group. Operative mortality was similar between open and MICS access groups (1% vs. 0.7%, p = 0.7), and after propensity score adjustment, the incidence of hemorrhage requiring re-exploration (p = 0.1), blood product transfusion (p = 0.6), surgical site infection (p = 0.9), sepsis (p = 0.6), prolonged ventilation (p = 0.2), gastrointestinal bleeding or ischemia (p = 0.1), stroke (p = 0.7), and multisystem organ failure (p = 0.7) were similar between groups. Although median length of ICU stay was shorter in MICS access patients (27 vs. 24 hours, p = 0.003), length of total hospital stay was similar between open and MICS access groups (6 vs. 6 days, p = 0.1). Over 8 years of follow-up, there was no significant difference in long-term survival between groups (p = 0.3).

CONCLUSIONS: Despite longer cross-clamp and cardiopulmonary bypass times, minimally invasive mitral valve repair demonstrated similarly excellent early and late outcomes compared to valve repair via median sternotomy.

Betty C. Tong1, Andrzej S. Kosinski1, William R. Burfeind, Jr.2, Mark W. Onaitis1, Matthew G. Hartwig1, Mark F. Berry1, David H. Harpole, Jr.1, Thomas A. D’Amico1

1Duke University, Durham, NC; 2St. Luke’s Health Network, Bethlehem, PA

BACKGROUND: Women with lung cancer have superior long-term survival outcomes compared to men, independent of stage. The etiology of this disparity is unknown. This study was undertaken to determine whether there are differences in perioperative outcomes after lung cancer surgery based on gender.

METHODS: The STS General Thoracic Database was queried for all patients undergoing resection of lung cancer between 2002 and 2010. Postoperative complications as defined by the STS Database were analyzed with respect to gender. Univariable analysis was performed, followed by multivariable modeling to determine significant risk factors for postoperative morbidity and mortality.

RESULTS: A total of 34,188 patients (16,643 men and 17,545 women) were considered. Univariable analysis demonstrated statistically significant differences in postoperative complications favoring women in all categories of postoperative complications. In addition, women had lower in-hospital and 30-day mortality (O.R. 0.56, 95% CI 0.44–0.71; p < 0.001).

Multivariable analysis demonstrated that several pre-operative conditions were independently predictive of 30-day mortality: male gender, increasing age, lower diffusion capacity, renal insufficiency, preoperative radiation therapy, cancer stage, extent of resection and thoracotomy as surgical approach.

There were gender differences in predictors of perioperative mortality. Coronary artery disease was an independent predictor of mortality in women but not men. Thoracotomy as surgical approach and preoperative radiation therapy were predictive of mortality for men but not women. Post-operative prolonged air leak and empyema were predictive of mortality in men but not women.
### Table 1. Predictors of Mortality After Lung Cancer Resection

<table>
<thead>
<tr>
<th>Variable</th>
<th>All Patients OR (p Value)</th>
<th>Males OR (p Value)</th>
<th>Females OR (p Value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female gender</td>
<td>0.56 (&lt;0.001)</td>
<td>1.07 (&lt;0.001)</td>
<td>1.04 (&lt;0.001)</td>
</tr>
<tr>
<td>Age</td>
<td>1.06 (&lt;0.001)</td>
<td>1.07 (&lt;0.001)</td>
<td>1.04 (&lt;0.001)</td>
</tr>
<tr>
<td>DLCO</td>
<td>0.98 (&lt;0.001)</td>
<td>0.98 (&lt;0.001)</td>
<td>0.97 (&lt;0.001)</td>
</tr>
<tr>
<td>CAD</td>
<td>1.23 (0.09)</td>
<td>1.09 (0.54)</td>
<td>1.64 (0.04)</td>
</tr>
<tr>
<td>Pre-op Chemo</td>
<td>1.01 (0.95)</td>
<td>0.75 (0.29)</td>
<td>1.58 (0.16)</td>
</tr>
<tr>
<td>Pre-op XRT</td>
<td>1.61 (0.03)</td>
<td>1.86 (&lt;0.001)</td>
<td>1.25 (0.51)</td>
</tr>
<tr>
<td>Renal insufficiency</td>
<td>3.14 (&lt;0.001)</td>
<td>2.81 (&lt;0.001)</td>
<td>4.68 (0.001)</td>
</tr>
<tr>
<td>Pathologic stage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1.00 (0.07)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>II</td>
<td>1.05 (0.19)</td>
<td>1.19</td>
<td>0.79</td>
</tr>
<tr>
<td>III</td>
<td>1.65 (0.65)</td>
<td>1.65</td>
<td>1.70</td>
</tr>
<tr>
<td>IV</td>
<td>2.43 (0.24)</td>
<td>2.53</td>
<td>2.46</td>
</tr>
<tr>
<td>Extent of resection</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sublobar</td>
<td>1.00 (0.69)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>Lobar</td>
<td>1.54 (0.48)</td>
<td>1.64</td>
<td>1.41</td>
</tr>
<tr>
<td>&gt; Lobar</td>
<td>4.51 (0.61)</td>
<td>4.82</td>
<td>4.43</td>
</tr>
<tr>
<td>Approach</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoracotomy</td>
<td>1.00 (0.69)</td>
<td>&lt;0.001</td>
<td>0.65</td>
</tr>
<tr>
<td>VATS</td>
<td>0.69 (0.007)</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td></td>
<td>0.58 (0.003)</td>
<td>0.90 (0.65)</td>
<td></td>
</tr>
<tr>
<td>Postoperative Air Leak</td>
<td>1.32 (0.10)</td>
<td>1.57 (0.02)</td>
<td>0.87 (0.68)</td>
</tr>
<tr>
<td>Postoperative Empyema</td>
<td>4.00 (0.002)</td>
<td>3.83 (0.004)</td>
<td>4.39 (0.25)</td>
</tr>
</tbody>
</table>

**CONCLUSIONS:** Women have lower postoperative morbidity and mortality after lung cancer surgery. Some risk factors are gender-specific with regard to mortality. Further study is warranted to determine the etiology of these differences and to determine their effect on both short- and long-term survival.
OBJECTIVES: Recent publications suggest that the morbidity attributed to unrepaired giant paraesophageal hernias is overestimated. Because surgical repair carries a risk of postoperative morbidity and mortality, some have recommended a watchful waiting approach to minimally symptomatic patients. We and others have shown, however, that elective laparoscopic repair is associated with very low morbidity and mortality compared to nonelective repair. As such, the development of risk stratification tools to assist the surgeon and patient in decision-making regarding surgical intervention are needed, to optimize patient outcomes and reduce paraesophageal hernia associated morbidity and mortality. We hypothesize that pretreatment patient and hernia characteristics can be used to predict increased risk of postoperative morbidity and mortality.

METHODS: Patients undergoing first-time open transabdominal or laparoscopic repair of giant paraesophageal hernias were retrospectively identified from a prospectively-maintained single-institution database (n = 985; 1997–2010). Giant paraesophageal hernias were defined as gastric herniation of 30% or more. Demographic characteristics and comorbidities were analyzed to determine variables significantly associated with 30-day morbidity and mortality. These variables were then combined in predictive models. Fisher’s exact test, Student’s t-test and forward stepwise logistic regression were used for statistical analysis, with significance defined as p ≤ 0.05.

RESULTS: Laparoscopic repair was performed in 97% (n = 951). Median age and body mass index were 70.7 years and 28.9, respectively. The most common comorbid diseases were coronary artery disease (15%), cerebrovascular disease (n = 8%), and pulmonary disorder (30%). Non-elective surgery was necessary in 20.3% (n = 199). Thirty day major morbidity and mortality were 22.9% and 2.6%, respectively. Pulmonary complications were the most common adverse outcomes, including pneumonia (6.7%). Patient age 80+ years and urgency of surgery were significant independent predictors of major morbidity (p < 0.001 for both variables) and mortality (p < 0.001 for both variables). The age-adjusted Charlson comorbidity index, adjusted for urgency of operation (elective or nonelective) and decade of age, were 66.7% accurate predicting major morbidity and 87.1% accurate predicting in-hospital and/or 30-day mortality. A seven-variable model consisting of operative approach, age, sex and four variables of the Charlson comorbidity index (heart failure, pulmonary disease, peripheral vascular disease and a composite comorbid variable of rare
Charlson diagnoses (mild liver disease, moderate to severe liver disease, diabetes w/ organ damage, hemiplegia, lymphoma, leukemia, metastatic cancer, or AIDS) was most predictive of major morbidity, with an accuracy of 68.7%. A five-variable model consisting of operative approach, age, and three variables of the Charlson comorbidity index (history of dementia, pulmonary disease and peptic ulceration) was most predictive of mortality, with an accuracy of 87.5%.

**CONCLUSIONS:** Predictive models consisting of variables of the Charlson comorbidity index combined with additional patient and operative characteristics can accurately determine mortality after repair of giant paraesophageal hernia. Efforts to further refine predication models for major morbidity are needed to improve risk stratification and develop tools to guide the surgeon and patient in decisions regarding watchful waiting.
CF16. **The Impact of Barrett’s Surveillance on Esophageal Preservation, Tumor Stage, and Survival with Esophageal Adenocarcinoma**

Kimberly S. Grant, *Steven R. DeMeester*, Shahin Ayazi, Michael Hermansson, Joerg Zehetner, Daniel Oh, Jeffrey Hagen  
*University of Southern California Keck School of Medicine, Los Angeles, CA*

**OBJECTIVES:** The benefit of surveillance endoscopy in patients with Barrett’s esophagus (BE) is controversial. Previously, progression to high-grade dysplasia (HGD) or esophageal adenocarcinoma (EA) was treated with esophagectomy. Now, endoscopic techniques to treat HGD and superficial EA allow esophageal preservation and may represent an added benefit of surveillance. The aim of this study was to compare tumor stage, type of treatment, and survival in patients with surveillance-detected versus symptom-detected HGD or EA.

**METHODS:** Retrospective review of patients treated for HGD or EA from 2005 to 2010. Patients were considered to be under surveillance if at least one endoscopy and biopsy confirmed BE prior to the discovery of HGD or EA.

**RESULTS:** There were 49 patients identified by surveillance and 175 by symptoms. Characteristics of the groups are shown (Tables 1, 2, 3). Esophageal preservation was significantly more likely in patients undergoing surveillance (43% versus 10% in the symptom group, p < 0.0001). Further, patients undergoing surveillance were significantly more likely to be found with HGD or an intramucosal tumor when the surveillance interval was 12 months or less (88% versus 53% for longer surveillance interval, p = 0.029, see Table 4). Survival was significantly better in the surveillance group (5-year survival 59% versus 42% in the symptom group, p = 0.0004, see image).

<table>
<thead>
<tr>
<th></th>
<th>Surveillance (n = 49)</th>
<th>Symptoms (n = 175)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in years, median (IQR)</td>
<td>68 (61–78)</td>
<td>69 (59–76)</td>
<td>0.62</td>
</tr>
<tr>
<td>Gender: M/F</td>
<td>44/5</td>
<td>154/21</td>
<td>0.84</td>
</tr>
<tr>
<td>Median duration of reflux symptoms in years (IQR)</td>
<td>30 (20–40)</td>
<td>2 (0–20)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Median number of endoscopies before HGD or EA (IQR)</td>
<td>3 (2–4)</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Esophagectomy (%)</td>
<td>28 (57%)</td>
<td>158 (90%)</td>
<td>&lt;0.0001</td>
</tr>
</tbody>
</table>

*WTSA Member*
Table 1 (continued)

<table>
<thead>
<tr>
<th></th>
<th>Surveillance (n = 49)</th>
<th>Symptoms (n = 175)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endotherapy (resection ± ablation)</td>
<td>21 (43%)</td>
<td>17 (10%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Neoadjuvant therapy (%)</td>
<td>0</td>
<td>60 (34%)</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Median follow-up, months (IQR)</td>
<td>30 (18.5–43)</td>
<td>21 (13–37)</td>
<td>0.0199</td>
</tr>
<tr>
<td>Median survival, months</td>
<td>61</td>
<td>46</td>
<td>0.0004</td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>T stage</th>
<th>Surveillance (n = 49)</th>
<th>Symptoms (n = 175)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGD</td>
<td>7 (14%)</td>
<td>4 (2%)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>T1a</td>
<td>27 (55%)</td>
<td>28 (17%)</td>
<td></td>
</tr>
<tr>
<td>T1b</td>
<td>11 (22%)</td>
<td>11 (7%)</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>4 (8%)</td>
<td>21 (13%)</td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>0</td>
<td>100 (61%)</td>
<td></td>
</tr>
</tbody>
</table>

*Patients with complete pathologic response to neoadjuvant therapy excluded from T stage analysis

Table 3

<table>
<thead>
<tr>
<th>N stage</th>
<th>Surveillance (n = 49)</th>
<th>Symptoms (n = 175)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>N stage [in esophagectomy patients]:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N0</td>
<td>24 (86%)</td>
<td>77 (49%)</td>
<td>0.002</td>
</tr>
<tr>
<td>N1 (1–2 pos nodes)</td>
<td>3 (11%)</td>
<td>22 (14%)</td>
<td></td>
</tr>
<tr>
<td>N2 (3–6 pos nodes)</td>
<td>1 (3%)</td>
<td>23 (15%)</td>
<td></td>
</tr>
<tr>
<td>N3 (7 or more pos nodes)</td>
<td>0</td>
<td>36 (23%)</td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Surveillance Interval

<table>
<thead>
<tr>
<th>T stage</th>
<th>12 Months or Fewer (n = 17)</th>
<th>More than 12 Months (n = 17)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>HGD/T1a</td>
<td>15 (88%)</td>
<td>9 (53%)</td>
<td>0.029</td>
</tr>
<tr>
<td>T1b–T3</td>
<td>2 (12%)</td>
<td>8 (47%)</td>
<td></td>
</tr>
</tbody>
</table>
CONCLUSIONS: Surveillance endoscopy for BE increases the likelihood for esophageal preservation in patients who progress to HGD or EA. Compared to patients that presented with symptoms, those under surveillance had earlier stage disease, required no neoadjuvant therapy and had better survival. Surveillance performed at 1 year intervals or less resulted in significantly earlier tumor stage.
CF17. The Impact of Neoadjuvant Chemoradiotherapy on Tumor pathology, Perioperative Outcomes and Survival in Stage II and III Esophageal Cancer
Sheraz R. Markar, *Donald E. Low
Virginia Mason Medical Center, Seattle, WA

OBJECTIVE: Neoadjuvant chemoradiotherapy is now a standard treatment approach in patients with locoregional esophageal cancer. The aim of this study is to provide a direct assessment of the use of neoadjuvant chemoradiotherapy and its impact upon complications, mortality and survival following surgical resection of Clinical Stage II and III esophageal cancer.

METHODS: All patients undergoing esophagectomy for cancer between 1991 and 2011 had information prospectively entered in an IRB-approved database. Patients in Clinical Stage II and III were compared according to whether they received surgery alone vs. neoadjuvant chemoradiotherapy and surgery. Presenting demographics, peri-operative outcomes and survival were assessed.

RESULTS: 500 patients were operated on for cancer during the study period. 188 (37.6%) patients received neoadjuvant chemoradiotherapy (1 (1.2%) Stage I, 75 (39.9%) Stage II, 103 (60.2%) Stage III, 7 (53.8%) Stage IV).

Age was significantly lower in patients receiving neoadjuvant chemoradiotherapy in both Stage II (64.6 ± 9.7yrs vs. 68.3 ± 10.9yrs) and III (61.1 ± 10 vs. 66.1 ± 12 yrs) groups, while the Charlson co-morbidity index, ASA grade and incidence of adeno-carcinoma were similar. There were no statistically significant differences between patients receiving neoadjuvant chemoradiotherapy and surgery vs. surgery alone in immediate extubation rate (99.2 vs. 99.5%), post-operative blood transfusion (3.3 vs. 4.8%) or the incidence of complications including anastomotic and chyle leak, re-operation, atrial fibrillation, myocardial infarction, pneumonia, stroke, pulmonary embolism and in-hospital mortality. Patients receiving neoadjuvant chemoradiotherapy had a similar ICU stay (2.2 ± 3 vs. 1.9 ± 1.9 days; P = 0.23) but demonstrated a reduced length of hospital stay (10.5 ± 5.2 vs. 11.7 ± 6.5 days; P < 0.05).

Complete response to neoadjuvant chemoradiotherapy was seen in 25.3% Stage II and 23.3% Stage III patients. The incidence of positive resection margin was significantly more common in the surgery alone group in both Stages II (8.7% vs. 2.7%; P < 0.05) and III (12.8% vs. 2.9%; P < 0.05) groups. However when all Stage II and III patients were analyzed, no statistically significant improvement was seen in overall survival in patients receiving neoadjuvant chemoradiotherapy when compared to surgery alone.

* WTSA Member
Subset analysis of patients with a complete response to neoadjuvant chemoradiotherapy demonstrated a trend towards improved survival in clinical stages II (85.7 ± 25 vs. 62.9 ± 9.1 months; P = 0.49) and III (52.1 ± 9.8 vs. 47.7 ± 9.2 months; P = 0.4). Stage IIA patients with a complete response (27.8%) also demonstrated improved survival (95 ± 28.1 vs. 53.8 ± 8.7 months; P = 0.18). Negative resection margin was associated with a significantly improved survival in stage II (71.7 ± 5.2 vs. 21.4 ± 5.8 months; P < 0.05) and stage III (51.8 ± 7 vs. 11.5 ± 4.4; P < 0.05) disease in both univariate and multivariate analyses.

**CONCLUSIONS:** The results of this study show neoadjuvant chemoradiotherapy is not associated with a survival benefit in all patients. Patients who obtain complete pathological response show a trend towards survival benefit. Neoadjuvant chemoradiotherapy increases the incidence of negative resection margins in stage II and III cancers, which is the most important issue associated with survival. This highlights the importance of planning operations to optimize the opportunity to provide negative surgical resection margins, and of identifying patients not responding to neoadjuvant chemoradiotherapy to allow them to proceed directly to surgery.
CF18. Src Kinase Inhibition Reverses P27/Kip1 Mislocalization and Reduces Growth of Pre-Neoplastic Barrett’s Esophagus Cell Lines


1Heart and Lung Institute, St. Joseph’s Hospital and Medical Center, Phoenix, AZ; 2Translation Genomics Research Institute, Phoenix, AZ

OBJECTIVE: Local ablation (RFA or Cryo), or esophagectomy, are currently the only therapies available for the treatment of high-grade dysplasia (HGD) in Barrett’s esophagus (BE). There are no chemopreventative strategies to offer BE patients with HGD in lieu of more invasive procedures. Our understanding of the molecular changes that occur in HGD offer an opportunity to inhibit the progression of HGD to esophageal adenocarcinoma (EAC).

The tumor suppressor, p27-kip1 functions to regulate cell growth and is commonly deregulated EAC and BE. Deregulation of p27-kip1 occurs through post-translational modification, specifically protein phosphorylation, which induces nuclear export to the cytoplasm, inhibiting its regulatory function. Functionally, targeted inactivation of p27-kip1 by phosphorylation is due to several protein kinases, especially the Src family. Src kinases promote nuclear export of p27-kip1 and Src displays increased activity in HGD-BE. We hypothesize that targeted inhibition of Src may restore p27-kip1’s regulatory function and thus may serve as a potential chemopreventative modality for BE patients with HGD.

METHODS: To test this hypothesis, we examined the effects of a well-tolerated and FDA approved Src kinase inhibitor, dasatinib upon growth and localization of p27-kip1 in immortalized dysplastic (CP-D) and metaplastic (CP-A) BE cell lines. Localization of p27-kip1 was analyzed using confocal microscopy, while growth of BE cell lines was assessed via CellTiter-Glo following treatment with dasatinib. Dasatinib effects upon mRNA levels of the proliferative markers Cyclin D1 and E1 were also evaluated. Immunoblot analysis of protein markers was also performed upon treated BE cell lines.

RESULTS: Confocal analysis of CP-A and CP-D BE cells revealed cytoplasmic localization of p27-kip1, which relocalized to the nucleus with dasatinib treatment (Figure 1A). Dasatinib treatment reduced cell viability in BE cell lines (Figure 2B), which correlated with reduced mRNA levels of both Cyclins D1 and E1. At lower doses of dasatinib, dysplastic BE cells were more sensitive to the treatment compared to metaplastic BE cells (Figure 2B). p27 mRNA and protein levels were unaffected by dasatinib treatment, however dasatinib treatment resulted in cleavage of the apoptotic marker, PARP, indicating activation of cell death (Figure 2C).

* WTSA Member
Figure 1 – Dasatinib reverses the mis-localization of p27kip1, reduces cell growth and induces apoptosis. A) Immunofluorescence of p27kip1 in dysplastic (CP-D) and metaplastic (CP-A) untreated (Top Panels) or treated with 100nM dasatinib for 24 hours (Bottom Panels). Treatment with 100nM dasatinib results in relocalization of p27kip1 (green) from the cytoplasm to the nucleus (blue). (B) CellTiter-Glo cell viability assay on dysplastic (CP-C) and metaplastic (CP-A) BE cells treated with increasing concentrations of dasatinib. (C) Immunoblot displaying increasing levels of cleaved-PARP compared to p27 protein levels during a 96 hour dasatinib treatment. Beta-actin was used as a loading control.
CONCLUSIONS: Dasatinib reverses the cytoplasmic mislocalization of p27 by inhibiting src kinase activation in BE and HGD cell lines. After treatment, the expression of the proliferative markers Cyclin D1 and Cyclin E1 decreased correlating with reduced cell growth and activated apoptosis within BE cell lines. Dysplastic BE cells appeared to be more sensitive to lower doses of dasatinib compared to the metaplastic line. Taken together, these findings suggest that dasatinib, a targeted agent with minimal side effects, has potential as a treatment for patients with high-grade Barrett’s esophagus and sub-cellular localization of p27-kipl has potential as a biomarker for HGD-BE patients who could be treated with dasatinib.

Table 1-Expression of proliferative markers Cyclin D1 and Cyclin E1. Fold change analysis from qRT-PCR completed on dysplastic (CP-D) and metaplastic (CP-A) immortalized BE cell line mRNA isolated after a 96 hour 100nM dasatinib treatment.
**OBJECTIVE:** During the last decade there has been a dramatic shift from the use of open techniques to percutaneous dilatational tracheostomy (PDT) in critically ill patients requiring prolonged ventilatory support. Though short term safety of the PDT has been demonstrated, less is known about long term complications. Through an illustrative case series, we present and define corkscrew stenosis, a new type of tracheal stenosis uniquely associated with PDT. Our report highlights the unique characteristics, mechanism of formation, and means of prevention of this potential complication.

**METHODS:** Patients treated for post PDT tracheal stenosis from January 2008 until December 2011 in our institution were reviewed. Information identified from each case included gender, age, history of presentation, lesion morphology, imaging, and management strategies.

<table>
<thead>
<tr>
<th>Case #</th>
<th>Age, yr</th>
<th>Sex</th>
<th>History</th>
<th>Symptoms</th>
<th>cm to Cords</th>
<th>Length, cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>62</td>
<td>F</td>
<td>Severe Sepsis</td>
<td>Dyspnea, Hoarseness</td>
<td>2.5</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>60</td>
<td>M</td>
<td>Heart Failure</td>
<td>Dyspnea with phonation</td>
<td>2.8</td>
<td>1.3</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>F</td>
<td>Severe Sepsis</td>
<td>Dyspnea, Cough</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>62</td>
<td>F</td>
<td>Severe Sepsis</td>
<td>Dyspnea</td>
<td>0.75</td>
<td>1.5</td>
</tr>
<tr>
<td>5</td>
<td>41</td>
<td>F</td>
<td>S/P Hanging</td>
<td>Dyspnea, Stridor</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
<td>M</td>
<td>Severe Sepsis</td>
<td>Dyspnea</td>
<td>2.5</td>
<td>2</td>
</tr>
<tr>
<td>7</td>
<td>70</td>
<td>M</td>
<td>Heart Failure</td>
<td>Stridor</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>29</td>
<td>M</td>
<td>Stroke</td>
<td>Dyspnea</td>
<td>3.5</td>
<td>2.6</td>
</tr>
<tr>
<td>Mean</td>
<td>51 ± 18</td>
<td></td>
<td></td>
<td></td>
<td>2.32 ± 0.87</td>
<td>1.63 ± 0.55</td>
</tr>
</tbody>
</table>
RESULTS: During the study period 8 patients were treated for tracheal stenosis after PDT. The mean age was 51 ± 18 years and the gender breakdown was 4 men and 4 women. The reason for the initial cause of respiratory failure and eventual need for PDT was variable; however, the most common cause was severe sepsis. The lesions were characterized by a corkscrew morphology at the stoma site with a mean distance of 2.32 ± 0.87 cm from the vocal cords. These lesions suggested disruption and fracture of the proximal tracheal cartilages during PDT insertion led to posterior displacement of the anterior tracheal wall into the tracheal lumen. The majority of our cases required tracheal resection for definitive repair.

CONCLUSIONS: Corkscrew stenosis is unique to PDT. Stenosis after open surgical tracheostomy is most often found distal to the stoma site and caused by cuff related tracheal injury. On the other hand, corkscrew stenosis occurs immediately proximal to the stoma site and is associated with tracheal ring fracture at this location. This is distinctly uncommon in open surgical tracheostomy where the anterior tracheal wall flap is displaced away from the tracheal lumen. During PDT, if posterior displacement of fractured tracheal rings is severe enough, the broken ends of these rings have a tendency to interdigitate in a corkscrew pattern leading to a severely narrowed tracheal lumen. Lengthy cannulation and scar formation can serve to hold the deformed rings in this unfavorable position. We suggest that prevention of corkscrew stenosis be directed at avoiding severely displaced tracheal ring fractures by utilizing technical considerations which include bronchoscopic guided placement between second and third tracheal rings, perpendicular rather than oblique insertion, and avoidance of rotational torque at the insertion site during PDT insertion. Recognizing corkscrew stenosis, its unique mechanism of formation, and technical means of prevention is important in advancing the safety of PDT and care for all critically ill patients who may require prolonged ventilatory support.
CF20. Minimally Invasive Repair of Pectus Excavatum in Adult Patients: An Early Experience Using a Modified Nuss Technique

Marianne V. Merritt1, *Dawn E. Jaroszewski1, Lisa E. McMahon2, Irene T. Ma1, Jesse J. Lackey1, David M. Notrica2

1Mayo Clinic, Phoenix, AZ; 2Pediatric Surgeons of Phoenix, Phoenix, AZ

OBJECTIVE: Minimally invasive repair of pectus excavatum (MIRPE) or Nuss procedure is the most common method of repair in pediatric patients and is increasingly being employed to repair adult patients. We present our experience with adults utilizing a modified technique.

METHODS: A retrospective review patients who underwent MIRPE from January 2010-December 2011 was performed.

RESULTS: 84 adult patients were identified. Mean age was 34 years (range 18–67) and 77% were men. Mean severity index was 6.1. Thirty (36%) patients were “redo” revisions of previous pectus repair. Twelve patients required complex revisions of prior open repairs including anterior rib, partial sternal resections, and/or chest wall plating in addition to thoracoscopic-guided placement of typical sternal support bars. All patients received at least 2 bars and 3 bars were placed in 21%. In all adult patients, shorter bar lengths with a more lateral intercostal space entrance into the chest reduced intercostal muscle stripping. Bar migration was prevented by lashing the bar around the ribs in multiple sites with FiberWire®. Mean operative time for primary repair was 117 minutes (range 60–378) and revision procedures 213 minutes (range 70–513). Two patients at primary repair additionally required sternal osteotomy and resection of a portion of cartilage attachments to facilitate repair. Morbidity included: pleural effusions requiring thoracentesis (2); Pneumothorax requiring placement of a chest tube (3); pericardial effusion treated with non-steroidals (1). Bar displacement requiring reoperation occurred in 3 patients (3.5%). Three patients (3.5%) with complex revisions and 1 primary MIRPE (1.2%) had post-operative infection. Hospitalization was a mean of 5.4 days for primary MIRPE and 14 days for revisions.

* WTSA Member
Posterior-anterior (A) and lateral (B) chest x-ray with support bars after pectus excavatum repair
CONCLUSION: 47-year-old male with pectus excavatum; severity index 3.8 before (A) and after (B) Minimally invasive repair with 2 support bars.

CONCLUSION: A modified MIRPE can be successfully utilized to repair pectus excavatum in the majority of adult patients with minimal complications.
OBJECTIVE: In light of recently reported good cancer-specific survival among patients undergoing stereotactic body radiation therapy (SBRT) controversy remains regarding appropriate treatment for high risk patients with stage 1 lung cancer. The purpose of this study was to compare selection criteria and short term outcomes between 3 multi-institutional prospective clinical trials utilizing SBRT (RTOG 0236), sublobar resection (ACOSOG Z4032), and radiofrequency ablation (RFA-Z4033).

METHODS: Selection criteria and outcomes were compared (Chi-square, Kruskal-Wallis). Age, ECOG scores, FEV1%, and DLCO% were utilized to perform a propensity matched analysis among clinical stage 1A patients in RTOG 0236 and ACOSOG Z4032. Early post-procedure mortality and grade 3 or higher adverse events (AEs) were compared using conditional logistic regression with 5 strata (propensity score group).

RESULTS: Overall 90-day mortality for SBRT, surgery, and RFA was 0%, 2.4% (5/211), and 2.0% (1/51), respectively (p = 0.5), with 1 (2.0%) treatment-related death in the RFA group (p = 0.07). Overall, 30-day grade 3+ AEs were more common with surgery vs. SBRT (28% vs. 9.1%, p = 0.004) (RFA not reported) although there was no difference between the 3 groups at 90 days.

There was no pathologic staging for SBRT or RFA. Among clinical stage IA patients in Z4032, 29.3% had a higher, more advanced pathologic stage at surgery. Among clinical stage IA patients with available pre-operative data, a propensity matched comparison between SBRT (n = 32) and surgery (202) was performed. The odds ratio indicated a trend towards a greater risk with surgery for 30-day grade 3+ AEs (OR = 2.37 (95% CI: 0.75–9.90, p = 0.18) and for 90-day grade 3+ AEs (OR = 1.92 (95% CI: 0.71–6.08, p = 0.25) vs. SBRT. In the sickest strata for Z4032, the median DLCO% and FEV1% was 30% and 39%, respectively with 30-day 3+ AEs of 45% (19/42). In the healthiest strata for Z4032, the median DLCO% and FEV1% was 69% and 56%, respectively, with 30-day AEs of 15% (p = 0.004).
## Pre-Treatment Characteristics

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<th>ACOSOG Z4032 (Sublobar Resection)</th>
<th>ACOSOG Z4033 (RFA)</th>
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<td>Age</td>
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<td>ECOG 1-2</td>
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<td>169 (80.1%)</td>
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<td>Clinical Stage 1A</td>
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<td>208 (98.6%)</td>
<td>51 (100%)</td>
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<td>pO2 ≤ 55 mmHg or SpO2 ≤ 88%</td>
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<td>pCO2 &gt; 45 mmHg</td>
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<td>DLCO%</td>
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<td>46.4 ± 15.6</td>
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<td>FEV1%</td>
<td>61.3 ± 33.4</td>
<td>53.8 ± 19.6</td>
<td>48.8 ± 20.3</td>
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</table>

### CONCLUSIONS:
In an unmatched comparison 30-day morbidity is higher in surgical patients undergoing sublobar resection for clinical stage 1 lung cancer vs. SBRT although this was not significant with propensity matching. A lack of surgical staging among nonoperative treatments currently fails to identify a significant proportion of more advanced pathologic disease. Inclusion of high risk patients in a randomized trial will help delineate the relative survival benefit of each modality and may help to stratify subsets of patients considered high risk.
**CF22.** Positron Emission Tomography Combined with Diagnostic Chest Computed Tomography Enhances Detection of Regional Cancer Recurrence after Stereotactic Body Radiation Therapy for Stage I Non-Small Cell Lung Cancer

**Michael I. Ebright,** Gregory A. Russo, Avneesh Gupta, Rathan Subramaniam, Hiran C. Fernando, Lisa A. Kachnic

*Boston University School of Medicine, Boston, MA*

**OBJECTIVES:** Surveillance protocols after stereotactic body radiation therapy (SBRT) for stage I non-small cell lung cancer (NSCLC) are not well defined. Prospective studies evaluating SBRT have used three-month interval post treatment imaging: alternating computed tomography (CT) and chest x-ray. Positron emission tomography (PET) has not been considered useful for assessment after SBRT. We set out to determine whether PET in combination with diagnostic chest CT (PET/d-CT) could enhance detection of salvageable regional recurrence.

**METHODS:** We performed a retrospective analysis of post treatment imaging for 18 patients consecutively treated with SBRT for biopsy-proven stage I NSCLC. All patients had PET/d-CT every three months after treatment. A blinded radiologist retrospectively interpreted the diagnostic CT scans. CT results were reported according to the RTOG 0236 response criteria, and were compared to PET/d-CT readings. Pathological confirmation of recurrence was obtained selectively. Regional recurrence-free survival (rRFS) was compared using the Mantle-Cox test.

**RESULTS:** The median follow-up for these patients was 21 months. Thirteen patients had stage IA and 5 had IB NSCLC. The overall survival rates at one and two years were 83% and 69%, respectively. CT scan alone indicated no regional recurrences. PET/d-CT indicated eight regional recurrences. The one-year rate of rRFS as evaluated by CT alone and PET/d-CT was 100% and 57%, respectively (P = 0.004). Five of the eight regional recurrences indicated by PET/d-CT were pathologically confirmed making the one-year biopsy proven rRFS, as evaluated by PET/d-CT, 70%. When compared to the one-year rate of rRFS as indicated by CT, this difference remains statistically significant (P = 0.03). Five of the eight patients with regional cancer recurrences went on to have salvage treatment.

**CONCLUSIONS:** PET/d-CT enhances detection of regional recurrence compared to CT alone and may allow the opportunity for salvage therapy. The current RTOG standard of CT alone is inadequate, as it under-estimates disease control. PET/d-CT should be part of routine clinical follow-up after SBRT.
OBJECTIVE: Ex vivo lung perfusion (EVLP) has the potential to increase the number of patients treated with lung transplantation (LTx). EVLP performed with the novel Vivoline system and early clinical outcome in patients transplanted with reconditioned lungs were reviewed in detail.

METHODS: Between January and October 2011, six pairs of donor lungs deemed unsuitable for transplantation underwent EVLP with the Vivoline® system and Steen solution using packed red blood cells to an erythrocyte volume fraction (EVF) of 10-15%. After re-warming and reconditioning; function was evaluated (EVLP mean duration of 231 min) and lungs with acceptable function were transplanted. Early technical experience from the Vivoline system as well as clinical outcome for EVLP LTx patients (n = 6, mean age 50 ± 19, range 17–71) were evaluated.

RESULTS: Donor lungs were initially rejected due to either inferior PaO2/FiO2 (n = 4, median 28.9 KPa, range 9.1–41.8 kPa) or infiltrate on chest x-ray (n = 2). The donor lungs improved from a mean PaO2/FiO2 of 24 ± 12 KPa in the donor to a mean PaO2/FiO2 of 57 ± 41 KPa at the end of the EVLP (median improvement 28.4 kPa, range 21–51 kPa) (n < 0.01). Hemodynamic (flow, pulmonary vascular resistance, pulmonary artery pressure etc) and respiratory (ventilation, peak airway pressure, compliance etc) parameters were within normal physiological ranges during evaluation and there were no differences between parameters at different FiO2 values (0.21, 0.5 or 1.0). Lungs that were wet and heavy to start with dried out during EVLP and came down in weight. In contrast, lungs that started EVLP without edema gained some weight during EVLP. EVF increased somewhat during EVLP from a mean of 11.8 to 12.8 (p = 0.03) and blood-glucose decreased from a mean of 12 to 9.3 mmol/l (p = 0.03). Two single lungs were deemed unsuitable due to subpleural hematoma, consolidation or edema and not used for LTx. Eventually, six recipients from the regular waiting list underwent either single (n = 2) or double (n = 4) LTx after EVLP. One patient had primary graft dysfunction grade 2 at 72 hours, however, median time to extubation was 7 hours in all patients. All patients survived 30 days and were discharged from hospital.
CONCLUSION: The use of EVLP Vivoline system seems safe and indicates that lungs otherwise refused for LTx can be recovered and subsequently used for transplantation with acceptable results. Larger series of patients as well as long-term data is required before EVLP can be determined as an important adjunct to LTx.
CF24. Intraoperative Hyperthermic Chemotherapy Perfusion for Malignant Pleural Mesothelioma: A Basic Science Evaluation
*Robert B. Cameron, Dongmei Hou, David Geffen
UCLA School of Medicine, Los Angeles, CA

OBJECTIVES: Hyperthermic chemotherapy perfusion has been used in the treatment of both pleural and peritoneal mesothelioma with sketchy basic science supportive data. Further, clinical data is also very limited with no prospective randomized data to justify use of this potentially toxic therapy. We sought to generate a basic science foundation for this clinical practice; and the optimal conditions if appropriate.

METHODS: Growth of a variety of in vitro established cell lines, including a hyperthermia-sensitive Chinese Hamster Ovarian cell line (CHO-K1), a normal lung fibroblast line (MRC-5), a lung cancer line (A549), and three human mesothelioma cell lines (NCI-H28, NCI-H2052, and MSTO-211H) was assessed using either a novel tetrazolium compound (3-(4,5-dimethylthiazol-2-yl)-5-(3-carboxymethoxyphenyl)-2-(4-sulfophenyl)-2H-tetrazolium, inner salt; MTS) and an electron coupling reagent (phenazine methosulfate; PMS) (MTS metabolic assay), which measures the absorbance at 490 nm of a formazan product reduced from MTS by living cells, or a standard dilution clonogenic assay, which enumerates colony-forming units of >50 cells. Each cell line was plated into flasks and then exposed to varying combinations of chemotherapy agents and hyperthermia (37–45°C). The cells then were harvested and assessed in either assay. Chemotherapeutic agents used include those commonly used with mesothelioma, including cisplatin, gemcitabine, and pemetrexed.

RESULTS: Initially, conditions were explored using hyperthermia alone in CHO-K1, A549, and NCI-H28 cell lines using temperatures of 37°C, 42°C, and 45°C for 20, 40, and 60 mins. This showed a reproducible dose-response curve in CHO-K1 cells with increasing temperature producing lower survival to only 1.5% of the control at 45°C for 60' (p < 0.01). The A549 cells also showed a response but only at the highest temperature and the NCI-H28 cells showed a much more modest reduction to 65% at 45°C for 60' (p < 0.01). When the two assays were directly compared, the MTS assay failed to detect differences between groups and therefore was discontinued from remainder of these experiments. Next hyperthermia was limited to the physiologic limit of 42°C, and the addition of chemotherapy was assessed. Doses were chosen based on prior pharmacokinetic data from studies showing a maximum tissue/blood level of 200 ngm/ml for cisplatin pleural instillation and were felt to more accurately reflect actual tumor levels. Cisplatin alone reduced the clonogenic potential modestly to 26%, 16.4%, and 13.6% at 42°C for 60' (p < 0.01); however, this was only a further reduction of 29.6%, 33.8%, and 34.2%, respectively, from the cisplatin alone control. Therefore, most of the reduction was attributable to chemotherapy not hyperthermia. With combinations of cisplatin/gemcitabine and cisplatin/pemetrexed the effect was

* WTSA Member
much more significant, with reduction to 9.6%, 0%, and 0% (p < 0.01) (incremental reduction of 16.5%, 0%, and 0%, respectively due to hyperthermia). Cisplatin/pemetexed produced essentially identical results. Further, effects on MRC-5 and A549 cells demonstrate no particular sensitivity of mesothelioma cells to hyperthermia (or chemotherapy).

**CONCLUSIONS:** Intrapleural chemotherapy appears to be most effective when using two drug combinations. The use of hyperthermia alone or with chemotherapy produces at best only a modest effect and does not necessarily support its current clinical use.
OBJECTIVE: Secretory phospholipase A2 IIa (sPLA2 IIa) has an emerging role in lung cancer. Inhibition of sPLA2 IIa can stimulate lung cancer cell apoptosis and decrease invasion, however, its relevance as a potential therapeutic target has yet to be determined. K-ras mutations are found in 25–40% of lung cancers and are thought to be a significant driver of oncologic virulence. There currently are no targeted therapies for this mutation despite significant study. Mutations in K-Ras are associated with increased PLA2 activity. Our objective is to investigate the role of sPLA2 IIa in the growth of K-Ras mutant lung cancer cells, and determine the level of sPLA2 IIa expression in tumor tissue. We hypothesize that sPLA2 IIa modulates primary lung cancer growth in K-Ras mutant lung cancer cells and that tumor expression of sPLA2 IIa correlates with cancer stage.

METHODS: K-Ras mutant cells (independent: A549, H460, SW1573, dependent: H358, H2009) were treated with a specific sPLA2 IIa inhibitor. Apoptosis was evaluated by flow cytometric detection of annexin V and propidium iodide. Cell viability and proliferation were measured with 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) and bromodeoxyuridine (BrdU) incorporation assays, respectively. The effect of sPLA2 IIa inhibition on phosphorylation of NF-κB and ERK 1/2 was detected by western blot. sPLA2 IIa mRNA expression in tumor tissue was evaluated by quantitative RT-PCR.

RESULTS: sPLA2 IIa inhibition significantly reduces viability and proliferation in all K-Ras mutant lung cancer cells (Figure 1A, B). This is associated with increased apoptosis (Figure 2) and decreased NF-κB phosphorylation with variable phosphorylation in ERK 1/2. In tumor tissue, there is a trend of increased sPLA2 IIa mRNA with advanced tumor stage (Figure 3).
CONCLUSIONS: sPLA2 IIa modulates cell growth in lung cancer cells with K-Ras mutations. Additionally, this growth modulation occurs in cells that are not dependent on K-Ras for survival. sPLA2 IIa expression is also detectable in tumor tissue and appears to increase with tumor stage. This suggests that sPLA2 IIa could be employed as a global target in the therapy of lung cancer.
CF26. A Prospective Randomized Clinical Trial Evaluating the Optimal Method for Chest Tube Removal  
*Robert J. Cerfolio, Ayesha S. Bryant  
*University of Alabama at Birmingham, Birmingham, AL

OBJECTIVES: The objective is to determine the optimal manner to remove a chest tube after pulmonary resection.

METHODS: This was a prospective, randomized study at one institution. Patients who underwent elective thoracotomy for pulmonary resection by one surgeon were randomized to have their chest tube removed on either full inspiration or full expiration. Outcomes included incidence of a new and/or increased pneumothorax on the post-chest tube x-ray, symptoms and/or cause for delayed discharge.

RESULTS: Between 11/09 and 6/11, 1026 patients underwent pulmonary resection. Of these, 342 met the study criteria and agreed to participate in the study. Of the 179 patients randomized to have their chest tube removed on full inspiration, 58 (32%) had a larger or new pneumothorax after chest tube removal and 6 (3%) required intervention or delayed discharge. Of the 163 patients randomized to have their chest tube removed on full expiration, 32 (19%, p = 0.02) developed a larger or new pneumothorax after chest tube removal. It was only clinically significant in 2 patients.

CONCLUSIONS: Removal of chest tubes during end expiration leads to a lower incidence of pneumothorax rather than on end inspiration. Because of these trends and for safety reasons, this study was closed early prior to finding a statistically significant difference in clinically significant pneumothoraces.

* WTSA Member
**CF27. Fontan Fenestration Closure Is Not Associated with Improved Event-Free Survival**

Bartlomiej R. Imielski¹, *Ronald K. Woods², Kathleen A. Mussatto², Pippa M. Simpson¹, Yumei Cao¹, James S. Tweddell²

¹Medical College of Wisconsin, Milwaukee, WI; ²Children’s Hospital of Wisconsin, Milwaukee, WI

**OBJECTIVES:** Fontan Fenestration reduces the peri-operative length of stay, morbidity and mortality; however there are few data to guide the decision to close a fenestration and timing of closure. The primary purpose of this study is to compare the event-free and failure-free survival between Fontan patients with intentionally closed and open fenestrations.

**METHODS:** 171 patients who underwent a fenestrated Fontan between January 1, 1994, and June 30, 2007 were analyzed in this retrospective study. 129 patients maintained a patent fenestration (Open) and 42 had intentional fenestration closure (Closed). Failure was defined as death, transplant, or Fontan takedown. Morbid events included the above and NYHA functional class > II, pacemaker, protein-losing enteropathy, stroke, thrombus, plastic bronchitis, or thoracic operation(s) post-Fontan.

**RESULTS:** The median (interquartile range) age at Fontan was 2.95 (2.31, 3.72) yrs for the entire cohort. The median age at fenestration closure was 5.77 yrs. Median duration of follow-up was 3.47 yrs. Failure occurred in 9 patients; death occurred in 5 (3.9%) Open vs. 2 (4.8%) Closed and takedown in 2 (1.6%) Open vs. 0 Closed. There were no transplants. Of these failures, 3 occurred within the first month and an additional 3 within the first year after Fontan (all Open). For those patients that had events, 47 in total (35 Open, 12 Closed), the median time to event was 0.08 yrs Open and 1.54 yrs Closed, which was less than the mean time from Fontan to fenestration closure (2.3 yrs). Of the 12 events in the Closed fenestration group (11 patients with one having two events), 2 patients had events on the same date as the fenestration closure, 3 patients had events after the date of fenestration closure (ranging from 0.09 to 4.8 yrs after), while 6 patients had events before date of fenestration closure (ranging from 0.36 to 1.3 yrs before). There were no significant differences in event-free and failure-free survival between the Open and Closed groups, nor
between events post-closure and events for Open, $p > 0.2$. Event-free survival for Open vs. Closed was 97.4% vs. 97.1% at 1 yr, 82.7% vs. 87.7% at 5 yrs and 42% vs. 37% at 10 yrs, respectively. There was a significant increase in systemic saturation by 5.6% at last follow-up for those whose fenestrations were intentionally closed, $p < .01$. A Cox proportional hazard model, including age at Fontan, Fontan type, length of hospital stay, mean pulmonary artery pressure cardio-pulmonary bypass time, gender, and fenestration group showed that only older age at Fontan had a negative effect on event free survival ($p < 0.02$).

**CONCLUSIONS:** Fenestration closure was not associated with a reduction in events or failure, although it was associated with increased systemic saturation. The timing of events suggests further consideration of a possible benefit of earlier fenestration closure.
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<th>Fontan Takedown</th>
<th>Subsequent Thoracic Operations</th>
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<td>Open (0.78%)</td>
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<td>2 (2.38%)</td>
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<td>Closed (4.76%)</td>
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</table>

Table 1: Number of Events by Fenestration Group and Time

- **Death**
  - Within one month of Fontan: Open (0.78%), Closed (3.10%)
  - Within one year of Fontan: Open (0.78%), Closed (4.76%)
  - After one year of Fontan: Open (0.78%), Closed (3.88%)
  - Fontan to the last living follow-up: Open (3.88%), Closed (5.43%)

- **NYHA III-IV**
  - Within one month of Fontan: Open (0.78%), Closed (3.10%)
  - Within one year of Fontan: Open (0.78%), Closed (4.76%)
  - After one year of Fontan: Open (0.78%), Closed (3.88%)
  - Fontan to the last living follow-up: Open (3.88%), Closed (5.43%)

- **Fontan Takedown**
  - Open: 2 (1.55%), 2 (1.55%), 1 (0.78%), 2 (1.55%)
  - Closed: 3 (2.33%), 3 (2.33%), 2 (1.55%), 2 (2.38%)

- **Subsequent Thoracic Operations**
  - Within one month of Fontan: Open 3 (7.14%), Closed 1 (2.38%)
  - Within one year of Fontan: Open 2 (1.55%), Closed 1 (2.38%)
  - After one year of Fontan: Open 5 (3.88%), Closed 2 (4.76%)
  - Fontan to the last living follow-up: Open 5 (3.88%), Closed 2 (4.76%)

- **Subsequent Thoracic Operations**
  - Stroke: Open 1 (1.55%), Closed 3 (2.33%)
  - PLE: Open 2 (1.55%), Closed 3 (2.33%)
  - Thrombus: Open 1 (0.78%), Closed 5 (3.88%)
  - Pacemaker: Open 1 (0.78%), Closed 4 (9.52%)

- **Number of Events by Fenestration Group and Time**

  - **Open**
    - 1 (0.78%)
    - 3 (1.55%)
  - **Closed**
    - 3 (2.33%)
    - 2 (1.55%)

  - **Number of Events by Time**
    - Within one month of Fontan: 1 (0.78%), 3 (2.33%)
    - Within one year of Fontan: 1 (0.78%), 2 (1.55%)
    - After one year of Fontan: 1 (0.78%), 2 (1.55%)
    - Fontan to the last living follow-up: 1 (0.78%), 2 (1.55%)

  - **Number of Events by Type**
    - Death: Open 3 (7.14%), Closed 1 (2.38%)
    - NYHA III-IV: Open 2 (1.55%), Closed 1 (2.38%)
    - Fontan Takedown: Open 2 (1.55%), Closed 3 (2.33%)
    - Subsequent Thoracic Operations: Stroke 1 (1.55%), PLE 2 (1.55%), Thrombus 1 (1.55%), Pacemaker 1 (0.78%)
OBJECTIVES: Unbalanced AV canal defects (UAVCs) include hypoplastic ventricles (HVs) and AV valves (HAVV), precluding initial complete two ventricle repairs (2VRs). The lesions, principally the AVV abnormalities, also adversely affect single ventricle repairs (SVRs). For 2VRs, however, catch-up growth was required and produced by increasing HAVV flow with a snared ASD. Staging the procedures allowed intracardiac shunting during HV/HAVV growth which maintained patient stability. After growth, septal defects were closed. Our objectives: (1) Determine if reliable HV and HAVV catch-up growth occurred. (2) Assess the AVV repairs. (3) Provide 5–15 year follow-up on the 2VRs.

METHODS: From 1990–2005, 24 consecutive infants (14F, 10 M) diagnosed by echocardiography with complete UAVCs (N = 21) or subsets (N = 3) were placed on a 2VR track. HV volumes (19L, 5R) and valve areas were calculated from biplane echos, indexed and z values determined (standard error of the mean from expected). Ventricular and AVV hypoplasia were defined by z values ≤−3.0; (although the common AVVs made the hypoplastic component difficult to accurately determine).

Three operative approaches were used: (1) Staged repair (N = 10). First, complete AVV repair and partial ASD/VSD closure increased HAVV flow into the HV. Later, septal closures were completed. In three, a large TV and only a vestigial MV (5–6 mm diameter) was present instead of a common AVV. The TV was partitioned to create a second MV, providing adequate cardiac output. (2) Repair with AVV partition (N = 9). Partitioning the common AVV far into the large AVV component increased HAVV area. (3) Repair leaving a snared ASD or VSD (N = 5). Shorter term intracardiac shunting allowed time for growth.

For staged repairs (all had pulmonary artery bands), the first operation was at 15–408 days (average 159) and the second 5–145 days later (average 89).

Follow-up (5–15 years) evaluations were done locally. Accurate ventricular volumes required biplane echos. If single echo views were provided, the ventricles or valves were judged to be within normal limits (wnl) or not. Two patients, previously “doing well” were lost to follow-up.

RESULTS: Initial and follow-up HV and HAVV sizes are shown (Table 1). For staged repairs (all had pulmonary artery bands), the first operation was at 15–408 days (average 159) and the second 5–145 days (average 89) later.
Table 1: Growth of Hypoplastic Ventricles and AV Valves in Complete UAVC Defects at Mid-Term

<table>
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<th>Initial sizes</th>
<th>Average</th>
<th>Range</th>
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<tr>
<td>Hypoplastic ventricles</td>
<td>Indexed volumes</td>
<td>5.9 ± 4.6 cc</td>
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<tr>
<td></td>
<td>z values</td>
<td>-4.6 ± 1.4</td>
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<tr>
<td>Hypoplastic AV valves</td>
<td>Diameters</td>
<td>10.7 ± 4.8 mm</td>
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<td>z values</td>
<td>-2.5 ± 2.7</td>
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<tr>
<td>Follow-up Sizes</td>
<td>Average</td>
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<tr>
<td>Hypoplastic ventricles</td>
<td>Indexed volumes</td>
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<td>Hypoplastic AV valves</td>
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A fatal CNS bleed just prior to ECMO weaning (1) and later potassium overdose deaths (2) gave an 88% mid-term survival. Reoperations for AVV regurgitation (3) AVV stenosis (1) and MV replacement (1) had satisfactory outcomes.

Catch-up growth occurred in all hypoplastic structures. The greatest increase: an LV volume that grew from 1.3 to 77ccs with a mitral area from 0.27 to 1.9 cm². All survivors have satisfactory 2VRs and, by report, 15/19 are on no cardiac medications.

CONCLUSIONS:
1) Reliable HV/HAVV catch-up growth occurred.
2) Planned intracardiac shunts maintained stability during growth.
3) AVV reoperations were common but satisfactory.
4) 2VRs were satisfactory at mid-term in all.
OBJECTIVES: Peripheral pulmonary artery stenosis (PPAS) is a rare congenital heart defect that is frequently found in association with Williams and Alagille syndromes. There is some controversy regarding the optimal treatment of PPAS, with most centers favoring catheter-based interventions. In contradistinction, we have preferentially utilized surgical reconstruction of PPAS. The purpose of this study was to review the results of this surgical experience with PPAS.

METHODS: This was a retrospective review of patients who underwent surgical reconstruction of PPAS between 2002 and 2011. There were 15 patients identified: 7 had Williams syndrome, 6 had Alagille syndrome, and 2 had no identifiable syndrome. Detailed pulmonary angiography was performed in all patients to define stenoses at the main branch, lobar, and segmental arterial levels. The mean pre-operative right ventricle to left ventricle (RV/LV) pressure ratio was 0.88 ± 0.05 (range 0.72 to 1.00).

The surgical approach was via a median sternotomy with cardiopulmonary bypass support (median of 209 minutes). All peripheral stenoses were augmented surgically with multiple segmental patches using pulmonary artery homograft tissue. The main pulmonary artery and central branch pulmonary arteries were enlarged to achieve a normal size for the patients’ body surface area. The median age at surgery was 14 months, and concomitant procedures were performed in 8 of the 15 patients. Six Williams syndrome patients had concomitant repair of supravalvar aortic stenosis, and for these 6 patients, the RV/LV pressure ratio was corrected to account for the LV to aortic gradient. Aortic cross-clamp was performed only for these concomitant procedures. Statistical analysis was performed with a paired t-test.

RESULTS: There was one operative mortality in this cohort of 15 patients. A comparison of the pre-operative to post-operative RV/LV pressure ratios is shown in the following graph.
There was a 55% reduction in the RV/LV ratio post-operatively, and this decrease was sustained over time. The patients have been followed for a median duration of 5 years, and there has been no late mortality. None of the 14 survivors have required re-operations; a single patient underwent balloon dilation of a residual pulmonary arterial stenosis in the catheterization lab.

CONCLUSIONS: The data demonstrate that this comprehensive surgical approach to the treatment of PPAS was associated with a low early mortality and no late mortality. The surgical reconstruction of PPAS results in a significant decrease in right ventricular pressure that is sustained over time. We would hypothesize that the physiological results of reducing right ventricular pressure will confer a long-term survival advantage in this cohort of patients.
CF30. **Differential Responses of the Right Ventricle to Abnormal Loading Conditions In Vivo: Possible Pathophysiologic Mechanisms**

*Anthony Azakie*, Jeffrey Fineman, Youping He

*UCSF, San Francisco, CA*

**OBJECTIVES:** In vivo models of pathologic cardiac hypertrophy generated by insertion of aorto-pulmonary shunts in fetal lambs have shown that cardiac transcriptional factors are modulated in a predictable fashion. Transcriptional activators of the hypertrophic program are upregulated while expression of repressors is inhibited. The right ventricle (RV) demonstrates differential adaptations in response to pressure versus volume loading, a phenomenon which may be important in the management of children and adults with congenital heart disease (CHD), an emerging population. The purpose of this study is to elucidate possible mechanisms of the RV response to pressure versus volume loading in vivo.

**METHODS:** Fetal lambs had aorto-pulmonary shunting or PA banding. Two to 4 weeks after spontaneous delivery ovine hearts were evaluated for hemodynamic changes and changes in expression of sarcomeric gene proteins (myosin heavy chain, troponin T); tissue specific transcriptional activators (Transcriptional enhancer factor-1, myocyte enhancer factor-2, NKX2.5, GATA-4 and Sp1); and the transcriptional repressor Sp3. Western blot densitometry and chromatin immunoprecipitation were applied using standard techniques. Transactivation assays were performed using transient transfections in ovine cardiomyocytes in culture using luciferase reporter genes.

**RESULTS:** Following PA banding, the RV pressure increased from 42 mmHg ± 4 mmHg to 96 mmHg ± 8 mmHg. The RVs of shunted and banded animals showed significant increases in the expression levels and promoter binding of activators MEF-2, GATA-4, NKX2.5, TEF-1, and Sp1. The transcriptional repressor Sp3 was downregulated in shunted animals, but its expression was paradoxically increased in the RV of the PA band group. Immunoprecipitation of Sp3 showed post-translational modification to the acetylated isoform. In transient transfections of ovine cardiomyocytes, acetylation of Sp3 converted it from a transcriptional repressor to an activator.

**CONCLUSIONS:** Pressure and volume load of the RV results in different molecular adaptations during pathologic hypertrophy. Post-translational modifications of the transcriptional repressor Sp3, by acetylation, may be an important mechanism in the differential response of the RV to different, abnormal loading conditions. Sp3 may serve as a biomarker for RV failure for various defects in adults with CHD. These findings may have therapeutic implications in the management of right heart failure.

* WTSA Member
CF31. Late Functional Outcome of Atrioventricular Valve and Right Ventricular Outflow Tract in Patients with Tetralogy of Fallot with Atrioventricular Septal Defect: A 20-year Single Center Experience
Yasuhiro Kotani, Devin Chetan, Luc Mertens, John Coles, Christopher Caldarone, Glen Van Arsdell, Osami Honjo
The Hospital for Sick Children, Toronto, ON, Canada

OBJECTIVES: We sought to elucidate late functional outcome of atrioventricular (AV) valve and right ventricular outflow tract following repair of tetralogy of Fallot (TOF) with AV septal defect (AVSD).

METHODS: The retrospective study included 41 patients (TOF/AVSD, n = 38, double outlet right ventricle/AVSD, n = 3) who underwent repair from 1990 to 2010. Mean age and body weight were 36.3 ± 40.7 (range, 2.8–186) months and 12.2 ± 8.1 (range, 4.6–37.5) kg, respectively. Thirty-two (78%) were Trisomy 21. Twenty previous operations (Blalock-Taussig shunt in 10, surgical pulmonary valvotomy in 2, balloon pulmonary valvotomy in 1) were done in 13 (32%) patients. Preoperative echocardiography showed significant (>mild+) AV valve regurgitation in 3 patients. Mean pulmonary valve size was 8.2 ± 2.5 mm (18.7 ± 7.8 mm/m²). AVSD was repaired with standard two-patch technique in all but one patient.

RESULTS: Right ventricular outflow tract (RVOT) reconstruction was achieved by native pulmonary valve preserved in 23 (56%), transannular patch in 11 (27%), pulmonary valve implantation in 3 (7%), and right ventricle to pulmonary artery conduit in 4 (10%). There were 3 early deaths and no late death. There was no mortality since 1998. The overall survival was 92.1% at 15 years. During mean follow-up period of 87 (range, 0.1–225) months, 29 re-interventions were performed in 12 (32%) hospital survivors (Figure 1). Freedom from all re-intervention at 5, 10, and 15-year was 73.7, 69.3, and 52.8 %, respectively. Eighteen (62%) out of 29 procedures were related RVOT. There were 2 re-operations for AV valve regurgitation. Freedom from RVOT-related re-intervention was significantly lower in patients with no native pulmonary valve preserved (70% vs. 95% at 10 years, p = 0.046, Figure 2). No predictor for re-intervention was identified. There was 1 re-intervention for subaortic stenosis. All but 1 patient had mild or less left AV valve regurgitation, and all patients had mild or less right AV valve regurgitation at the latest follow-up. The latest mean estimated RVOT gradient and RV systolic pressure were 27 ± 17 mmHg, and 39 ± 11 mmHg, respectively.
CONCLUSIONS: Late survival and AV valve function after repair of AVSD with TOF are excellent. RVOT-related re-intervention is rare if the native pulmonary valve is preserved at repair. In the current era, surgically modified history of TOF/AVSD is not significantly different from that of simple TOF.
OBJECTIVES: To document neurodevelopmental (ND) outcomes associated with deep hypothermic circulatory arrest (DHCA) with or without intermittent perfusion (IP) and to explore whether IP prolongs the safe duration of DHCA.

METHODS: Cross-sectional ND evaluation at 2 years of age was performed for patients who had congenital heart surgery in infancy. The third edition of Bayley Scales of Infant and Toddler Development was used to assess cognitive, language, and motor functioning. Clinical and perioperative data were extracted from the medical record.

RESULTS: Thirty-three patients without chromosomal abnormality who underwent cardiac surgery with DHCA were stratified into two groups based on the use of IP: Fourteen patients had 40–74 minutes of DHCA with IP, 19 patients had ≤46 minutes of uninterrupted DHCA. Five additional patients who had cardiac surgery without DHCA were included as a comparison. Mean cognitive, language, and motor scores for each group fell within one standard deviation of the normative mean (10 ± 3). Despite a longer duration of DHCA in the IP group as compared to the Uninterrupted DHCA group, ND outcomes were comparable (Table 1). Both groups had lower gross motor scores than patients who were not subjected to DHCA (F (2,28) = 3.3, P = .05). However, after adjusting for presence of a significant comorbidity and length of hospital stay, group differences in gross motor outcomes were not statistically significant. For patients who received DHCA with or without IP, duration of DHCA (ranging from 5–74 minutes) was not associated with ND outcomes. Final multivariable models consisted of length of hospital stay for the cognitive domain ($\beta = -.56$, $P < .01$, 29% of variance), birth weight for the expressive communication domain ($\beta = .38$, $P < .05$, 11% of variance), length of CICU stay for the fine motor domain ($\beta = -.40$, $P = .04$, 12% of variance), and presence of a significant comorbidity for the gross motor domain ($\beta = -.51$, $P < .01$, 24% of variance).
### Neurodevelopmental Outcomes (Mean and Interquartile Range)

<table>
<thead>
<tr>
<th>Neurodevelopmental Domains</th>
<th>DHCA with IP (N = 14)</th>
<th>Uninterrupted DHCA (N = 19)</th>
<th>NO DHCA (N = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>8.6 ± 2.9 (7.5–10)</td>
<td>8.6 ± 3.7 (7.8–10.3)</td>
<td>10 ± 2.4 (7.5–12)</td>
</tr>
<tr>
<td>Receptive Communication</td>
<td>9.1 ± 3.8 (6.8–12)</td>
<td>8.9 ± 4.4 (6–11.8)</td>
<td>11.3 ± 1 (10.3–12)</td>
</tr>
<tr>
<td>Expressive Communication</td>
<td>9.6 ± 4.5 (7–12)</td>
<td>8.8 ± 4.2 (6–10.3)</td>
<td>11.5 ± 2.5 (9–13.5)</td>
</tr>
<tr>
<td>Fine Motor</td>
<td>10.9 ± 1.1 (10–12)</td>
<td>8.9 ± 3.5 (8–10)</td>
<td>11.3 ± 1.5 (10–12.8)</td>
</tr>
<tr>
<td>Gross Motor</td>
<td>8.0 ± 0.8 (8–8.3)</td>
<td>8.2 ± 2.0 (7.5–9.5)</td>
<td>10.3 ± 0.5 (10–10.8)</td>
</tr>
</tbody>
</table>

### Clinical Data (Mean and Interquartile Range/Frequency and Percentage)

<table>
<thead>
<tr>
<th>Clinical Characteristics</th>
<th>DHCA with IP (N = 14)</th>
<th>Uninterrupted DHCA (N = 19)</th>
<th>No DHCA (N = 5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at Surgery (Months)</td>
<td>3.0 ± 3.7 (0.2–5.0)</td>
<td>1.8 ± 2.0 (0.3–2)</td>
<td>2.8 ± 2.0 (1.3–4.8)</td>
</tr>
<tr>
<td>Weight at Surgery (Kg)</td>
<td>4.7 ± 2.1 (3.1–6.4)</td>
<td>3.9 ± 1.2 (3.4–4.9)</td>
<td>4.6 ± 0.8 (3.8–5.3)</td>
</tr>
<tr>
<td>Duration of CPB (Mins)</td>
<td>132.1 ± 43.1 (102.5–156)</td>
<td>88.6 ± 34.1 (73–95)</td>
<td>61.2 ± 30.1 (34.0–91.5)</td>
</tr>
<tr>
<td>Duration of DHCA (Mins)</td>
<td>54.9 ± 12.0 (44.5–65.5)</td>
<td>32.9 ± 13.1 (31–41)</td>
<td>N/A</td>
</tr>
<tr>
<td>CICU Stay (Days)</td>
<td>11.6 ± 10.0 (3.5–18)</td>
<td>14.3 ± 35.7 (1–9)</td>
<td>3.2 ± 2.2 (2–5)</td>
</tr>
<tr>
<td>Length of Stay (Days)</td>
<td>33.5 ± 50.6 (12.8–24.5)</td>
<td>25.2 ± 41.0 (9–26)</td>
<td>8.0 ± 2.1 (6–10)</td>
</tr>
<tr>
<td>Premature Birth</td>
<td>2 (14.3%)</td>
<td>2 (10.5%)</td>
<td>0</td>
</tr>
<tr>
<td>Significant Comorbidity</td>
<td>5 (35.7%)</td>
<td>6 (31.6%)</td>
<td>0</td>
</tr>
<tr>
<td>Multiple Procedures (Lifetime)</td>
<td>8 (57.1%)</td>
<td>7 (36.8%)</td>
<td>0</td>
</tr>
</tbody>
</table>
CONCLUSIONS: The use of IP may prolong the safe duration of DHCA. Patients who underwent 40 or more minutes of DHCA with IP achieved similar ND outcomes to patients who had shorter periods of uninterrupted DHCA, and duration of DHCA was not associated with ND outcomes. Although gross motor scores were lower among patients subjected to DHCA as compared to those who were not, this appears to be influenced by patient characteristics, such as severity of illness. Studies comparing IP to other perfusion strategies during prolonged operations, such as regional cerebral perfusion, should be considered.
CF33. **Fate of Right Ventricular and Valve Performance Following Early Bidirectional Glenn After Norwood Operation: Impact of Shunt Strategy Controlled for Hypoplastic Left Heart Syndrome Anatomical Subtype**  
**Anastasios C. Polimenakos**, Chawki F. El Zein, Michel N. Ilbawi  
*Rush University Medical Center, Advocate Hope Children’s Hospital, Chicago, IL*

**OBJECTIVE:** Norwood operation (NO) with right ventricle (RV)-to-pulmonary (PA) shunt (NO-RVPA) is, reportedly, associated with hemodynamic and survival advantage. Shunt strategy has been implicated in ventricular and valvar function. Outcomes after NO-RVPA compared to classic, as part of a strategy involving early bidirectional Glenn (BDG), were analyzed with reference to RV, tricuspid and neo-aortic valve performance.

**METHODS:** Between January 2005 and December 2010 128 neonates with hypoplastic left heart syndrome (HLHS) underwent NO. When controlled for the subtype of aortic/mitral stenosis (AS/MS) 28 had NO-RVPA and 26 classic. Patients with non-HLHS single ventricle anatomy or hybrid approach for HLHS were excluded. Mean age and weight at NO were 8.5 ± 3.3 days and 3.2 ± 0.5 kg(NO-RVPA), and 8.7 ± 3.4 days and 3.3 ± 0.6 Kg (classic), respectively. Echocardiography evaluation (TTE) after NO (TTE-1), at mid-interval between NO and BDG (TTE-2), at pre-BDG (TTE-3), after BDG (TTE-4) and pre-Fontan (TTE-5) was undertaken. Cardiac catheterization was used to assess end-diastolic pressure (RVEDP).

**RESULTS:** Operative, interstage and pre-Fontan survival for AS/MS after NO was 88.1% (90.3% NO-RVPA vs 84.7% classic, p 0.08), 82.5% (82.7% NO-RVPA vs 81.8% classic, p 0.9) and 80.7% (79.6% for NO-RVPA vs 81.8% for classic, p 0.9), respectively. Mean age and weight at BDG were 15.5 ± 5.3 weeks and 5.9 ± 2.6 kg, respectively. At a mean follow-up of 26.7 ± 9.3 months there were one late death (NO-RVPA) and heart transplantation (classic) after BDG. RV (1) global function, (2) mid-,basal and longitudinal indexed dimensions, (3) fractionated area change (FAC) before (TTE-1, TTE-2, TTE-3) and after BDG (TTE-4,TTE-5) and (4) RVEDP (pre-BDG and pre-Fontan) were not statistically different between the groups (p > 0.05). No statistically significant difference was found for tricuspid or neo-aortic valvuloplasty between the groups (p > 0.05).

**CONCLUSION:** Controlled for HLHS subtype of AS/MS shunt strategy provides no mid-term survival or hemodynamic (ventricular or valve) advantage despite an early protective effect on RV performance by NO-RVPA. RV unloading with early BDG might help preserving ventricular performance.
OBJECTIVE: National pediatric ECMO cost and resource utilization are not well characterized. Hospital environments (HE) and their influence on ECMO outcomes are also unknown. The wisdom of extending regionalization initiatives in the provision of ECMO support requires evidence that such mandates would improve outcomes while reducing cost. We sought to define the prevalence of different HE’s where pediatric ECMO occurs, and the contemporary cost of pediatric ECMO.

METHODS: The 2009 Healthcare Cost and Utilization Project (H-CUP) Kids’ Inpatient Database (KID) was searched for all discharges where ECMO support was provided. AHRQ HCUP cost-to-charge ratio fi les estimated hospital-specifi c costs from total hospital charges. Hospitals were segregated into terciles (high volume >30 cases; medium volume 15–30 cases; low volume <15 cases) based on total annual ECMO volume, and then were classified as small, medium, or large depending on total bed size as delineated in the KID. Four HE’s were then created which combined hospital bed size and annual ECMO volume, including: small, low-volume; small, high volume; large, low volume; large, high volume. ECMO cases were classifi ed as cardiac or non-cardiac based upon indication. Cardiac cases were mapped to Risk Adjustment for Congenital Heart Surgery (RACHS) categories. Weighted linear and logistic regression determined multivariable factors associated with prolonged hospital length of stay (LOS), increased hospital cost, and increased prevalence of in-hospital death.

RESULTS: We identifi ed 1670 (national estimate 2541 ± 220) pediatric ECMO cases from 7.3 million national pediatric discharges in 4,121 hospitals. Median age was less than 1 year (range birth–20 yrs). Nearly all ECMO cases occurred at urban teaching hospitals (2221 ± 207; 99%), with only 1% occurring at either urban nonteaching or rural hospitals. Based on the four HE’s: ECMO cases occurred at 94 ± 35 (4%) small, low-volume centers, 696±80 (27%) large, low-volume centers, and 170 ± 120 (7%) large, high volume centers. No small, high-volume centers were identifi ed. Median hospital LOS was 31 days (range 0–332 days). Mean estimated hospital cost was (229,340 ± 148,403 USD). Estimated hospital costs were signifi cantly higher in small, low-volume ECMO centers (298,545 ± 140,690 USD) compared to others (227,475 ± 148,214 USD), P = 0.007. Hospital LOS tended to be longer at small, low-volume hospitals as well (47.5 days) compared to others (44.7 days), though statistical significance was not reached. In-hospital death was higher at small, low-volume
hospitals (51%) compared to others (44%). Multivariable analysis demonstrated that high volume ECMO centers (Odds ratio 0.26 [95% C.I. 0.07–0.93] P-value 0.03) and lower RACHS categories (Odds ratio 0.65 [95% C.I. 0.44–0.96] P = 0.04) reduced the risk of in-hospital death.

CONCLUSIONS: Pediatric ECMO currently is performed in a range of HE’s, including small, low volume centers. The contemporary national cost of pediatric ECMO is substantial. Regionalization of care, in which the majority of pediatric ECMO support for complex cardiac surgery patients is concentrated in large, high volume centers, should reduce resource utilization and improve in-hospital survival.
OBJECTIVES: Branch pulmonary artery stenosis is a potential complication following stage I palliation of hypoplastic left heart syndrome (HLHS) and may result in need for interval intervention on the pulmonary arteries (PA). We compared children with HLHS undergoing staged palliation with a Sano versus modified Blalock-Taussig shunt (mBTS) for need of PA intervention. We also evaluated whether the position of the Sano shunt predicted PA interventions.

METHODS: Retrospective chart review of all patients who underwent stage I palliation and subsequent staged palliation procedures from 1/1/2002–9/1/2011. Patient cohort were divided based on shunt type during stage I palliation: Sano shunt (n = 67) and mBTS (n = 33). The Sano shunt cohort was further stratified into two groups based on shunt position in relationship to the aorta (Right 17 vs. Left 50). Catheterization and echocardiographic data were reviewed and Nakata and McGoon indices were calculated. Outcomes included mortality, need for transplantation and need for operative or catheter based PA intervention.

RESULTS: Operative mortality following stage I procedure was 20% (mBTS: n = 7, 21%, Sano: n = 13, 19%). Interim mortality between stage I and bidirectional Glenn (BDG) procedure was 5/80 (6%; 4 Sano and 1 mBTS). Operative mortality by Sano shunt position was left (12, 24%) and right (1, 5.9%). Two patients required transplant before BDG. Operative mortality after bidirectional cavopulmonary anastomosis (BDG) was 2/63 (3%) (mBTS: 1/21, Sano: 1/42). There was no operative mortality after Fontan. Three patients underwent heart transplant following Fontan (mBTS: n = 1, Sano: n = 2). There was no significant difference in mortality between the mBTS and Sano shunt overall or after each stage. Prior to the BDG procedure, there was a trend toward an increased number of patients requiring PA interventions in the Sano group compared to the mBTS (p = 0.08). Overall, and after BDG, significantly more patients in the Sano group required PA intervention (p = 0.005 and p = 0.04). There was a trend toward a significant difference in PA interventions in patients that had the Sano shunt placed to the right vs. left of the aorta after the Stage I procedure.
In patients for whom a Nakata and McGoon index could be calculated, there was no significant difference between mBTS and Sano shunt, where the Nakata was 161.08 (91.76–882.66) and 267.8 (75.09–793.84) and the McGoon was 1.37 (0.71–3.14) and 1.52 (0.68–3.09) for the mBTS and Sano shunt respectively.

**CONCLUSIONS:** Consistent with a previous multicenter randomized trial, patients who receive a Sano versus mBTS have a greater chance of requiring PA interventions. In patients with Sano placement to the right, mortality was lower and there is a trend of increased need for PA intervention. Further refinement of surgical technique should lead to improved outcomes in staged palliation for HLHS.
OBJECTIVES: We reviewed our experience with surgical treatment of coronary artery fistulae (CAF).

METHODS: Between June 1983 and December 2009, 46 pt (median age: 59 yr, range: 1–84 yr) underwent surgical repair of congenital CAF. Presenting symptoms included angina in 16 pt (35%), congestive heart failure in 11 (24%), and bacterial endocarditis in 5 (11%). Preoperatively, 9 pt (20%) had at least moderate tricuspid valve (TV) regurgitation. Coronary artery (CA) dominance was right in 38 pt (83%) and significant CA stenosis was identified in 9 (20%). Associated CA aneurysm was found in 8 pt (17%). The most common pattern was isolated right CA to coronary sinus fistula (18 pt, 39%); 11 (23%) had more than one fistula. One pt (2%) had prior coil embolization.

RESULTS: Repair was performed using cardiopulmonary bypass in 39 pt (85%), with extracardiac repair and intracardiac repair performed in 30 pt (65%) and 16 pt (35%) respectively. The most common associated procedures were CA bypass in 13 pt (28%), patent foramen ovale closure in 7 (15%), and TV repair in 4 (9%). Early mortality occurred in one patient (2%). Postoperative myocardial infarction (MI) occurred in five pt (11%) in the territory served by the fistula; 4 of these patients underwent simple ligation or division of their fistulae with no CA bypass grafting. Mean follow-up was 6 ± 5.8 yr, maximum 22 yr. Late mortality occurred in 11 pt (24%); and was definitely due to MI in one pt. Nine pt (19%) had at least moderate residual TR, and one pt underwent reoperation for severe TR. Survival was significantly reduced compare with age- and gender-matched population (p = 0.03). Recurrent fistulae were identified in two pt (4%) while residual fistulae were detected in three (6%). No pt required re-intervention for residual CAF.

CONCLUSIONS: Perioperative myocardial infarction is an important complication of ligation of congenital CA fistula and may contribute to reduced late survival of these pt. The tricuspid valve should be evaluated carefully at the time of fistula repair because of the relatively high rate of residual regurgitation in survivors.
OBJECTIVE: Previous studies have shown that individual risk factors are poor predictors of mortality after heart transplantation in patients with congenital heart disease. We developed composite risk factor groups to better predict mortality after cardiac transplantation.

METHODS: We conducted a cross-sectional retrospective analysis of all heart transplants performed for congenital heart disease at a single congenital heart transplant center between 1996 and 2011. Patient, procedural, and hospital course data was obtained through a review of medical records. Univariate analyses were performed using Fisher’s exact test for categorical data and the Mann-Whitney U test for continuous variables. Overall mortality was examined with Kaplan-Meier estimates for univariate analysis and Cox regression analysis for multivariate analysis. A comparison of patients with functional single ventricles (SV) vs. biventricular hearts (BV) was performed. Mean follow up duration for the whole group was 51 ± 43 months (median 43 months).

RESULTS: 46 patients underwent heart transplantation during the study period. Mean age at transplant was 9.0 ± 9.1 years. 45% (n = 21) were in the single ventricle (SV) and 55% (n = 25) were in the biventricular group (BV). The SV group had significantly more previous sternotomies (p = 0.003) and longer bypass times (266 ± 78 vs. 207 ± 64 minutes, p = 0.001). High PRA levels (>10%) were also more common in the SV group (83% vs. 13%, p = 0.08). Overall hospital mortality was 4.3% (n = 2, both SV). There was no significant difference in operative mortality (10% SV vs. 0% BV; p = 0.2) or major morbidity (43% SV vs. 44% BV; p = 0.25) between the two groups. High-risk groups identified by univariate analysis were patients with a SV diagnosis + renal insufficiency/dialysis (p < 0.005), SV + ventricular assist device (VAD), or VAD + renal insufficiency/dialysis (p < 0.006). The composite VAD + dialysis was a predictor of overall mortality by multivariate analysis (p = 0.005). Although survival at 2 years was lower in the single ventricle cohort (81% vs. 96%, p = NS), this benefit was not apparent (both = 69%) at late followup (Figure 1).

* WTSA Member
CONCLUSIONS: Preoperative dialysis and mechanical assistance + dialysis are strong predictors of overall mortality and identify high-risk congenital heart transplant recipients. Although individual risk factors may not predict survival, a composite of factors may be more useful in identifying the high-risk recipient.
CF38. Is Additional Pulsatile Pulmonary Blood Flow Beneficial to Patients with Bidirectional Glenn?

Sunita J. Ferns, Chawki ElZein, Kanwar Multani, Imran Sajan, Sujata Subramanian, Anastasios Polimenakos, Michel N. Ilbawi

The Heart Institute for Children, Oak Lawn, IL

OBJECTIVES: Controversy continues whether additional sources of pulmonary blood flow (PBF) are beneficial when combined with Bidirectional Glenn procedure (BDG). The objective of this study is to compare the results of BDG when performed with or without pulsatile PBF in a cohort of patients with single ventricle.

METHODS: Records of 212 patients undergoing staged single ventricle palliation between 01/01/2000 and 12/31/2010 were retrospectively reviewed. Of those, 103 (33 pulsatile group A and 70 non-pulsatile group B) were matched for pre, intra-operative variables and follow up period and constitute the material for the study. Data is reported as mean and 95% confidence interval.

RESULTS: Demographics are shown in the Table. There was no difference in oxygen saturations immediately after the BDG in the two groups. The duration and output of chest tube drainage, incidence of chylothorax, and total length of stay was higher in group A. There was no significant difference in the number of diuretics or oxygen requirement upon discharge in either group. Pre Glenn measurements showed a mean McGoon ratio in group A of 1.5 (1.46–1.57) and group B of 1.59 (1.53–1.66), p = 0.11, however there was a significant difference in the ratio between groups at pre Fontan measurements: group A 1.76 (1.73–1.79) and group B 1.6 (1.54–1.66), p < 0.05. There was a trend towards higher incidence of veno-venous collaterals in group A 11/33 (33.3%) vs. 17/70 (24.3%) p = 0.28. There was no perioperative or interstage mortality in either group.

<table>
<thead>
<tr>
<th></th>
<th>Group A (n=33)</th>
<th>Group B (n=70)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean Age at Glenn, days (95% CI)</td>
<td>182 (155-209)</td>
<td>176 (153-200)</td>
<td>0.76</td>
</tr>
<tr>
<td>Mean Weight, kg (95% CI)</td>
<td>5.6 (5.2-6.1)</td>
<td>5.8 (5.5-6.1)</td>
<td>0.2</td>
</tr>
<tr>
<td>Mean Oxygen saturation, % (95% CI)</td>
<td>78 (77-79)</td>
<td>77 (77-78)</td>
<td>0.1</td>
</tr>
<tr>
<td>Mean Chest tube duration, days (95% CI)</td>
<td>4.2 (3.5-4.8)</td>
<td>2.5 (2.3-2.7)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Mean Chest tube drainage, ml (95% CI)</td>
<td>374 (302-447)</td>
<td>134 (119-150)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Chylothorax patients (%)</td>
<td>6 (18.1)</td>
<td>2 (2.9)</td>
<td>&lt;0.05</td>
</tr>
<tr>
<td>Mean ICU stay, days (95% CI)</td>
<td>5.5 (4.2-6.9)</td>
<td>4.3 (3.5-5.1)</td>
<td>0.1</td>
</tr>
<tr>
<td>Mean length of stay, days (95% CI)</td>
<td>10 (8-12.7)</td>
<td>7 (5.9-8.3)</td>
<td>&lt;0.05</td>
</tr>
</tbody>
</table>

CONCLUSIONS: Pulsatile BDG is associated with better pulmonary artery growth, which might improve long term outcomes after Fontan. However, it was associated with a higher postoperative complication rate.
CF39. Tricuspid Valve Repair Improves Right Ventricular and Tricuspid Valve Remodeling in Patients with Hypoplastic Left Heart Syndrome

Shinya Ugaki, Nee Khoo, David Ross, *Ivan Rebeyka, Ian Adatia
Stollery Children’s Hospital, University of Alberta, Edmonton, AB, Canada

OBJECTIVE: Tricuspid regurgitation (TR) is a significant risk factor for reoperation and mortality in patients with hypoplastic left heart syndrome (HLHS). The effects of tricuspid valve (TV) repair on quantitative measures of right ventricular and TV remodeling have not been well documented. Therefore, we sought to quantify right ventricular and TV remodeling pre and post TV repair in patients with HLHS.

METHODS: We retrospectively reviewed two-dimensional echocardiograms performed 1 month before and after TV repair between 2005–11. From the apical 4 chamber view we measured right ventricular end-diastolic area (RVEDA), RV fractional area change (FAC), TV leaflet coaptation length, TR vena contracta width, TV tenting area and TV end-diastolic annular diameter. The severity of TR were graded qualitatively. We compared values pre and post TV repair using a paired t test.

RESULTS: Nineteen patients underwent TV repair and 2 were excluded (1 died and 1 had inadequate echocardiograms). We analyzed the echocardiograms of 17 TV repairs (Male 12: Female 5, median age 30 months, range 1.5–53, median weight 13.0 kg, range 3.1–17.2). Concomitant procedures were performed in 14/17 and included modified Fontan operation, atrial septectomy, bidirectional Glenn, aortic arch repair. TV repair included annuloplasty (n = 15) and/or cleft closure (n = 5) and/or commissure closure (n = 4). Detailed results are displayed in the table.

<table>
<thead>
<tr>
<th></th>
<th>Pre TV Repair N = 17 Mean ± SD</th>
<th>Post TV Repair N = 17 Mean ± SD</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RVED area (cm²)</td>
<td>14.1 ± 5.2</td>
<td>11.8 ± 3.9</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>RV FAC (%)</td>
<td>44.4 ± 6.4</td>
<td>39.7 ± 8.5</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>TV end-diastolic annular diameter (mm)</td>
<td>23.6 ± 3.9</td>
<td>19.8 ± 4.2</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Coaptation length of the lateral leaflet (mm)</td>
<td>0.4 ± 2.4</td>
<td>3.1 ± 2.7</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Coaptation length of the septal leaflet (mm)</td>
<td>2.0 ± 2.7</td>
<td>3.4 ± 2.0</td>
<td>0.02</td>
</tr>
<tr>
<td>TV tenting area (mm²)</td>
<td>23.7 ± 26.0</td>
<td>10.5 ± 9.8</td>
<td>0.01</td>
</tr>
<tr>
<td>Vena contracta width (mm)</td>
<td>5.4 ± 1.3</td>
<td>2.7 ± 1.8</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>TR graded (0 to 4)</td>
<td>3.1 ± 0.6</td>
<td>1.7 ± 0.9</td>
<td>&lt;0.01</td>
</tr>
</tbody>
</table>

* WTSA Member
CONCLUSION: TV repair significantly improves the TV coaptation length of the lateral and septal leaflet, TV end-diastolic annular diameter, TV tenting area, TR vena contracta width and RVEDA in children with HLHS and moderate TR. TV repair impact favorably on quantitative markers of RV and TV remodeling. Further follow up on the decreased RV function is required to determine if this is a temporary phenomenon related to reduced RV preload or permanent RV dysfunction from late repair of the TV.

7:00 am – 11:00 am  **FAMILY HOSPITALITY, Hibiscus**
7:00 am – 8:00 am  Continental Breakfast Served
8:00 am – 10:00 am  Full Breakfast Served
10:00 am – 11:00 am  Snacks & Beverages Served

8:45 am – 9:30 am  **COFFEE BREAK, VISIT EXHIBITS, Haleakala 1**
OBJECTIVE: Cardiothoracic (CT) surgery is known to have a high post-operative short-term readmission rate. A Physician Assistant Home Care (PAHC) program was initiated to reduce readmission rate by providing ongoing care following discharge to patients discharged to their home. We evaluated the actions taken during the home care visits, the readmission rates and readmission diagnoses.

METHODS: Prospective analysis of CT department’s patient readmission rate prior to and after implementation of PAHC was conducted. Patients who underwent CABG and/or valve replacement or repair were evaluated from August 2009 to September 2011. The PAHC began September 2010. The same Physician Assistants (PAs) responsible for pre-operative, intra-operative and post-operative care, as well as pre-preoperative and post-operative office visits, conduct house calls to patients discharged to their homes on days two and five post-discharge. The only expenses to the hospital were gas mileage and PAs time away from hospital. Readmission rates before and after initiation of the PAHC program were compared, as were the reasons for readmissions.

RESULTS: 1013 cases were performed of which 701 were discharged directly to their home. 346 patients were discharged prior to PAHC and 340 patients were discharged during the PAHC period. Readmission rate for the pre-PAHC period was 58 patients (16.8%) and for the PAHC were 38 (11.2%), a 33% reduction in readmission rate. Mean monthly readmissions during pre-PAHC period was 4.6 (±1.9) and PAHC period was 2.9 (±1.7), p = 0.0232. The PAs traveled on average 25.5 miles (range 5 to 69.4) in this period and made an average of 3 house calls per day (range 1 to 7). The most common readmission diagnoses were infection (sternal wound, lower extremity cellulitis, pneumonia, phlebitis, fever and sepsis) 24 (41.4%) pre-PAHC period and 14 (36.8%) PAHC period (52% reduction); cardiac (arrhythmias, MI, CHF, pericardial effusion, syncope) 14 (24.1%) pre-PAHC period and 14 (36.8%) PAHC period (52% increase); gastrointestinal (bleeds, ileus, gastritis, cholecystitis, pain) 5 (8.6%) pre-PAHC period and 8 (21.1%) PAHC period (144% increase); pulmonary (plural...
effusion, COPD exacerbation, pneumothorax) 6 (10.3%) pre-PAHC period and 2 (5.3%) PAHC period (49% reduction); neurological (focal and non-focal deficits) 3 (5.2%) pre-PAHC period and 1 (2.6%) PAHC period (49% reduction); and vascular (DVT and PE) 2 (3.4%) pre-PAHC period and 2 (5.3%) PAHC period (53% increase).

CONCLUSION: The PAHC program significantly reduces the 30 day readmission rate which reduced the cost to our hospital and improved patient care for patients who were discharged to their home. We are currently working to implement the program to the nursing homes and rehabilitation centers implemented in Nursing Homes and Rehabilitation facilities. By making house calls we reduced readmissions for infections, pulmonary and neurological causes. Certain readmission diagnoses (cardiac, gastrointestinal, and vascular) seem to present regardless of home visits.
OBJECTIVES: Locally advanced esophageal squamous cell carcinoma (SCC) is associated with high rates of pathological complete response (pCR) after chemoradiotherapy (CRT). Although pCR is known to be an important predictor of improved survival in esophageal SCC, currently there are no parameters available to clinically differentiate these patients from patients with residual disease (RD). The purpose of this study was to identify clinical predictors of a pCR following CRT in patients with locally advanced esophageal SCC.

METHODS: A retrospective review of patients with locally advanced esophageal SCC who underwent CRT followed by surgery was performed from a prospectively maintained institutional database. Patients who achieved pCR after CRT were compared to patients with RD.

RESULTS: Between January 1996 and December 2010, 116 patients met inclusion criteria. 65 patients (56%) had a pCR. Median survival was 128.1 months in patients with pCR and 28.4 months in patients with RD (p < 0.01). When compared to patients with RD, patients with a pCR were more likely to have a well or moderately differentiated tumor, a lower post-induction PET SUVmax, a larger decrease in PET SUVmax, a less thick tumor on post-CRT CAT, and a higher likelihood of a normal appearing post-CRT endoscopy with benign biopsy of the tumor bed.
Table 1: Predictors of pCR to chemoradiotherapy in esophageal SCC

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Pathological Complete Response (pCR) n = 65, 56%</th>
<th>Residual Disease (RD) n = 51, 44%</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median Survival</td>
<td>128.1 months</td>
<td>28.4 months</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Well or moderately differentiated tumor</td>
<td>65%</td>
<td>41%</td>
<td>&lt;0.04</td>
</tr>
<tr>
<td>Post-induction PET SUVmax (mean)</td>
<td>2.9</td>
<td>5.7</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Larger decrease in PET SUVmax</td>
<td>74%</td>
<td>51%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Greatest thickness of tumor on post-CRT CT scan</td>
<td>12.8 mm</td>
<td>15.3 mm</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Normal appearing post-CRT endoscopy</td>
<td>50%</td>
<td>25%</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>Benign biopsy of the tumor bed on post-CRT endoscopy</td>
<td>94%</td>
<td>59%</td>
<td>&lt; 0.01</td>
</tr>
</tbody>
</table>

CONCLUSIONS: Following CRT, a normal endoscopy (normal appearance, benign tumor bed biopsy), a tumor smaller than 12 mm in greatest thickness by CT scan, an SUV max less than 2, and a reduction in SUV max greater than 70%, are all associated with a likelihood greater than 70% of clinically identifying esophageal SCC patients with a pCR. These clinical parameters can be used to better select patients for expectant follow-up after CRT.
OBJECTIVES: Changes in cardiothoracic surgical training including reduced work hours, increased complexity of operations, and shorter training programs such as the six year integrated programs, have diminished the resident experience. To augment surgical education, simulation is being proposed as a key component in the curriculum, particularly early in the training process. With continued demonstration of improving technical skills by simulation training, residency programs can justify their universal implementation.

To assess the impact of dedicated instruction on 4th year medical students’ proficiency in performing an end-to-side coronary anastomosis using a porcine heart model, as compared to non-simulator-trained senior general surgical residents.

METHODS: Ten 4th year medical students were trained to perform an end-to-side anastomosis of canine vein to porcine anterior descending artery using the porcine simulator. Students met weekly for 4 months and were trained using deliberate practice methodology and one-on-one instruction from the same cardiothoracic surgeon. At the end of the training period, each student was filmed performing a complete anastomosis. Eleven senior general surgery residents (post graduate year 4 & 5) were filmed performing an anastomosis after a single tutorial by the same cardiothoracic surgeon. All films were graded by three independent cardiac surgeons in a blinded fashion. The primary outcome was the mean final score (range 1 to 10) of a modified Objective Structured Assessment of Technical Skill scale. The secondary outcome was time to completion in seconds. Statistical analysis used both parametric (Student’s t-test) and nonparametric (Wilcoxon rank sum) methods.

RESULTS: The overall mean final score was 3.8, and mean time to completion was 723 seconds (12 minutes). The mean final score was 3.27 (95% CI: 2.47–4.06) for medical students and 4.21 (95% CI: 3.4–5.03) for senior residents, demonstrating no significant difference (p = 0.102). The mean time to completion was 792.67 seconds (95% CI: 623.4–961.9) for medical students and 659 seconds (95% CI: 599.1–719) for senior residents, also showing no significant difference (p = 0.118).
CONCLUSIONS: Dedicated instruction of 4th year medical students on microvascular techniques using a porcine end-to-side coronary artery anastomosis simulation model results in performance comparable to senior general surgery residents. These results suggest that focused tissue simulator training, under expert guidance, can compress the learning curve needed to acquire technical proficiency.
19. Progression of Neoaortic Annulus and Root Diameters and Aortic Regurgitation Following the Modified Ross-Konno Procedure
*Bahaaldin Alsoufi 1, Zohair Al-Halees 1, Cedric Manlhiot 2, Mamdouh Al-Ahmadi 1, Majid Al-Fayyadh 1, Brian McCrindle 2, Bahaa Fadel 1
1King Faisal Specialist Hospital & Research Center, Riyadh, Saudi Arabia; 2Hospital for Sick Children and University of Toronto, Toronto, ON, Canada

DISCUSSANT: IVAN M. REBEYKA

OBJECTIVES: In children with complex multi-level left ventricular outflow tract (LVOT) obstruction or significant annular hypoplasia, the Ross procedure, combined with a modified Konno-type aorto-ventriculoplasty (Ross-Konno) is commonly performed. Nonetheless, progressive annular and neo-aortic root dilatation with subsequent development of autograft regurgitation or root aneurysm is of great concern. Patients following Ross-Konno may be at an especially high risk due to the inherent disruption of supporting aortic annulus. This study examines progression of neoaortic annulus and root diameters and their effect on development of regurgitation following the Ross-Konno procedure.

METHODS: Forty three patients, median age 6 years, underwent modified Ross-Konno by incising the annulus into the septum plus myectomy without VSD patch insertion. Serial Echocardiograms (n = 188, median 5 per patient, range 2–11) were collected and regression models adjusted for repeated measures were used to model longitudinal growth of aortic annulus and root.

RESULTS: There were 2 operative deaths (5%) and 1 late mortality. At 8 years, survival was 93% and freedom from autograft, homograft and all-cause reoperation was 100%, 81% and 72%, respectively. Median post-procedure neoaortic annulus diameter and Z score were 14 mm (7 to 21), and 1.25 (–3 to +6.1), and median post-procedure root diameter and Z score were 21 mm (9 to 30) and 1.55 (–1.3 to +4.1). Serial Echo data showed progressive increase in neoaortic annulus (+0.56 mm/Y, p < 0.001) and root (+0.89 mm/Y, p < 0.001) diameters but little changes in annulus (–0.07/Y, p = 0.08) and root (–0.002/Y, p = 0.96) Z scores. Nine patients developed autograft regurgitation. Progression of regurgitation (jet width / aortic annulus ratio, AR) was +0.001/Y (p = 0.22). Older patients started with smaller annulus and root Z scores but had a weak trend for faster AR, annulus and root diameter increase than younger patients. Patients who required concomitant cardiac surgery had faster annulus diameter increase.
CONCLUSIONS: The Modified Ross-Konno procedure without patch allows LVOT reconstruction with good mid-term outcomes. In this subset of children with predominantly congenital LVOT obstruction, the autograft continues to grow however; stable annulus and root Z scores indicate that enlargement isn’t out of proportion to somatic growth. Only few patients developed autograft regurgitation, usually trivial and nonprogressive, and none required autograft reoperation within our follow-up interval. Our results support the modified Ross-Konno as the procedure of choice in children with complex LVOTO.
No Dissection Technique Is Safe for Re-Operative Aortic Valve Replacements with a Patent Left Internal Thoracic Artery Graft


Brigham and Women’s Hospital, Boston, MA

DISCUSSANT: RICHARD J. SHEMIN

OBJECTIVES: Management of a patent left internal mammary artery (LITA) graft during reoperation is controversial. A no dissection technique avoids dissecting and clamping the LITA graft; myocardial protection is achieved using adjunctive systemic hypothermia and hyperkalemia. We compared postoperative outcomes following isolated reoperative aortic valve replacement (AVR) in patients with previous CABG with a patent LITA graft using a no dissection technique to patients with previous CABG without a LITA graft.

METHODS: Outcomes were analysed for patients who underwent isolated reoperative AVR patients with previous CABG between 1/1/2002 to 6/30/2011. Patency of the LITA was confirmed using either coronary angiogram or CT angiogram. The patent LITA group did not undergo dissection or clamping of the LITA graft, and myocardial protection was obtained using systemic hypothermia and hyperkalemia in addition to antegrade and retrograde cardioplegia. The Patent LITA group was compared to a No LITA group. The No LITA group underwent isolated AVR with previous CABG but had no LITA graft; therefore no LITA dissection was involved. Patients with concomitant coronary and/or valve surgery, occluded, injured or dissected LITA were excluded.

RESULTS: 174 patients were identified for the Patent LITA group and 26 for the No LITA group. Perfusion time (median 158 min vs 145 min, p = 0.10) and cross clamp time (median 77 min vs 82 min, p = 0.61) were similar. There were no differences between the two groups in operative mortality (6.9% vs 7.7%, p = 1.00). When compared utilizing Society of Thoracic Surgeons risk algorithms, the observed vs expected mortality ratios were 1.0 and 1.2 respectively. Complication rates, including reoperation for bleeding (4.6% vs 3.8%, p = 1.00), percent transfused (58.6% vs 65.4%, p = 0.67), and intubation time (median 12.0 hours vs 11.1 hours, p = 0.40) were similar. We used postoperative CKMB leak as a measure of the adequacy of myocardial protection; peak CKMB values within 24hrs of surgery were not statistically different (median 27.4 µ/mL vs 29 µ/mL, p = 0.72).

+ Samson Resident Prize Essay
* WTSA Member
CONCLUSION: Re-operative AVR in patients with a previous CABG and a patent LITA graft may be treated safely without dissection or clamping of the LITA. Myocardial protection using systemic hyperkalemia and hypothermia appears equivalent to the protection achieved in patients who had no LITA graft. This method may prevent unnecessary injury of the LITA graft during dissection for reoperation.
11:10 am – 12:00 pm C. WALTON LILLEHEI
POINT/COUNTERPOINT SESSION

Haleakala 4 & 5
Open Aortic Valve Replacement Versus
Transcatheter Aortic Valve Replacement in the
Low-Risk Patient
Moderator: Robert C. Robbins
Open: Anthony P. Furnary
TAVR: William F. Fearon

12:00 pm – 12:30 pm ANNUAL BUSINESS MEETING (Members Only),
Haleakala 4 & 5

12:30 pm – 2:00 pm FAMILY LUNCHEON, Haleakala Garden

7:00 pm – 10:00 pm KIDS & TEENS BANQUET, Tsunami

7:00 pm – 11:00 pm PRESIDENT’S RECEPTION AND BANQUET
Reception: Haleakala Gardens
Banquet: Haleakala 1

NOTES
CONSTITUTION AND BYLAWS
THE WESTERN THORACIC SURGICAL ASSOCIATION
Founded as The Samson Thoracic Surgical Society

CONSTITUTION

ARTICLE I. NAME
The name of this Corporation is The Western Thoracic Surgical Association (hereinafter “the Association”).

ARTICLE II. PURPOSES
The purposes of the Association shall be:

To succeed to, and to continue to carry on, the activities formerly conducted by The Samson Thoracic Surgical Society, a corporation.

To associate persons residing in the western United States and Canada who desire to advance the quality and practice of thoracic and cardiovascular surgery as a specialty.

To encourage research and study of thoracic and cardiovascular functions and disorders so as to increase knowledge and improve treatment.

To hold scientific meetings for the presentation and discussion of topics of interest to thoracic and cardiovascular surgeons and to encourage publication to these proceedings.

ARTICLE III. MEMBERSHIP
Section 1.
The membership of this Association shall consist of surgeons whose principal professional activities are devoted to the practice of thoracic and cardiovascular surgery, and who either fulfill the qualifications specified in Section 4 below or both fulfill the qualifications specified in Section 3 below and who are admitted to membership pursuant to the procedure specified in the By-Laws.

Section 2.
There shall be four types of membership: Active, Senior, Honorary and Charter, as defined in the By-Laws.
Section 3.
A candidate for active membership must:

a. Be a Diplomat of the American Board of Thoracic Surgery of the United States, a Fellow in the Cardiovascular and Thoracic Surgery in the Royal College of Surgeons of Canada, or possess such educational credentials as judged equivalent by the Council.

b. Reside within or have completed a cardiothoracic residency training program within the geographic limits of the Association, which are the states of Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming, and the provinces of Alberta, British Columbia, Manitoba, and Saskatchewan.

c. Have been engaged in the practice of thoracic and cardiovascular surgery either outside of or within the geographic limits of the Association for at least three years following completion of postgraduate training. If a candidate has completed his/her thoracic surgical residency in an institution within the geographic limits of the Association, such completion may count towards one of the three years of practice as noted above.

d. Have demonstrated interest in advancing the practice of thoracic and cardiovascular surgery through continuing professional contributions and scientific publications.

e. Have obtained the sponsorship of members of the Association as provided in the By-Laws.

Section 4.
All members in good standing of The Samson Thoracic Surgical Society in June, 1983 shall become members of the Association.

Section 5.
Charter members. Charter membership in the Association shall be accorded to those members who were charter members in good standing of The Samson Thoracic Surgical Society in June, 1983.

Section 6.
The privilege of continuing membership shall be subject to adherence to the provisions of the Constitution and By-Laws of the Association.
ARTICLE IV. OFFICERS

Section 1.
The officers of the Association shall be a President, a Vice President, a Secretary, a Treasurer, an Editor, and an Historian.

Section 2.
The term of office of the President, Vice President, Secretary and Treasurer shall be one year. The President and Vice President shall not be eligible for re-election. The Secretary and Treasurer shall be eligible for re-election but may serve for no more than four (4) consecutive years. The term of Editor and Historian shall be defined in the By-Laws.

Section 3.
Neither the Secretary nor the Treasurer may serve concurrently as the President.

Section 4.
The Officers shall be elected at the Annual Meeting of the Association in accordance with the procedures set forth in the By-Laws.

ARTICLE V. COUNCIL

Section 1.
The governing body of the Association shall be the Council and its composition shall be as provided in the By-Laws.

ARTICLE VI. MEETINGS

Section 1.
The Association shall hold Annual Business and regular Scientific Meetings, the time and place to be determined by the Council. Only members of the Association may attend the Business Meetings.

Section 2.
Special meetings of the Council or of the members may be called as provided in the By-Laws.
ARTICLE VII. AMENDMENTS

Proposed amendments to the Constitution shall be submitted in writing to the members at least 30 days prior to a regular business meeting at which the proposed amendments shall be presented to the membership. Notice of such proposed amendments shall be mailed to each member at least thirty days prior to the next regular meeting at which the vote shall be taken. An affirmative vote of two-thirds of the members present is required to adopt an amendment to the Constitution.
ARTICLE I. APPLICATION FOR ACTIVE MEMBERSHIP

Section 1. Applicant.

a. An applicant for Active membership shall obtain a sponsor who is a member of the Association and who, attesting to the applicant’s professional competence and ethical behavior, shall obtain for him from the Chairman of the Membership Committee the application form and a list of the qualifications for Active membership.

b. An applicant for Active Membership shall (1) have a full and unrestricted license to practice medicine in his or her respective state or province, and (2) have a current appointment on the surgical staff of a hospital with no reportable action pending which could adversely affect such applicant’s staff privileges at any hospital.

c. Any applicant for Active Membership must possess ethical and moral fitness, as well as professional proficiency, as determined, in part, on the basis of reports from members consulted as references, reports from other references and other information.

Section 2. Candidate.

An applicant shall become a candidate for membership upon receipt by the Chairman of the Membership Committee of a properly executed application form and the written recommendation of three members, including his sponsor, attesting to his professional competence and ethical behavior. The names of all candidates shall be included in the notice of the regular meeting.

Section 3. Election to Membership.

Candidates recommended by the Membership Committee and approved by the Council shall be submitted to a vote at the Annual Business Meeting. Election to Active membership shall require an affirmative vote of the majority of members present.

Section 4. Notice of Election.

Every newly elected member shall be furnished by the Secretary with an official notice of election, accompanied by a copy of the Constitution and By-Laws. A Certificate of Membership signed by the President, the Secretary, and the Chairman of the Membership Committee bearing the Seal of the Association shall be presented to the newly elected members at the first session of the next regular meeting immediately following their election.
Section 5. Candidates Not Elected.
The Secretary shall notify the primary sponsor of candidates not recommended for election and separately notify the candidate.

Section 6. Re-application.
An unsuccessful candidate may reapply for membership by submitting a written request and obtaining new sponsor letters, which may be obtained from the same persons who previously submitted sponsor letters. Re-application shall not be permitted more than two times.

ARTICLE II. MEMBERS
Section 1. Active Members.

a. Duties and Rights. It shall be the duty of each Active member to attend regularly the meetings of the Association, to participate in the Scientific Programs, and to uphold the ideals and objectives of the Association. Each Active member shall be entitled to one vote and may hold any office in the Association.

b. Dues. All Active members shall pay dues. The amount of dues may be changed upon the recommendation of the Council and approval of the majority of the members present at the Annual Business Meeting. Dues shall be payable on April 16th of each year. Members may not attend a meeting unless their dues are current.

c. Number of Members. The number of Active members residing within the geographic limits of the Association shall be limited to two hundred and fifty (250).

d. Moving Outside Geographic Limits. Active members who move outside the geographic limits of the Association may maintain their status and shall not be limited in number. They shall be exempt from the Annual Meeting attendance requirement under Section 1(f) below.

e. Delinquency. The Treasurer shall submit to the Council a list of the members who have failed to pay their dues by March 31st of each year, and notice of such delinquency shall be mailed to each such member at the address recorded in the records of the Association. If the delinquency is not made good within three (3) months of the mailing of such notice, or excused for adequate cause by the Council, the membership of each delinquent member shall be subject to termination pursuant to Section 1(g) following.
f. **Nonattendance.** The membership of any member who fails to attend three (3) consecutive meetings of the Association, unless such nonattendance is excused by the Council for adequate cause, shall be subject to termination pursuant to Section 1(g) below.

g. **Termination Procedure.** Any member whose membership has become subject to termination for delinquency or nonattendance shall be given written notice of such prospective termination not less than forty (40) days before the effective date of the termination. Any member who is subject to termination may apply for reconsideration by filing a written request with the Council, addressed to the Secretary, within thirty (30) days following the mailing of notice of such termination, which request shall state the reasons why such membership should not be terminated. If such a request is received within the requisite period, termination will be delayed until after the next Council meeting. If the Council finds the reasons given in the request to be adequate, membership shall not be terminated, conditioned upon payment of any arrears, where applicable. If the Council finds the reasons given in the request not to be adequate, the termination shall become effective on the sixth day after the Council meeting.

h. **Disability.** A member who becomes disabled may petition the Council for senior membership status and the Council may grant such request for a period of time until the member can return to practice.

i. **Resignation.** A member may resign from the Association at any time by tendering a resignation in writing and paying in full any dues or obligations owing the Association at the time.

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**Section 2. Senior Members.**
Senior membership shall be obtained by written request and Council approval for members retired from active practice at age 60 or shall be automatic at age 70 provided that continuing active membership without respect to age shall be granted on written request. Senior members shall have the same duties, rights and privileges as active members except that they shall be exempt from dues and meeting attendance requirements and shall not hold office, except the office of the Historian. Their numbers shall not be limited.

**Section 3. Honorary Members.**
Honorary membership shall be granted to persons deemed suitable by reason of special contributions in the field of thoracic and cardiovascular surgery or professional accomplishments. Such persons need not be certified thoracic
surgeons. Persons deemed suitable as Honorary members may become such when proposed by two members, endorsed by the Membership Committee and the Council, and approved by a majority of the members present at the next meeting. Honorary members shall be exempt from dues and meeting attendance requirements and shall have no rights to vote or hold office except as provided below. The Editor of THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY shall be an honorary member of the Association and ex-officio member of the Council without vote.

a. **Conduct.** A member of the Association shall conduct his relationship with patients, fellow physicians, and the public at large in a manner consistent with the Principles of Medical Ethics of the Society of Thoracic Surgeons, and with the purposes of this Association.

b. **Discipline.** Upon the recommendation of the Ethics Committee, the Council may take disciplinary action against a member for conduct inconsistent with the provisions of this Section or with the purposes of the Association. Any question concerning the conduct or discipline of a member shall be directed to the Chairman of the Ethics Committee. In the event that the Ethics Committee determines that disciplinary action should be considered in a particular case, the Committee shall submit to the Council a written recommendation of the disciplinary action which the Committee proposes be taken. Such determination by the Ethics Committee shall be made only after the member has been given not less than thirty (30) days written notice of the date, time and place of the Committee’s meeting, and of the nature of the complaint regarding the conduct of the member or charges against the member which are considered by the Committee, and informing the member that he may appear in person and/or by a representative and may submit whatever information he deems proper to refute the charges under consideration.

In the event that the Ethics Committee recommends to the Council that disciplinary action be taken against a member, such member shall be given thirty (30) days written notice of the time and place of the Council meeting at which such recommendation is to be considered, and of his right to appear in person or by representative to submit whatever information he deems appropriate to refute the recommendation of the Committee. Disciplinary action may consist of censure, probation, suspension, or expulsion from membership, as deemed appropriate by a majority of the Council following hearing and consideration as
set forth above. No such disciplinary action shall become effective less than five (5) days after the scheduled date of the Council meeting at which the member had the opportunity to refute the Committee’s recommendation.

ARTICLE III. OFFICERS

Section 1. Nomination and Election.
Candidates for election as Vice President, Secretary, Treasurer and Councilor-at-Large shall be placed in nomination by the Nominating Committee. Nominations for any of these offices may also be made from the floor. An affirmative vote by the majority of the members present at an Annual Meeting shall be required for election to office. The Vice President, Secretary and Treasurer shall be elected annually, and will hold office from the termination of the meeting at which elected until the termination of the next regular meeting when their successor will be elected. The Vice President shall become the President upon completion of his term as Vice President.

Section 2. Duties of the President.
The President shall be the chief executive officer of the Association and shall have general supervision over the business of the Association, subject to the control of the Council. He shall preside at all meetings and generally shall perform all duties incident to the office of President, together with such other duties as may from time to time be delegated to him by the Council.

Section 3. Duties of the Vice President.
The Vice President shall perform the duties of the President in the absence or inability to act of the President, and such other duties as set forth in these By-Laws or as may from time to time be delegated to him by the Council.

Section 4. Duties of the Secretary.
The Secretary shall certify and maintain the records of the Association, including a copy of the Constitution and By-Laws, together with any amendment thereto, and a record of the names, classifications, and addresses of the members. The Secretary shall keep minutes of the meetings of the Association, shall file all non-financial reports required by law and shall send all notices required by law, by these By-Laws, or by direction of the Council, and shall perform such other duties as may be assigned by the Council.
Section 5. Duties of the Treasurer.
The Treasurer shall receive and have charge of all funds of the Association, subject to the direction of the Council. He shall perform the usual duties incident to the office of the Treasurer, including the collection of dues, the payment of the Association’s bills and obligations as approved by the Council, and the preparation, submission to the Council and presentation to the members of an annual financial report, including any that may be required by statute, together with such additional duties as may from time to time be assigned to him by the Council. The financial affairs and the financial statements of the Association shall be audited by an Audit Committee of members, or by an outside auditor as determined from year to year by the Council.

Section 6. Duties of the Editor.
The Editor of THE JOURNAL OF THORACIC AND CARDIOVASCULAR SURGERY shall be the Editor of the Association and shall be an ex-officio member without vote of the Program Committee and the Council. The Editor shall be appointed annually by the Council. The Editor shall serve as advisor to the Association on standards for editing and review for publication of manuscripts and proceedings of the Association.

Section 7. Duties of the Historian.
The Historian shall be the Parliamentarian and Historian of the Association and shall act as its public relations and press representative, and perform such other duties as may from time to time be delegated to him by the Council. The Historian shall be appointed annually by the Council.

Section 8. Duties of the Representative to the American College of Surgeons Board of Governors.
The representative to the Board of Governors of the American College of Surgeons shall represent the membership of the Association to the American College of Surgeons’ Board of Governors in accordance with the duties of a specialty society Governor. Such Governor shall be appointed by the American College of Surgeons from nominees submitted by the Council of the Association and shall serve on the Council as an ex-officio member without vote.

Section 9. Compensation of Officers.
No Officer of the Association shall receive any compensation for his services, but may be reimbursed for expenses when authorized by the Council.
ARTICLE IV. COUNCIL

Section 1. Composition of the Council.
The Council shall be composed of the President, Vice President, Secretary, Treasurer, Immediate Past President, (3) Councilors-at-Large, up to (2) Councilors/Founders and ex-officio, without vote, the Historian, Editor, and Representative to the Board of Governors of the American College of Surgeons.

Section 2. Councilors-at-Large.
One Councilor-at-Large may be elected at each Annual Business Meeting by majority vote and serve three years.

Section 3. Duties of the Council.
The Council shall exercise all corporate powers, excepting as otherwise provided in the By-Laws. The Council shall appoint the Historian and the Editor, and may in its discretion appoint an Assistant Secretary or Assistant Treasurer.

Section 4. Liability of Councilors.
A Councilor shall have no liability based upon any alleged failure to discharge his obligations as a Councilor, except for any self-dealing transaction prohibited by law.

Section 5. Compensation of the Council.
No Councilor shall receive any compensation for serving as a Councilor of the Association, but may be reimbursed for expenses when authorized by the Council.

Section 6. Council Meetings.

a. **Regular and Special Meetings.** The Council shall hold regular meetings just before the beginning of the Annual Meeting of members, and shall hold such additional meetings as shall be called from time to time by the President or by any two voting members of the Council.

b. **Notice.** Meetings of the Council shall be held upon four days’ notice by first class mail or 48 hours’ notice delivered personally by telephone or telegraph. Notice of regular meetings need not be given if the time and place of such meeting has been set previously by the Council. Notice of a meeting need not be given to any Councilor who signs a waiver of notice or a written consent to holding the meeting or an approval of the minutes thereof, whether before or after the meeting,
who attends the meeting without protesting, prior thereto or at its commencement, the lack of such notice to such Councilor. All such waivers, consents and approvals shall be filed with the corporate records or made a part of the minutes of the meetings.

c. **Quorum.** The presence of five (5) voting members of the Council shall constitute a quorum for a Council meeting.

d. **Telephone Conference.** Council members may participate in a meeting through the use of a conference telephone or similar communications equipment, so long as all members participating in such meeting can hear one another. Participation in a meeting pursuant to this section constitutes presence in person at such meeting.

e. **Manner of Acting.** Every act or decision done or made by a majority of the Councilors present at a meeting duly held at which a quorum is present is an act of the Council. A meeting at which a quorum is initially present may continue to transact business, notwithstanding the withdrawal of Councilors, if any action taken is approved by at least a majority of the required quorum for such meeting.

f. **Adjournment.** A majority of the Councilors present, whether or not a quorum is present, may adjourn any meeting to another time and place. If the meeting is adjourned for more than 24 hours, notice of such adjournment shall be given prior to the time of the adjourned meeting to the Councilors who were not present at the time of the adjournment.

**ARTICLE V. EXECUTIVE DIRECTOR**
The Council may appoint an Executive Director, who shall be responsible for the operational management of the affairs of the Association, under the executive direction of the Officers in their respective areas of responsibility. The Executive Director shall be bonded in an amount sufficient to safeguard the financial assets of the Association.
ARTICLE VI. COMMITTEES
Section 1. Standing Committees.
The Standing Committees of the Association shall be:

a. **Membership.** The Membership Committee shall consist of a Chairman and five members, each to serve for a term of three years provided that the terms are initially arranged such that two members retire each year. The Committee shall formulate and recommend to the Council, rules governing the qualifications and procedure with respect to elections of new members and, when appropriate, a recommendation as to the numerical limitations upon each type of membership. The Committee shall consider all applications for membership and report their recommendations to the Council for review and for presentation to the meetings of the members.

b. **Program.** The Program Committee shall consist of a Chairman and five members, each to serve for a term of three years, provided that the terms are initially arranged so that two members retire each year. The President, Secretary, and Editor shall also serve as members ex-officio without vote. It shall be the responsibility of the Program Committee to make all arrangements necessary to provide scientific sessions of high quality. The Program Committee shall submit a budget of expenses for the program, and the names of persons to be invited as guest speakers, to the Council for approval before making any final commitments regarding the expenses and guest speakers. The Program Committee shall have the additional responsibility of the initial editorial review of all manuscripts presented at the regular meeting before they are submitted to the Editor.

c. **Local Arrangements.** The Local Arrangements Committee shall consist of a Chairman and as many members as are deemed appropriate by the Council. The Committee shall serve for a term of one year. The responsibility of the Committee shall be to make the general arrangements for the Annual Meeting and to submit a report and budget for such arrangements to the Council at least thirty days before such Annual Meeting.

d. **Nominating.** The Nominating Committee shall consist of the five most recent surviving Past Presidents of the Association. The most senior Past President shall serve as Chairman. The Committee shall prepare a slate of nominees to fill any vacancies among the Officers and Council which exist or will occur at the time of the Annual Meeting. The Committee shall submit its proposed slate to the Council before presentation to the members at the Annual Meeting.
e. **Ethics.** The Ethics Committee shall consist of the three most recent surviving Past Presidents of the Association. The most recent Past President shall serve as Chairman. The Committee shall consider questions of conduct of members and make recommendations to the Council pursuant to Article II, Section 4 of these By-Laws.

**Section 2. Appointment.**
Appointment to vacant chairmanships or memberships of each Standing Committee, except the Nominating and Ethics Committees, shall be made by the Vice President for the year during which he will be President. The Vice President shall make known to the Nominating Committee and the Council for review and approval his selection of members for the Committee appointments. Vacancies on Committees occurring between regular meetings shall be filled by the President.

**Section 3. Special Committees.**
The Council from time to time may create such Special Committees and appoint the Chairman and members thereof as it deems appropriate for carrying out the purposes and activities of the Association.

**ARTICLE VII. MEETINGS OF MEMBERS**

**Section 1. Special Meetings.**
Special meetings of the members may be called by the President or by 5 percent or more of the members. Any special business meeting of the members called by the President to act on an amendment to the By-Laws shall be approved by the Council.

**Section 2. Notice of Meetings.**
Notice of each Annual or Special Meeting shall be given appropriately as determined by the President or by the Council to members of record at the close of business on the business day preceding the day on which notice is given, provided that such notice of the Annual Meeting or Special Meeting of the members shall be given to each member by the Secretary in writing at least thirty (30) and not more than ninety (90) days prior to the date thereof.

**Section 3. Quorum.**
No fewer than fifty (50) member shall constitute a quorum for the transaction of the business of the Association at any meeting. However, if fewer than one-third (1/3) of the members are present at the meeting, the only matters which may be voted upon are those matters as to which proper notice was given.
Section 4. Proposals to the Members.
Proposals concerning the operation or policies of the Association may be brought before meetings of the members upon majority vote of the Council or written request of a majority of the voting members delivered to the Secretary not less than thirty (30) days prior to such meeting. A decision reached at the meeting regarding such a proposal shall be a two-thirds (2/3) vote of the members, assuming a quorum, shall be binding on the Council and the Association.

Section 5. Proxies.
Attendance or voting at a meeting of members by proxy is prohibited and shall be invalid and of no effect.

Section 6. Reports and Papers.
All reports and papers read before the Association at the Annual Meeting shall be deposited with the Secretary at the time of their presentation.

ARTICLE VIII. GENERAL

Section 1. Operation of the Association.
The Association shall operate as set forth in its Articles of Incorporation, Constitution and By-Laws, and its funds, both income and principal, shall be used solely for the purposes therein set forth, no part of the same being available for the benefit of any member or other person, firm or society.

The Treasurer’s financial report referred to in Article III, Section 5, shall be considered the Annual Financial Report of the Association and the Council shall have no duty to cause any other financial report to be prepared. The financial report shall be distributed in writing to the members at the Annual Meeting or mailed to the members as the Council determines.

Section 3. Fiscal Year.
The fiscal year of the Association shall be from January 1 through December 31 of the next calendar year.

Section 4. Parliamentary Procedure.
The meetings of the members and Council, excepting as otherwise provided in the By-Laws shall be conducted pursuant to Sturgis Standard Code of Parliamentary Procedure, as set forth in the then current edition of said work.
Section 5. Reserve and Endowment Funds.
The Council may establish a reserve fund and from time to time direct that 
funds of the Association not required for current operations be transferred to 
such fund to provide long term financial stability to the Association and to be 
a means for accumulating funds for future projects. The reserve fund shall be 
deposited in an insured account or accounts in a savings bank and/or savings 
and loan association or invested in whole or in part in investments which legally 
may be made by trustees under the laws of the State of California. The Council 
may create a Reserve Fund Committee to make recommendations concerning the 
investment and deposit of the fund. The Council may in its discretion withdraw 
and use in the current operations of the Association the income of the fund, but 
withdrawals of principal shall be made only with the approval of the proposed 
withdrawal and use of the funds by a majority of the Council members present 
at a meeting.

The Council shall establish a Paul C. Samson Endowment Fund to perpetuate 
the educational activities of the Association and to underwrite in whole or in 
part the Paul C. Samson Resident Prize Award.

ARTICLE IX. ASSESSMENTS
If in the judgment of the Council special needs of the Association so require, it 
may propose an assessment of a specified amount to be charged to each 
member. Notice of such proposal shall be mailed to the members at least thirty 
(30) days in advance of the meeting at which the vote is to be taken, and shall 
be effective if approved by two-thirds (2/3) of the members present at such 
meeting.

ARTICLE X. GUESTS
Section 1. Guests of the Members.
Each member may invite one guest and accompanying person to meetings of 
the Association. Members shall notify the Secretary in advance of the names of 
their guests. The Council shall determine the charge to be made for guests and 
the expenses relating to the guests’ attendance shall be the responsibility of the 
member who has issued the invitation.
Section 2. Guests of the Program Committee.
The Program Committee may invite guests to participate in the scientific programs. Such guests shall be expected to bear the expenses related to their participation and attendance at meetings except as provided in Article X, Section 3.

The Council may invite guests to attend the meetings of the Association without charge when deemed appropriate and in the interest of carrying out the purposes of the Association.

Section 4. Participation of Guests.
Guests shall be expected to withdraw when the business of the Association is to be conducted, as an announcement by the President.

ARTICLE XI. INDEMNIFICATION
The Association shall indemnify any person, who is or was a Councilor, officer, employee or other agent of the Association, to the extent allowed by law, so long as such person acted in good faith, in a manner such person believed to be in the best interests of the Association and with such care, including reasonable inquiry, as an ordinary prudent person in a like position would use under similar circumstances.

ARTICLE XII. DISSOLUTION
Section 1. Voting.
The Association shall not be dissolved except by the affirmative vote of two-thirds (2/3) of the members entitled to vote.

Section 2. Conditions.
In the event of dissolution of the Association in any manner and for any cause, after the payment or adequate provision being made for payment of all of its debts, and liabilities, all of the remaining funds and assets of the Association shall be transferred to a nonprofit fund, foundation or corporation which is organized and operated exclusively for educational or scientific purposes related to the purpose of the Association, and which has established its tax exempt status under Section 501 (c) (3) of the Internal Revenue Code and Section 23701 (d) of the Revenue and Taxation Code of California, or equivalent statutes then in effect.
ARTICLE XIII. AMENDMENTS

Proposed amendments to these By-Laws shall be submitted in writing to the members at a business meeting called for that purpose immediately preceding the one at which the vote is taken. An affirmative vote of two-thirds (2/3) of the members present is required to adopt an amendment to the By-Laws.

Revised: June 1999
June 2000
June 2001
June 2007
June 2009
June 2010
GUIDELINES FOR EXPERT WITNESS TESTIMONY
The Western Thoracic Surgical Association joins with other specialty organizations in emphasizing the obligation of objectivity when its members respond to requests to serve as expert witnesses in the judicial system. The perceived need for a guideline outlining policies and standards for expert testimony was recognized by the Council following a report by the Association’s Ethics Committee of a complaint against a member. Within the legal system the definition of an “expert” is far less stringent than what the medical profession might acknowledge. In a trial the attorneys introduce the qualifications of their experts and their testimony generally embodies relevant facts, the expert’s knowledge and experience, and the expert’s best judgment. Attacks on the credibility of an expert witness are termed impeachments and tactics can be employed during cross-examination to question the expert’s qualifications. It is this issue that the Association wishes to specifically address, the qualifications of an expert. An expert witness should have current experience and ongoing knowledge about the areas of clinical medicine in which they are testifying as well as familiarity with practices during the time and place of the episode being considered as well as the circumstances surrounding the occurrence. The expert witness should be an impartial practicing physician. He or she must not become an advocate or a partisan in a legal proceeding. Truthfulness is essential and misrepresentation or exaggeration of facts or opinions in an attempt to establish an absolute right or wrong may be harmful both to the individual parties involved and to the profession as a whole. The experts’s views must not narrowly reflect applicable standards to the exclusion of the other acceptable choices. The ultimate test for accuracy and impartiality is a willingness to prepare testimony that could be presented unchanged for use by either the plaintiff or the defendant. The solicitation of physicians to serve as expert witnesses by plaintiff’s attorneys who offer large fees may result in highly biased and inaccurate testimony. The expert witness should possess excellent special knowledge but be cognizant of the limitations of his competence in his own special field, and recognize the possibility of multiple accepted avenues of therapy. The expert witness gives testimony that educates the court and the jury rather than obfuscates and distorts for personal gain.
NECROLOGY

Stanley S. Baldwin, M.D., Eugene OR
James W. Calvin, M.D., La Quinta, CA
Donald P. Elliott, M.D., Venice, CA
John Eugene, M.D., Anaheim, CA
Marshall V. Marchbanks, M.D., Santa Rosa, CA
Ivan A. May, M.D., Walnut Creek, CA
Edward A. Smeloff, M.D., Kihei, HI
Laurence P. Sterns, M.D., Edmonton, AB Canada
John A. Waldhausen, M.D., Elizabethtown, PA
PAST PRESIDENTS

David J. Dugan
1974–1977

Bertrand V. Meyer

John C. Callaghan
1984–1985

Quentin R. Stiles
1988–1989

John E. Connolly
1977–1978

Paul A. Ebert
1981–1982

Richard M. Peters
1985–1986

John R. Benfield
1989–1990

Norman E. Shumway
1978–1979

Robert W. Jamplis
1982–1983

Ivan A. May
1986–1987

Richard P. Anderson
1990–1991

Harold V. Liddle
1979–1980

Arthur N. Thomas
1983–1984

Lucius D. Hill
1987–1988

Richard G. Fosburg
1991–1992
James B.D. Mark
1992–1993

Daniel J. Ullyot
1996–1997

David R. Clarke
2000–2001

Steven W. Guyton
2004–2005

Marvin Pomerantz
1993–1994

Winfield J. Wells
1997–1998

Donald B. Doty
2001–2002

R. Scott Mitchell
2005–2006

D. Craig Miller
1994–1995

Kent W. Jones
1998–1999

Edward D. Verrier
2002–2003

Elliot T. Gelfand
2006–2007

Richard G. Sanderson
1995–1996

Bradley J. Harlan
1999–2000

Vaughn A. Starnes
2003–2004

Douglas E. Wood
2007–2008
THE SAMSON ENDOWMENT/SAMSON WTSA FUND

In 1984, on the tenth anniversary of its founding, the Samson Thoracic Surgical Society changed its name to the Western Thoracic Surgical Association in order to better describe its scope and to gain professional recognition as the major surgical specialty organization it had become. Thereafter, the Council sought a means to perpetuate the name of Paul C. Samson, the patron and inspiration of the society during its early years. Mindful of Paul’s legendary warmth and generosity to young surgeons and his lifelong dedication to both graduate and postgraduate surgical education, it was decided to link his name with the activities of the Association that pertained to these interests and in 1985 the Samson Endowment Fund was created.

The Fund is managed as an endowment and the interest accruing to the principal is used exclusively for specific educational purposes. One such purpose is the funding of the Samson Resident Prize Essay which each year brings to the scientific program the best work of residents from thoracic surgical education programs throughout North America and from abroad.

The Samson Endowment Fund has reached its goal and has now been capped. A new, unrestricted Samson WTSA Fund has been opened, the purpose of which is to help the WTSA achieve its ongoing mission of: associating persons who desire to advance the quality and practice of thoracic and cardiovascular surgery as a specialty; encouraging research and study of thoracic and cardiovascular functions and disorders so as to increase knowledge and improve treatment; and holding scientific meetings for the presentation and discussion of topics of interest to thoracic and cardiovascular surgeons and to encourage publication to these proceedings. It is suggested that each member make a contribution of $500 to the Samson Endowment and WTSA Funds. This may be viewed as a lifetime obligation to be discharged in any manner over any time period the Member chooses. Previous contributions to the now capped Samson Endowment Fund are totaled with any new donations to the Samson WTSA Fund when calculating whether a member has fulfilled his/her suggested lifetime contribution of $500. Contribution is entirely voluntary and failure to contribute is not penalized or singled out in any way. A line item for optional contribution is included on the annual dues statement only as a reminder.
DAVID J. DUGAN DISTINGUISHED SERVICE AWARD

The David J. Dugan Distinguished Service Award of the Western Thoracic Surgical Association is presented to members of the Association in recognition of distinguished achievement and outstanding contributions to the field of thoracic surgery in the areas of science or leadership over a sustained period of time. Nominations for this award are made by the Nominating Committee and are presented to the Council for consideration & approval.

1994  George E. Miller, Jr  
Pebble Beach, California

1997  Edward A. Smeloff  
Sacramento, California

1999  Jack M. Matloff  
Los Angeles, California

2002  Albert Starr  
Portland, Oregon

2004  Leonard L. Bailey  
Loma Linda, California

2005  Bruce A. Reitz  
Stanford, California

2007  W. Gerald Rainer  
Denver, Colorado

2009  Richard P. Anderson  
Seattle, Washington

2010  John A. Hawkins  
Salt Lake City, Utah
DONALD B. DOTY EDUCATIONAL AWARD

The Donald B. Doty Educational Award is a $10,000 educational grant with a twofold purpose: 1) to foster innovative educational initiatives in cardiothoracic surgery by WTSA members, and 2) to provide an opportunity for the dissemination of this information to other training centers and academic institutions.

2005 LDS Hospital
Salt Lake City

2006 James I. Fann
Stanford, CA

2007 Gordon A. Cohen
Seattle, WA

2008 John D. Mitchell
Aurora, CO

2009 Robbin G. Cohen
Los Angeles, CA

2010 Michael S. Mulligan
Seattle, WA

2011 Gordon A. Cohen
Seattle, WA
# PAST MEETING HIGHLIGHTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>President</th>
<th>Secretary</th>
<th>Local Arrangements Chairman</th>
<th>Samson Resident Prize Essay Award</th>
</tr>
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<tbody>
<tr>
<td>1975</td>
<td><strong>The Santa Barbara Biltmore Hotel, Santa Barbara, California</strong></td>
<td>David J. Dugan <em>Oakland, California</em></td>
<td>Arthur N. Thomas <em>San Francisco, California</em></td>
<td>John F. Higginson <em>Santa Barbara, California</em></td>
<td>William R. Brody <em>Bethesda, Maryland</em></td>
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<td>1976</td>
<td><strong>The Banff Springs Hotel, Banff, Alberta, Canada</strong></td>
<td>David J. Dugan <em>Oakland, California</em></td>
<td>Arthur N. Thomas <em>San Francisco, California</em></td>
<td>John C. Callaghan <em>Edmonton, Alberta, Canada</em></td>
<td>Joe W. Ramsdell <em>San Diego, California</em></td>
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<td>1978</td>
<td><strong>Hotel Del Coronado, Coronado, California</strong></td>
<td>John E. Connolly <em>Irvine, California</em></td>
<td>Arthur N. Thomas <em>San Francisco, California</em></td>
<td>Richard G. Fosburg <em>San Diego, California</em></td>
<td>James M. Wilson <em>San Francisco, California</em></td>
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PAST MEETING HIGHLIGHTS

1979  **Sun Valley Lodge, Sun Valley, Idaho**
President  Norman E. Shumway  Stanford, California
Secretary  Arthur N. Thomas  San Francisco, California
Local Arrangements Chairman  Harold V. Liddle  Salt Lake City, Utah
Samson Resident Prize Essay Award  Thomas H. Hoffmann  San Antonio, Texas

1980  **Tamarron Lodge, Durango, Colorado**
President  Harold V. Liddle  Salt Lake City, Utah
Secretary  Arthur N. Thomas  San Francisco, California
Local Arrangements Chairman  W. Gerald Rainer  Denver, Colorado
Samson Resident Prize Essay Award  Robert H. Breyer  Chicago, Illinois

1981  **Hyatt Regency Hotel, Maui, Hawaii**
President  Bertrand W. Meyer  Los Angeles, California
Secretary  Lucius D. Hill  Seattle, Washington
Local Arrangements Chairman  Quentin R. Stiles  Los Angeles, California
Samson Resident Prize Essay Award  Clifford M. Kitten  San Antonio, Texas

1982  **Hotel del Coronado, Coronado, California**
President  Paul A. Ebert  San Francisco, California
Secretary  Lucius D. Hill  Seattle, Washington
Local Arrangements Chairman  Richard G. Fosburg  La Jolla, California
Samson Resident Prize Essay Award  Douglas A. Murphy  Atlanta, Georgia
PAST MEETING HIGHLIGHTS

1983  The Broadmoor, Colorado Springs, Colorado
President                          Robert W. Jamplis
                                      Palo Alto, California
Secretary                           Lucius D. Hill
                                      Seattle, Washington
Local Arrangements Co-Chairmen      James B.D. Mark
                                      Stanford, California
                                      W. Gerald Rainer
                                      Denver, Colorado
Samson Resident Prize Essay Award   Michael L. Dewar
                                      Montreal, Quebec, Canada

1984  Hyatt Regency Hotel, Maui, Hawaii
President                          Arthur N. Thomas
                                      San Francisco, California
Secretary                           Lucius D. Hill
                                      Seattle, Washington
Local Arrangements Chairman        David J. Dugan
                                      Oakland, California
Samson Resident Prize Essay Award   Keith D. Dawkins
                                      Stanford, California

1985  Hyatt Lake Tahoe, Incline Village, Nevada
President                          John C. Callaghan
                                      Edmonton, Alberta, Canada
Secretary                           Lucius D. Hill
                                      Seattle, Washington
Local Arrangements Chairman        Edward A. Smeloff
                                      Sacramento, California
Samson Resident Prize Essay Award   George T. Christakis
                                      Toronto, Ontario, Canada

1986  Silverado Country Club, Napa, California
President                          Richard M. Peters
                                      San Diego, California
Secretary                           Richard G. Fosburg
                                      Del Mar, California
Local Arrangements Chairman        John R. Benfield
                                      Duarte, California
Samson Resident Prize Essay Award   David E. Hansen
                                      Stanford, California
# PAST MEETING HIGHLIGHTS

<table>
<thead>
<tr>
<th>Year</th>
<th>Location</th>
<th>President</th>
<th>City, State</th>
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<tbody>
<tr>
<td>1987</td>
<td>The Broadmoor, Colorado Springs, Colorado</td>
<td>Ivan A. May</td>
<td>Oakland, California</td>
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<td>Secretary</td>
<td>Richard G. Fosburg</td>
<td>Del Mar, California</td>
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<td>Local Arrangements Chairman</td>
<td>Leigh I.G. Iverson</td>
<td>Oakland, California</td>
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<td>Samson Resident Prize Essay Award</td>
<td>Louis A. Brunsting</td>
<td>Durham, North Carolina</td>
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<td>Del Mar, California</td>
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<td>Local Arrangements Chairman</td>
<td>Richard P. Anderson</td>
<td>Seattle, Washington</td>
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<td>Samson Resident Prize Essay Award</td>
<td>George E. Sarris</td>
<td>Stanford, California</td>
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<td>1989</td>
<td>Hyatt Regency Resort, Monterey, California</td>
<td>Quentin R. Stiles</td>
<td>Los Angeles, California</td>
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<td>Richard G. Fosburg</td>
<td>Del Mar, California</td>
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<td>Local Arrangements Co-Chairmen</td>
<td>Richard L. Murtland</td>
<td>Monterey, California</td>
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<td>Samson Resident Prize Essay Award</td>
<td>Michael A. Breda</td>
<td>Los Angeles, California</td>
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<td>1990</td>
<td>Hotel Del Coronado, San Diego, California</td>
<td>John R. Benfield</td>
<td>Sacramento, California</td>
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<td>Secretary</td>
<td>D. Craig Miller</td>
<td>Stanford, California</td>
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<td>Local Arrangements Chairman</td>
<td>Richard G. Fosburg</td>
<td>La Jolla, California</td>
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<td>Samson Resident Prize Essay Award</td>
<td>David Fullerton</td>
<td>Denver, Colorado</td>
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PAST MEETING HIGHLIGHTS

1991  Westin Hotel, Seattle, Washington
President                   Richard P. Anderson
                           Seattle, Washington
Secretary                  D. Craig Miller
                           Stanford, California
Local Arrangements Chairman Philip C. Jolly
                           Seattle, Washington
Samson Resident Prize Essay Award John S. Pirolo
                           St. Louis, Missouri

1992  Hyatt Regency Hotel, Kauai, Hawaii
President                   Richard G. Fosburg
                           La Jolla, California
Secretary                  D. Craig Miller
                           Stanford, California
Local Arrangements Co-Chairmen Edward L. Hurley
                           Sacramento, California
                           Philip W. Wright
                           Honolulu, Hawaii
Samson Resident Prize Essay Award Luis J. Castro
                           Stanford, California

1993  La Costa Resort, Carlsbad, California
President                   James B. D. Mark
                           Stanford, California
Secretary                  D. Craig Miller
                           Stanford, California
Local Arrangements Chairman Walter B. Cannon
                           Palo Alto, California
Samson Resident Prize Essay Award Paul J. Pearson
                           Rochester, Minnesota

1994  Resort at Squaw Creek, Olympic Valley, California
President                   Marvin Pomerantz
                           Denver, Colorado
Secretary                  Kent W. Jones
                           Salt Lake City, Utah
Local Arrangements Chairman Daniel L. Smith
                           Denver, Colorado
Samson Resident Prize Essay Award Barbara L. Robinson
                           Rochester, Minnesota
PAST MEETING HIGHLIGHTS

1995  The Coeur d’Alene Resort, Coeur d’Alene, Idaho
President  D. Craig Miller
Stanford, California
Secretary  Kent W. Jones
Salt Lake City, Utah
Local Arrangements Chairman  Ronald P. Grunwald
Spokane, Washington
Samson Resident Prize Essay Award  Michael J. Moulton
St. Louis, Missouri

1996  The Grand Wailea Resort, Wailea, Maui, Hawaii
President  Richard G. Sanderson
Tucson, Arizona
Secretary  Kent W. Jones
Salt Lake City, Utah
Local Arrangements Chairman  Edward A. Smeloff
Sacramento, California
Samson Resident Prize Essay Award  Daniel S. Schwartz
New York, New York

1997  The Silverado Country Club & Resort, Napa, California
President  Daniel J. Ullyot
Burlingame, California
Secretary  Kent W. Jones
Salt Lake City, Utah
Local Arrangements Chairman  Michael K. Wood
Hillsborough, California
Samson Resident Prize Essay Award  Edward M. Boyle, Jr.
Seattle, Washington

1998  The Chateau Whistler Resort, Whistler, B.C., Canada
President  Winfield J. Wells
Los Angeles, California
Secretary  Vaughn A. Starnes
Los Angeles, California
Local Arrangements Co-Chair  W.R. Eric Jamieson
Vancouver, B.C., Canada
Patricia A. Penkoske
Edmonton, Alberta, Canada
Samson Resident Prize Essay Award  Vivek Rao
Toronto, Ontario, Canada
## PAST MEETING HIGHLIGHTS

### 1999 The Resort at Squaw Creek, Olympic Valley, California

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<tr>
<td>President</td>
<td>Kent W. Jones</td>
<td>Salt Lake City, Utah</td>
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<tr>
<td>Secretary</td>
<td>Vaughn A. Starnes</td>
<td>Los Angeles, California</td>
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<tr>
<td>Local Arrangements Chairman</td>
<td>J. Edward Okies</td>
<td>Portland, Oregon</td>
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<td>Samson Resident Prize Essay Award</td>
<td>Leonard Y. Lee</td>
<td>New York, New York</td>
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### 2000 The Orchid at Mauna Lani, The Big Island, Hawaii

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<td>President</td>
<td>Bradley J. Harlan</td>
<td>Sacramento, California</td>
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<td>Secretary</td>
<td>Vaughn A. Starnes</td>
<td>Los Angeles, California</td>
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<td>Paul B. Kelly and Linda M. Kelly</td>
<td>Fair Oaks, California</td>
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<td>Samson Resident Prize Essay Award</td>
<td>Murray H. Kown</td>
<td>Stanford, California</td>
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### 2001 Rancho Bernardo Inn, San Diego, California

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<td>David R. Clarke</td>
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<td>Los Angeles, California</td>
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<td>Myles S. Guber and Debbie Bishop</td>
<td>Denver, Colorado</td>
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<td>Baiya Krishnadasan</td>
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### 2002 Big Sky Resort, Big Sky, Montana

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<td>President</td>
<td>Donald B. Doty</td>
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<td>Secretary</td>
<td>R. Scott Mitchell</td>
<td>Stanford, California</td>
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<tr>
<td>Local Arrangements Chairman</td>
<td>John A. Hawkins</td>
<td>Salt Lake City, Utah</td>
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<tr>
<td>Samson Resident Prize Essay Award</td>
<td>Susan D. Moffatt-Bruce</td>
<td>Stanford, California</td>
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# Past Meeting Highlights

**2003**  
**La Costa Resort, Carlsbad, California**  
President: Edward D. Verrier  
Seattle, Washington  
Secretary: R. Scott Mitchell  
Stanford, California  
Local Arrangements Chairman: Douglas E. Wood  
Seattle, Washington  
Samson Resident Prize Essay Award: Albert J. Chong  
Seattle, Washington

**2004**  
**Wailea Marriott, Wailea, Maui, Hawaii**  
President: Vaughn A. Starnes  
Los Angeles, California  
Secretary: R. Scott Mitchell  
Stanford, California  
Local Arrangements Chairman: Winfield J. Wells  
Los Angeles, California  
Samson Resident Prize Essay Award: Frederick A. Tibayan  
Stanford, California

**2005**  
**Fairmont Empress Hotel, Victoria, BC, Canada**  
President: Steven W. Guyton  
Seattle, Washington  
Secretary: John A. Hawkins  
Salt Lake City, Utah  
Local Arrangements Chairman: W. R. Eric Jamieson  
Vancouver, BC, Canada  
Samson Resident Prize Essay Award: Matthew G. Whitten  
Salt Lake City, Utah  
Donald B. Doty Award: LDS Hospital  
Salt Lake City, Utah

**2006**  
**Sun Valley Resort, Sun Valley, Idaho**  
President: R. Scott Mitchell  
Stanford, California  
Secretary: John A. Hawkins  
Salt Lake City, Utah  
Local Arrangements Chairman: Thomas A. Burdon  
Stanford, California  
Samson Resident Prize Essay Award: T. Brett Reece  
Charlottesville, VA  
Donald B. Doty Award: James L. Fann  
Stanford, California  
Norman E. Shumway Award: John A. Hawkins  
Salt Lake City, Utah
# Past Meeting Highlights

**2007**  
**Hyatt Regency Tamaya Resort & Spa, Santa Ana Pueblo, New Mexico**

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<td>President</td>
<td>Elliot T. Gelfand</td>
<td>Edmonton, AB, Canada</td>
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<td>Secretary</td>
<td>John A. Hawkins</td>
<td>Salt Lake City, Utah</td>
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<td>Local Arrangements Chairman</td>
<td>Jorge A. Wernly</td>
<td>Albuquerque, New Mexico</td>
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<td>Samson Resident Prize Essay Award</td>
<td>Jayan Nagendran</td>
<td>Edmonton, Canada</td>
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<td>Donald B. Doty Award</td>
<td>Gordon A. Cohen</td>
<td>Seattle, Washington</td>
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<td>Michael J. Weyant</td>
<td>Aurora, Colorado</td>
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**2008**  
**Sheraton Keauhou Bay Resort and Spa, Kona, Hawaii**

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<td>President</td>
<td>Douglas E. Wood</td>
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<tr>
<td>Secretary</td>
<td>John A. Hawkins</td>
<td>Salt Lake City, Utah</td>
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<tr>
<td>Local Arrangements Chairman</td>
<td>Michael S. Mulligan</td>
<td>Seattle, Washington</td>
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<td>Samson Resident Prize Essay Award</td>
<td>John Keech</td>
<td>Seattle, Washington</td>
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<tr>
<td>Donald B. Doty Award</td>
<td>John D. Mitchell</td>
<td>Denver, Colorado</td>
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<td>Norman E. Shumway Award</td>
<td>Joseph S. Carey</td>
<td>Torrance, California</td>
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**2009**  
**The Fairmont Banff Springs, Banff, Canada**

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<td>President</td>
<td>David A. Fullerton</td>
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<td>Secretary</td>
<td>Thomas A. Burdon</td>
<td>Palo Alto, California</td>
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<td>Local Arrangements Chairman</td>
<td>Michael J. Weyant</td>
<td>Aurora, Colorado</td>
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<tr>
<td>Samson Resident Prize Essay Award</td>
<td>David C. Mauchley</td>
<td>Denver, Colorado</td>
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<tr>
<td>Donald B. Doty Award</td>
<td>Robbin G. Cohen</td>
<td>Los Angeles, California</td>
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<td>Norman E. Shumway Award</td>
<td>Anthony D. Caffarelli</td>
<td>Stanford, California</td>
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2010  Ojai Valley Inn, Ojai, California
President  J. Scott Millikan
Billings, Montana
Secretary  Thomas A. Burdon
Palo Alto, California
Local Arrangements Co-Chairs  Dominic and Carolyn Tedesco
Ventura, California
Samson Resident Prize Essay Award  Phillip D. Smith
Aurora, Colorado
Donald B. Doty Award  Michael S. Mulligan
Seattle, Washington
Norman E. Shumway Award  Phillip D. Smith
Aurora, Colorado

2011  The Broadmoor, Colorado Springs, Colorado
President  Robbin G. Cohen
Los Angeles, California
Secretary  Thomas A. Burdon
Palo Alto, California
Local Arrangements Chairman  David and Christine Fullerton
Aurora, Colorado
Samson Resident Prize Essay Award  Jessica A. Yu
Denver, Colorado
Donald B. Doty Award  Gordon A. Cohen
Seattle, Washington
Norman E. Shumway Award  Agustin E. Rubio
Seattle, Washington
POSTGRADUATE COURSES AND SPEAKERS

1979  Management of the (Re-Do) Coronary Artery Patient
       Edward B. Stinson, MD, Stanford, CA
       The Infected Artificial Heart Valve
       Edward J. Hurley, MD, Sacramento, CA
       Changing Concepts in the Interpretation of Ventricular Filling Pressures
       Gregory A. Misbach, MD, San Francisco, CA
       Are Randomized Trials Possible for Devices or Surgical Procedures
       Lawrence I. Bonchek, MD, Milwaukee, WI

1980  Preoperative Assessment of the Patient with Marginal Pulmonary Function
       Richard M. Peters, MD, San Diego, CA
       Airway Management
       G. Hugh Lawrence, MD, Portland, OR
       Postoperative Care of the Patient With Marginal Pulmonary Function
       Alan Hilgenberg, MD, Denver, CO

1981  Historical Perspective
       John C. Callaghan, MD, Edmonton, Alberta, Canada
       Dysoxia of Cells
       Eugene Robin, MD, Palo Alto, CA
       Crystalloid Solution for Myocardial Protection
       R. Leighton Fisk, MD, Phoenix, AZ
       Blood Cardioplegia for Myocardial Protection
       Gerald D. Buckberg, MD, Los Angeles, CA
       Before and After – Myocardial Preservation
       Shahbudin Rahimtoola, MD, Los Angeles, CA

1982  Current Diagnostics and Drug Therapy For Thoracic Infections
       Arnold Weinberg, MD, Boston, MA
       Surgical Therapy of Pleural Space Infections
       G. Hugh Lawrence, MD, Portland, OR
       Post-Operative Mediastinal Wound Infections
       E.A. Rittenhouse, MD, Seattle, WA
       Current Therapy of Esophageal Perforations
       Arthur N. Thomas, MD, San Francisco, CA
POSTGRADUATE COURSES AND SPEAKERS

1983

The Thymus: Master Gland of the Immune System
Robert A. Good, MD, PhD, New York, NY

The Mediastinal Imaging Techniques
James B.D. Mark, MD, Stanford, CA

Surgical Approaches to the Mediastinum
Philip C. Jolly, MD, Seattle, WA

Surgical Oncology of Mediastinal Tumors
John R. Benfield, MD, Los Angeles, CA

1984

The Surgical Management of Aortic Dissection
Paul A. Ebert, MD, San Francisco, CA

Routine Use of the Internal Mammary Artery Conduit for Coronary Bypass: Late Clinical and Angiographic Follow-Up Studies
U. Scott Page, MD, Portland, OR

Cardiac Trauma
F. William Blaisdell, MD, Sacramento, CA

Physiologic Principles of Coronary Blood Flow as Applied to the Cardiac Surgical Patient
Julien J.E. Hoffman, MD, San Francisco, CA

1985

Cardiac Support Devices
J. Donald Hill, MD, San Francisco, CA

Cardiac Transplantation – Present Status and Future Prospects
Jack G. Copeland, III, MD, Tucson, AZ

Will the Real Cass Study Stand up?
Richard P. Anderson, MD, Seattle, WA

1986

Cell Membranes – Implications on Cancer Control
Jonathan Singer, MD, San Diego, CA

Pathophysiology of Left Ventricular Dysfunction in a Surgical Perspective
Kirk Peterson, MD, San Diego, CA

1987

Anti-Platelet Therapy – Practical Clinical Strategies for Bypass Graft Patients
Laurence A. Harker, MD, La Jolla, CA

Platelets, Vasospasm, and Aspirin – Thoughts on the Pathogenesis and Prevention of Arteriosclerosis
Laurence A. Harker, MD, La Jolla, CA
POSTGRADUATE COURSES AND SPEAKERS

1988  Single Lung Transplantation
       F. Griffith Pearson, MD, Toronto, Ontario, Canada

1989  Challenges of the Heights: Limits For Survival
       Michael Wiedman, MD, Boston, MA
       The Western Thoracic Surgical Association Multi-Institutional Study of
       Results In Cardiac Surgery
       Forrest L. Junod, MD, Sacramento, CA
       Daniel J. Ullyot, MD, San Francisco, CA

1990  Cellular and Molecular Biology of Lung Cancer: Clinical Implications
       Martin F. McKneally, MD, Albany, NY
       John D. Minna, MD, Bethesda, MD

1991  Modern Statistical Analysis of Surgical Risks and Outcomes
       Gary L. Grunkemeier, PhD, Portland, OR
       Eugene Blackstone, MD, Birmingham, AL

1992  Growth Factors in the Injury Response: Developing Strategies To Promote
       (And Prevent) Cell Growth
       Andrew Baird, MD, PhD, La Jolla, CA
       Alain Carpentier, MD, Paris, France

1993  Doing Better, Feeling Worse
       Donald Kennedy, PhD, Stanford, CA

1994  Esophageal Carcinoma from Molecular Biology to Esophagectomy
       Mark Orringer, MD, Ann Arbor, MI
       David Beer, PhD, Ann Arbor, MI

1995  Molecular Genetics of the Marfan Syndrome and Related Connective
       Tissue Disorders
       Hal Dietz, MD, PhD, Baltimore, MD
       Practical Update on Biostatistics for Cardiothoracic Surgeons
       Gary Grunkemeier, PhD, Portland, OR

1996  Regulation of Intimal Thickening and Luminal Narrowing After Vascular
       Reconstruction: Molecular Mechanisms and Pharmacological Control
       Alexander W. Clowes, MD, Seattle, WA
POSTGRADUATE COURSES AND SPEAKERS

1997  What is Wrong with the Failing Heart
       William W. Parmley, MD, San Francisco, CA

1998  The Surgical Treatment of End-Stage Heart Disease by Transplants and
       Mechanical Devices: Outcomes and Costs
       Keith Reemtsma, MD, New York, New York

1999  The Surgical Profession at the Turn of the Century: Challenges and
       Opportunities
       Samuel A. Wells, Jr., MD, Chicago, Illinois

2000  The Current Status of Therapy for Thoracic Aneurysms
       Denton A. Cooley, MD, Houston, Texas

2001  Thinking Beyond the Third Dimension
       Marc R. DeLeval, MD, FRCS, London, England

2002  Advances in Aortic Surgery
       Nicholas T. Kouchoukos, MD, FACS, St. Louis, Missouri

       Advances in Congenital Heart Disease Surgery
       Frank L. Hanley, MD, San Francisco, California

       Advances in Cardiac Valve Surgery
       Robert Karp, MD, Snowmass, Colorado

2003  Cell Transplantation to Prevent Heart Failure
       Richard D. Weisel, MD, Toronto, Ontario Canada

2004  Where, When and How it all Started
       Norman E. Shumway, MD, Stanford California

2005  Progress Toward A Tissue Engineered Heart Valve
       John E. Mayer, Jr., MD, Boston, MA

2006  Stem Cell Research
       Irving Weissman, MD, Stanford, CA

2007  Frontiers in Disease Phenotyping: The Example of Organ Transplantation
       Philip F. Halloran, MD, Edmonton, AB, Canada

2008  Allogeneic Stem Cell Transplantation for Malignant and Nonmalignant
       Hematologic Disorders
       Rainer F. Storb, MD, Seattle, Washington
2009  Cardiac Surgery and Translational Research—A Critical Partnership in Critical Condition
Francis G. Spinale, MD, Charleston, South Carolina

2010  The Emerging Science of Healthcare Delivery
Nicholas Wolter, MD, Billings, Montana

2011  Why Would Anyone Want to Be on Your Surgical Team?
Robert C. Myrtle, Los Angeles, California
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TSFRE was established in 1992 by the four leading American thoracic surgical associations, AATS, STS, WTSA and STSA, to respond to the decrease in research funding from the federal government and institutions for education and research in thoracic surgery—a challenge that continues today.

The Foundation has become a pivotal force for the growth and vitality of our specialty and its role is increasing, particularly in the areas of research, academic career development and postgraduate education.

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Fax 312-202-5801
bwiner@tsfre.org
2012 TSFRE RESEARCH AWARD RECIPIENTS

TSFRE RESEARCH FELLOWSHIPS provide support of up to $35,000 a year for up to 2 years for surgical residents who have not yet completed cardiothoracic surgical training.

Stephanie H. Chang, MD, Washington University
“Immunoregulation of Lung Cancer by Natural Killer Cells”

Michael Kwon, MD, Brigham & Women’s Hospital
“Isolated Left Ventricular Restrain Therapy for Heart Failure”

TSFRE RESEARCH GRANTS provide operational support of original research efforts by cardiothoracic surgeons who have completed their formal training, and who are seeking initial support and recognition for their research program. Awards of up to $40,000 a year for up to 2 years are made each year to support the work of an early-career cardiothoracic surgeon (within 5 years of first faculty appointment).

James Donohue, MD, University of Maryland
“Increasing Chemo Sensitivity to Esophageal Cancer Cells”

Mark J. Russo, MD, University of Chicago
“The Effect of Broader Geographic Organ Sharing on Survivals for Lung Transplant Candidates”
2012 EDUCATION AWARD RECIPIENTS

SIMULATION IN THORACIC SURGERY EDUCATION GRANTS

Provides grants to support the demonstration study for the application of simulation in thoracic surgery education.

Dilip Nath, MD, Children’s Medical Center
“Creation of a Novel Simulation Based Educational Paradigm in Congenital Cardiac Surgery”
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IS YOUR WTSA MEMBERSHIP INFORMATION CURRENT?

DO YOU HAVE:
A new email address for either work or home?
A new address or phone number?

Please let us know so that your WTSA records stay current, and that all of the important updates and news reaches you.

(Please Print)

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**OFFICE ADDRESS**

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**HOME ADDRESS**

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Home Phone  Home Fax

I prefer to receive my mailings at:  **HOME**  **OFFICE**

During the Annual Meeting, you may leave the completed form with the WTSA Registration Desk. You may also fax this form to: 978-524-0498, or mail to:

Western Thoracic Surgical Association
500 Cummings Center, Suite 4550
Beverly, MA 01915
SCHEDULE OF EVENTS

WEDNESDAY, June 27, 2012

9:00 a.m. – 1:00 p.m. Council Meeting
10:00 a.m. – 6:00 p.m. Registration
1:00 p.m. – 6:00 p.m. Speaker Ready Room
7:00 p.m. – 9:00 p.m. New Members Welcome Reception
7:00 p.m. – 9:00 p.m. Kids & Teens Reception (Ages 4-18)

THURSDAY, June 28, 2012

6:00 a.m. Samson Fun Run
6:30 a.m. – 7:50 a.m. Breakfast Session*: Using Lean Methods to Improve Operative Services Performance
7:00 a.m. – 8:00 a.m. Continental Breakfast
7:00 a.m. – 11:00 a.m. Family Hospitality
7:00 a.m. – 12:00 p.m. Exhibits
7:00 a.m. – 12:30 p.m. Speaker Ready Room
7:00 a.m. – 1:30 p.m. Registration
8:00 a.m. – 9:00 a.m. Scientific Session I
9:00 a.m. – 9:10 a.m. New Member & Samson Prize Finalists Introductions
9:10 a.m. – 9:55 a.m. Presidential Address
9:55 a.m. – 10:20 a.m. Coffee Break, Visit Exhibits & Posters
10:00 a.m. – 11:00 a.m. Spouse Forum Session
10:00 a.m. – 11:00 a.m. Scientific Session I
10:20 a.m. – 11:40 a.m. Scientific Session II
11:40 a.m. – 12:30 p.m. Controversies in Thoracic Surgery
12:30 p.m. – 1:30 p.m. Invited Guest Speaker
1:30 p.m. – 4:30 p.m. Kayak & Snorkel Tour*
1:45 p.m. – 5:00 p.m. Ocean Cruise Tour*
6:30 p.m. – 10:00 p.m. Luau Theme Dinner

FRIDAY, June 29, 2012

6:00 a.m. – 12:00 p.m. Registration
6:00 a.m. – 12:00 p.m. Speaker Ready Room
6:30 a.m. – 7:50 a.m. Breakfast Session*: Setting Up a TAVR Program
7:00 a.m. – 11:00 a.m. Family Hospitality
7:30 a.m. – 8:00 a.m. Continental Breakfast
7:30 a.m. – 12:00 p.m. Exhibits
8:00 a.m. – 8:50 a.m. Postgraduate Course
8:50 a.m. – 10:30 a.m. Scientific Session III
10:30 a.m. – 11:00 a.m. Coffee Break, Visit Exhibits & Posters
11:00 a.m. – 12:00 p.m. Scientific Session IV
1:00 p.m. – 6:00 p.m. Golf Tournament*
1:30 p.m. – 5:00 p.m. Tennis Tournament*

Free Evening

SATURDAY, June 30, 2012

6:00 a.m. – 11:30 a.m. Speaker Ready Room
6:00 a.m. – 12:00 p.m. Registration
6:30 a.m. – 7:30 a.m. Continental Breakfast
6:30 a.m. – 10:30 a.m. Exhibits
7:00 a.m. – 8:15 a.m. Concurrent Forums
7:00 a.m. – 11:00 a.m. Family Hospitality
8:30 a.m. – 9:50 a.m. Scientific Session V
9:50 a.m. – 10:10 a.m. Coffee Break, Visit Exhibits & Posters
10:10 a.m. – 11:10 a.m. Scientific Session VI
11:10 a.m. – 12:00 p.m. C. Walton Lillehei Point-Counterpoint
12:00 p.m. – 12:30 p.m. Business Meeting (Members Only)
12:30 p.m. – 2:00 p.m. Family Luncheon
7:00 p.m. – 10:00 p.m. Kids & Teens Banquet (Ages 4-18)
7:00 p.m. – 11:00 p.m. President’s Reception & Banquet

*Separate Subscription Required