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Department of Surgery
Research Leadership
Department of Surgery Research Leadership

Dr. Boughey – Vice Chair Research, Department of Surgery

Dr. Boughey has been Vice Chair of Research in the Department of Surgery since February 2014. Dr. Boughey has been at Mayo Clinic for 10 years and is a Professor of Surgery. She is the national principal investigator of 3 co-operative group clinical trials through the NCI cooperative groups. Dr. Boughey is the co-PI of the Breast Cancer Genome Guided Therapy study funded through the Center for Individualized Medicine and co-PI of the U10 LAPS grant funding cooperative group trials at Mayo. She sits on the Research Advisory Council.

Elizabeth Stanley – Research Administrative Support

In January, 2015, Elizabeth (Beth) Stanley was appointed as the Research Administrator for Surgery. Beth comes with more than 15 years of experience at Mayo Clinic. Her most recent experience was leading the implementation of shared services for oversight and management of Billing and Accounts Receivable across Arizona, Florida and Rochester.

Debbie Dixon – Research Operations Manager

Debbie has worked at Mayo Clinic since 2002 and has provided leadership for the Mayo Clinic Surgery Research Office since 2007. She has worked in research for over 35 years from animal work to bench research to clinical trials. Highlights include hyperbaric research with the U.S. Navy SEAL Team, scientist at Glaxo SmithKline and owning and operating her own clinical research company in North Carolina. Debbie has transitioned out of DoS as of January 2016.

Laurel Carlson – Interim Research Operations Manager

Lori Carlson has been at Mayo Clinic since 1993. Her background and experience is in critical care nursing, management and research. Lori has over twenty years of experience in clinical research including management and direct study coordination. Prior to joining the Department of Surgery Clinical Research Office in 2014, she was an Operations Coordinator in the Center for Translational Science Activities in Education Resources and Program Director for the Clinical Research Coordinator Program at Mayo Clinic.
Department of Surgery Research Executive Committee

Dr. Judy Boughey, Chair
Elizabeth Stanley, Research Administrator
Debbie Dixon, Research Operations Manager
Lori Carlson, Interim Research Operations Manager (effective 1/2016)

Dr. Jamie Bakkum-Gamez
Dr. Nicholas Chia
Dr. Patrick Dean
Dr. Amy Degnim
Dr. Elizabeth Habermann
Dr. Susan Hallbeck
Dr. Julie Heimbach
Dr. Jay Mandrekar
Dr. Kellie Mathis
Dr. Jordan Miller
Dr. Gustavo Oderich
Dr. Curtis Storlie
Dr. John Stulak
Mr. Jamie Sundsbak
Beth Holt, Administrative Assistant

The Department of Surgery Research Executive Committee meets bi-monthly. The Committee discusses resource allocation, research business and strategy, and coordinates events and reviews protocols that have been scientifically approved by the Surgery Peer Review Research Committee (SPRRC) for funding and support.
To increase the visibility of research both within the Department of Surgery and across the institution, DoS Research Grand Rounds were initiated in July 2014 and continued throughout 2015. These take place as part of the Monday evening conference. Dedicated one Monday per month to research topics also increases residents’ exposure to ongoing research efforts and opportunities.

If you would like to present your research, please contact RST Surgery Research (RSTsurgery@mayo.edu).

<table>
<thead>
<tr>
<th>Presenter</th>
<th>Topic</th>
<th>Date</th>
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<tbody>
<tr>
<td>Dr. Virginia Miller</td>
<td>Sex as a Variable in Surgical Research</td>
<td>January 19, 2015</td>
</tr>
<tr>
<td>Dr. Julianne Bingener-Casey</td>
<td>Quality of Life in Surgery</td>
<td>February 23, 2015</td>
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<tr>
<td>Dr. Eric Dozois</td>
<td>Phase I Studies of Autologous Mesenchymal Stromal Cell Coated Fistula Plug in Patients with Fistulizing Perianal Disease</td>
<td>March 16, 2015</td>
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<tr>
<td>Dr. Chris Shubert</td>
<td>Risk Stratified Model of Bundled Perioperative Cares for Pancreaticoduodenectomy – My KERN Scholar and Clinical Investigator Experience</td>
<td>April 20, 2015</td>
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<tr>
<td>Dr. Shanda Blackmon</td>
<td>The Evolution of Treatment of Pancoast Tumors</td>
<td>May 18, 2015</td>
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<tr>
<td>Dr. Susan Hallbeck</td>
<td>Surgical Microbreaks – what did the research show?</td>
<td>June 15, 2015</td>
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<tr>
<td>Dr. Scott Nyberg</td>
<td>Bridge to Liver Regeneration</td>
<td>July 20, 2015</td>
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<tr>
<td>Dr. Valerie Lemaine</td>
<td>Reducing Unplanned Reoperation for Mastectomy Skin Flap Necrosis – A Multidisciplinary Approach</td>
<td>September 21, 2015</td>
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<td>Dr. Martin Zielinski</td>
<td>Botulinum Toxin A Induced Paralysis Of The Lateral Abdominal Wall After Damage Control Laparotomy: A Multiinstitutional, Prospective, Randomized, Placebo Controlled Pilot Study</td>
<td>November 23, 2015</td>
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<td>Dr. Marina Walther-Antonio</td>
<td>Microbiome in Endometrial Cancer: The miSHIFT Hypothesis</td>
<td>December 21, 2015</td>
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### Consultants and Activity

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### # of innovators

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<td>Technologies with patent filings</td>
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### Research Dollars

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<th>2014</th>
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<td>Total Intramural</td>
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<td>3,440,838</td>
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<td>Total Extramural</td>
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<td>7,526,601</td>
<td>6,272,045</td>
<td>6,220,636</td>
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<td>Total Intramural + Extramural</td>
<td>8,905,644</td>
<td>9,946,427</td>
<td>9,712,882</td>
<td>9,380,993</td>
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</table>
2015

Programs and Committees
In 2015, the Department of Surgery had 181 Clinical Trials open, with 4509 subjects enrolled.

There are 56 Study Coordinators working with DoS Research Trials, and 23 Data Abstractors. The SCRO Office is located on Mayo 12, but staff work in several areas around the Rochester Campus.
Services Offered By Surgery Research Office

- Pre-site selection
- Site qualification
- Study start-up, close-out visit, and monitor visits
- Protocol Development
- Feasibility Assessment
- Assist with Committee Submissions:
  - SPRRC
  - Radiation Safety
  - Biospecimen Review, etc.
- Study file management
- Informed consent preparation
- Develop study specific documents
- Assistance with:
  - IRBe
  - MIRIS
  - RLIMS
- Lawson/Business Objects
- Budget preparation:
  - Research Pharmacy
  - TACMA
  - BAP Lab
  - Survey Research Center,
    - Code & Coverage Analysis
    - Research billing
- Study Coordination
- Oversight of research financial statements
- Assist with Investigational Device Exemption (IDE) and Investigational New Drug (IND) submissions
- Clinical Trials Management System (CTMS) users:
  - Ptrax
  - Medidata
  - Rave
- Collect, process, package and ship biospecimens
- Assistance with monitoring and auditing
- ClinicalTrials.gov registration assistance
- Assist with development and management of databases
  - REDCap
  - Rave
  - SDMS
- Maintain and order clinical trial supplies
  (i.e. bio-specimen collection kits, dressing supplies)
- Assist with publicity, recruitment and contact material
- Serve as study contact for multi-center clinical trials; investigator initiated and cooperative group trials
- Liaison for other research support services:
  - ORRS
  - CCaTS
  - HSR, Research Pharmacy
  - Medical Relations/Conflict of Interest Board
  - Office of Intellectual Property
Surgery Peer Review Research Committee

Goals

The Surgery Peer Review Research Committee (SPRRC) reviews protocols submitted for scientific merit. If the committee approves the science, the protocol will then be recommended to the Department of Surgery Research Executive Committee for resource allocation (e.g. funding, study coordinator support, FTE, etc.). All submitted protocols undergo statistical as well as scientific review.

SPRRC aims to both improve and facilitate research within the Department of Surgery, via a transparent and timely review process. The SPRRC meets from 7:00 to 7:30 a.m. on orange Tuesdays. Submissions need to be received by the blue Wednesday before the meeting to be considered.

Dr. John Stulak began chairing this committee in 2015. Dr. Kellie Mathis serves as the vice-chair for the SPRRC.

In 2015, 26 protocols were reviewed by the SPRRC with submissions from all divisions within the Department of Surgery.

Productivity from protocols approved in 2012-2015 includes:

- Manuscripts
- Presentations
- Abstracts
- Grants

Additional accomplishments:

- Scientific review forms aligned with the Cancer Center protocol review forms
- Submission forms updated with more details to assist investigator in creating a comprehensive protocol
- Collaboration developed with the Clinical Trials Program for protocol review

Members SPRRC

<table>
<thead>
<tr>
<th>Dr. John Stulak, Chair</th>
<th>Dr. Jay Mandrekar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dr. Kellie Mathis, Vice Chair</td>
<td>Dr. Mark Sawyer</td>
</tr>
<tr>
<td>Dr. Kevin Arce</td>
<td>Dr. Rory Smoot</td>
</tr>
<tr>
<td>Dr. Patrick Dean</td>
<td>Dr. Timucin Taner</td>
</tr>
<tr>
<td>Dr. Amy Degnim</td>
<td>Dr. Jacob Yetzer</td>
</tr>
<tr>
<td>Dr. Shannon Laughlin-Tommaso</td>
<td>Beth Holt - Administrative Assistant</td>
</tr>
</tbody>
</table>
Clinical Trials Program

Goals

• Offer cutting edge diagnostic and therapeutic options to surgical patients
• Provide study coordination and regulatory support
• Patient Education
• Increase number of clinical trials in DOS
• Ensure the quality of DoS Clinical Trials
• Increase number of patients accrued to trials
• Monitor current accrual
• Develop best practices for establishing and maintaining Clinical Trials in the Department of Surgery

Accomplishments

The Clinical Trials Program has incorporated several strategies to assist and support Clinical Trials in the Department of Surgery, and has several projects that will be coming in 2015.

• Established a DSMB for the Department of Surgery
• Provide reviews for Clinical Trials submitted to SPRRC
• Incorporated a Clinical Trials Inbox for direct support for investigators needing assistance with a Clinical Trial
• Early adopter of PTrax System
• Tested and provided feedback for CTMS epicenter
• Developed a Clinical Trials How-To guide to walk investigators through the process of developing and sustaining Clinical Trials
• Developed a Quick Reference Guide for Clinical Trials
• Monthly meetings to assess projects and develop new initiatives
• Protocol development assistance for new investigators

Members of the Clinical Trials Team can help you develop your trial. Please E-mail us at RST DOS Clinical Trials Team (RSTDOSCTT@ mayo.edu)
Data and Safety Monitoring Board

The Data and Safety Monitoring Board (DSMB) of the Mayo Clinic Rochester Department of Surgery Research was formed in early 2014

The DSMB is structured to serve trials meeting all the following criteria:

- Prospective trial
- Trial for which a DSMB or other approved oversight entity does not already exist
- Trial for which the function of a DSMB is justified – i.e. greater than minimal risk
- Trial which SPRRC has approved

The Department of Surgery, Clinical Trials DSMB is comprised of

- The chair of the DSMB (voting member), chosen from the physician representatives
- Additional three (3) or more physician representatives (voting members)
- Biostatistician representative (voting member)
- Representative from the Surgical Clinical Research Office (voting member)
- Ad hoc members appointed to the committee by the chair when additional expertise is required in reviewing certain studies (study-specific voting members)

The DOS DSMB will meet quarterly and most studies will be reviewed every 6 months.

Please email the RST DoS Clinical Trials Team (rstdosctt@mayo.edu) or any of the members if you would like to request the DSMB to monitor a clinical trial.

<table>
<thead>
<tr>
<th>DSMB Members</th>
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<tbody>
<tr>
<td>Dr. Jamie Bakkum Gamez</td>
<td>Dr. Jay Mandrekar</td>
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<tr>
<td>Dr. Judy Boughey</td>
<td>Dr. Kellie Mathis</td>
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<tr>
<td>Debbie Dixon, Research Operations Manager</td>
<td>Dr. Martin Zielinski</td>
</tr>
<tr>
<td>Lori Carlson, Interim Research Operations Manager (effective 1/2016)</td>
<td>Beth Holt, Administractive Assistant</td>
</tr>
</tbody>
</table>
Surgical Outcomes
The Surgical Outcomes group meets on a monthly basis to discuss surgical outcomes project ideas, methodologies, and works in progress.

- Dr. Cornelius Thiels is finishing his one-year as the Surgical Outcomes Fellow in the summer of 2016. His work has resulted in 24 peer-reviewed publications to date. His current work includes projects aimed at reducing readmission rates among diabetic patients using OPTUM, improving the patient-experience in the Department of Surgery, and a prospective trial to better understand the recovery process among patients undergoing major gastrointestinal surgery.

- Dr. John Bergquist is midway through a two-year clinician investigator training program under the mentorship of Dr. Mark Truty and Dr. Elizabeth Habermann. During the 2015-2016 academic year, his work was presented at two international and six national meetings. Also during this academic year, 8 manuscripts have been accepted with an additional 9 currently under review. His primary focus areas are the use of national databases to study oncologic surgical outcomes, use of biomarkers in cancer staging, and the application of patient-derived xenografts to evaluate novel chemotherapeutic agents and individualized medicine in hepatopancreatobiliary cancer.

- In addition to his work with Surgical Education/Simulation for DoS and pursuing the ACS sponsored Simulation Fellowship, Dr. T.K. Pandian has ongoing work with the Surgical Outcomes group at the CSHCD. Thus far this has resulted in two international presentations and one peer-reviewed publication. Ongoing projects and manuscripts focus on outcomes of pediatric surgical procedures/conditions.
<table>
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<td>Dr. Adam Krajewski</td>
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<td>Dr. Elizabeth Habermann, Vice Chair</td>
<td>Dr. Valerie Lemaine</td>
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<td>Interim Research Operations Manager</td>
<td>Dr. Brandon McCutcheon</td>
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<td>Dr. Zaid Abdelsattar</td>
<td>Dr. Brian Neff</td>
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<td>Dr. Sanj Kakar</td>
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<td>Dr. Jay Bergquist</td>
<td>Sharon Nehring, R.N.</td>
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<td>Diane Olson, M.A.</td>
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<td>Kristine Hanson</td>
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<td>Courtney Heins</td>
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<td>Dr. Rebecca Johnson</td>
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**Biological Sciences**

**Goals**

Generate new knowledge, bringing novel diagnostics and therapeutics to future patients

- Share Knowledge
- Increase Scientific Visibility and Funding
- Develop and implement mentorship strategies

- Dr. Mark Stegall’s research aims to understand the immunological basis for late organ rejection. His program and publications have effectively drawn patients to Mayo, and that in the future he may have a commercializable bioassay for predicting and treating organ rejection.

- Dr. Virginia Miller directs a high-profile research program on the biological basis for sex differences in human diseases.

- Dr. Nick Chia directs a program on the role of the gut microbiome in cancer and other diseases. He is working to develop novel tests and microbial “fingerprints” that will guide the use of prebiotic/probiotic therapies in patient treatments.

- Dr. Jordan Miller’s research aims to understand the biological basis of heart valve disease, and develop novel therapeutic interventions to slow progression of aortic valve stenosis and mitral valve prolapse. He has a Phase I clinical trial ongoing, Pase II clinical trial under development, and several patents related to therapeutic targets in heart valve disease.

- Dr. Scott Nyberg’s research aims to develop novel therapeutic options for patients with hepatic failure through development of bioartificial organs and xenotransplantation of humanized solid organs from animals. He currently has a device under development which will enter clinical trials and several patents related to technologies he has developed.

**Funding:**

- Dr. Nicholas Chia: MN Partnership Grant and O’Brien Urology Research Center Pilot Grant (NIH/NIDDK)
- Drs. Scott Nyberg and Peter Wettstein: 2012 ASTS Pfizer Collaborative Scientist Grant
- Dr. Martin Zielinski: KL2 Award (NIH/NCATS), and Microbiome Award
- Dr. Juliane Bingener-Casey: K23 Award (NIH/NIDDK)
- Dr. Virginia Miller: P50 (NIH/NIA)
- Dr. Jordan Miller: R01 (NIH/NHLBI)
- Drs. Jordan Miller, H. Schaff and M. Sarano: UH2/UH3 (NIH/NCATS)

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**Biological Sciences Team**

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<th>Dr. Christopher McGregor</th>
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<td>Dr. Myung Park</td>
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Innovation Accelerator Program

Dr. Jordan Miller and Jamie Sundsbak

The Mayo Surgical Innovation Accelerator rapidly identifies, develops, and refines new devices to address critical unmet patient needs. By partnering inventors with experts in engineering, manufacturing, and business development, we dramatically accelerate the rate at which novel technologies are delivered to patients.

2015 Innovation Accelerator RFA and Selection Process

The Innovation Accelerator Program received thirty-five submissions in response to a department-wide Request for Applications (RFA). An advisory panel comprised of individuals with expertise in surgery, device development, business development, and engineering reviewed applications and narrowed the submission down to five finalists for the Innovation Accelerator Program.

Innovation Accelerator Teams

- Dr. Shanda Blackmon: Mayo Blackmon Anastomotic Stent
- Dr. Johnathon Aho: Drainage Tube Obstruction Extractor
- Dr. David Joyce and Dr. Atta Behfar: Percutaneous LVAD Thrombolysis System
- Dr. Sue Hallbeck and Dr. Denny Yu: Surgical Sensor Shirt
- Dr. Alanna Rebecca and Dr. Solomon Azouz: Layered Nipple Areolar Complex Stencil

Innovation Accelerator Pilot Program

An accelerated twelve week program was established to move the idea from concept to vetted prototype. The program consisted of a series of ideation sessions with inventors and Contract Research Organizations (CRO’s) leading the construction of an initial prototype. Inventors were then instructed to garner feedback from colleagues and experts about their prototype and bring that information back to the team for construction of a second prototype. The Innovation Accelerator team worked with each team to determine logical next steps for their prototype.

Innovation Accelerator Demo Night at the Foundation House

Each of the five teams presented an update on their prototype during a special “Demo Night” at the Foundation House. During their presentations, teams gave a demonstration of their prototypes and took questions from the audience. Over thirty people attended this event and added valuable feedback and insight to the projects.

Funding Support

The Innovation Accelerator Pilot was supported by the Department of Surgery and Research Administration.
Medical Sciences 4 Facility

- Implementation of CORES Billing System has proven to be a useful addition to our systems and procedures. Not only for timely transfer of funds but also for reports regarding investigator usage, expenses, and number of procedures performed.

- Shared facility management model of Cardiovascular Innovation Laboratory (CVIL) has provided a steady atmosphere of work for staff. Techs have trained and function efficiently in both areas.

- The 5S project implemented Q4 2015 has been instrumental in maintaining a clean and efficient environment and has afforded several citation free internal and external inspections of both labs.

- Jo Powers, CVT, continues to train and is named as support staff on nearly 80 protocols.

- The staff will be helping to onboard a new investigator was assigned to the area. Dr. Joseph Lillegard, a former Research Fellow will be starting a substantial effort that will make use of the surgical facilities at Med Sci in 2016.

- **Metric for Year-End 2015**
  - **Total Charge-outs:** $348,731 (a 20% increase over 2014)
  - **Procedures:** 237
  - **Tech Time:** 2,433 hours
2015 Balfour Symposium

The 21st Annual Balfour Symposium took place, Friday, December 18, 2015 in Kahler Heritage Hall.

The Balfour Symposium highlights clinical and basic science research in the Department of Surgery for the visiting Balfour Professor and to inform the department members and trainees about the scholarly activities of the Department.

The 2015 Balfour Professor was David B. Hoyt, M.D., the executive director of the American College of Surgeons and emeritus professor of surgery at the University of California, Irvine. Dr. Hoyt is nationally and internationally recognized and has delivered numerous named lectures and has received multiple significant awards from his colleagues, as well as scientific organizations, globally and still serves as an advisor for many graduate students. Dr. Hoyt is the author of over 550 publications and the recipient of the American Heart Association Resuscitation Science Lifetime Research Achievement Award, The American College of Surgeons Distinguished Service Award and the Shock Society Scientific Achievement award.

Oral Trainee Presentations

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<thead>
<tr>
<th>Presenter</th>
<th>Title</th>
<th>Mentor</th>
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<tbody>
<tr>
<td>Jay Bergquist, M.D.</td>
<td>CA 19-9 in Anatomically Resectable, Early Stage Pancreatic Cancer is Independently Associated with Decreased Overall Survival and an Indication for Neoadjuvant Therapy: An NCDB Study</td>
<td>Mark Truty, M.D. and Elizabeth Habermann, Ph.D.</td>
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<tr>
<td>Raymond Hickey, Ph.D.</td>
<td>Autologous Hepatocyte Transplantation after Ex Vivo Gene Therapy in a Large Animal Model of Metabolic Liver Disease</td>
<td>Scott Nyberg, M.D., Ph.D.</td>
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<tr>
<td>Mohammad Khasawneh, M.B.B.S.</td>
<td>Post-Splenectomy Sepsis in Children: A 48 Year Population-Based Study</td>
<td>Martin Zielinski, M.D.</td>
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<tr>
<td>Zahraa Al-Hilli, M.B., B.Ch., BAO</td>
<td>Impact of Neoadjuvant Chemotherapy on Pathologic Axillary Nodal Status in HER-2 Positive Patients Presenting with Clinically Node-Negative Disease</td>
<td>Judy Boughey, M.D.</td>
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<tr>
<td>Cornelius Thiels, M.D.</td>
<td>Achieving a 5 Star Rating: Analysis of HCAHPS Scores Among Patients Undergoing Elective Colorectal Surgery</td>
<td>Elizabeth Habermann, Ph.D.</td>
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<tr>
<td>Alexis Hokenstad, M.D.</td>
<td>Effect of Extended Venous Thromboembolism Prophylaxis in Women Undergoing Surgery for Epithelial Ovarian Cancer</td>
<td>Jamie Bakkum-Gamez, M.D.</td>
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<tr>
<td>Alaa Sada, M.D.</td>
<td>Common Channel Length is Associated with Weight Loss and Nutritional Deficiencies after Duodenal Switch</td>
<td>Michael Kendrick, M.D. and Todd Kellogg, M.D.</td>
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<tr>
<td>Clara Nicolas Martinez</td>
<td>Share 35 Policy: Impact on Pre- and Post-Transplant Costs and Post-Transplant Mortality</td>
<td>Scott Nyberg, M.D., Ph.D.</td>
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**Oral Staff Presentations**

<table>
<thead>
<tr>
<th>Presenter</th>
<th>Title of Presentation</th>
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<tbody>
<tr>
<td>Martin Zielinski, M.D.</td>
<td>Ideal Blood Product Utilization for Hemorrhage Resuscitation</td>
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<tr>
<td>Scott Nyberg, M.D., Ph.D.</td>
<td>Liver Regenerative Medicine – Bench to Bedside</td>
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**2015 Balfour Winners -**

**Dr. Raymond Hickey** and **Dr. Zahraa Al-Hilli** were co-winners of the 21st Annual Balfour Surgery Research Symposium.

Dr. Hickey’s presentation was entitled “Autologous Hepatocyte Transplantation after Ex Vivo Gene Therapy in a Large Animal Model of Metabolic Liver Disease”

Dr. Al-Hilli’s presentation was entitled “Impact of Neoadjuvant Chemotherapy on Pathologic Axillary Nodal Status in HER-2 Positive Patients Presenting with Clinically Node-Negative Disease”
New Faces

Jay N. Mandrekar, Ph.D. has been appointed as the Ph.D. Statistician for the Department of Surgery Research. Dr. Mandrekar joined Mayo Clinic as a Research Associate after completing his Ph.D. Biostatistics from Ohio State University in September 2002. He is a Consultant in the Department of Health Sciences Research (HSR) with an adjunct Consultant appointment in the Department of Neurology. He also holds the academic rank of Professor of Biostatistics and Neurology in the Mayo Clinic College of Medicine. Dr. Mandrekar is the Biostatistics Core Director for the Department of HSR. In this role, he is responsible for overseeing 170+ statistical members, shaping the vision, developing staff and organization capabilities, establishing business plans, managing staff performances and resources, and promoting collaboration amongst HSR and clinical departments across Mayo’s three campuses. As a collaborative research scientist, he has published more than 240 peer-reviewed publications, and is very active in the national and international statistical meetings. His research interests are in predictive modeling, longitudinal data analysis and factor analysis. Extramurally, he has been a faculty member/course director at various biostatistics workshops for neurology researchers at national and international conferences; has participated in several study sections at the National Institute of Health, and is the biostatistics editor (since 2009) for Cephalagia (International Headache Society’s official journal) and Member-At-Large (since 2013) for Mayo Clinic Proceedings.

Curtis Storlie, Ph.D. has been appointed to the Mayo Clinic Department of Health Sciences Research and the Department of Surgery Research.

Dr. Storlie received his doctorate in Statistics from Colorado State University, and he joined the Los Alamos National Laboratory in 2010. There, he leveraged his expertise in uncertainty quantification, Bayesian modeling, and nonparametric regression to develop advanced predictive models to detect malware and other computer security breaches.

Dr. Storlie will be working in the Section of Clinical Statistics, Division of Biomedical Statistics. His primary collaborative activity will be to support the Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery and the Department of Surgery Research. His talent as a researcher combines novel statistical methodology with real-world problems to advance science. At Mayo, he will adapt his prior interests in streaming and intrusion detection into clinical algorithms for patient events – collaborating extensively with researchers from HSR while effectively engaging in the broader research community.
2015
Honors
## Colon and Rectal Surgery

<table>
<thead>
<tr>
<th>Recipient</th>
<th>Award</th>
<th>Awarding Organization</th>
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<tbody>
<tr>
<td>Dr. Scott Kelley</td>
<td>Cincinnati Top Doctors – Cincinnati Magazine</td>
<td>Cincinnati Magazine</td>
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## Subspecialty General Surgery

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<tr>
<th>Recipient</th>
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<tbody>
<tr>
<td>Dr. Michael Farnell</td>
<td>Distinguished Mayo Clinician Award</td>
<td>Officers and Councilors, Mayo Clinic</td>
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<tr>
<td>Dr. David Farley</td>
<td>Teacher of the Year Award; General Surgery Residence Program</td>
<td>Department of Surgery, Mayo Clinic</td>
</tr>
<tr>
<td>Dr. David Farley</td>
<td>Teacher of the Year Award; Department of Surgery &amp; Subspecialties</td>
<td>Mayo Fellows Association, Mayo School of Graduate Medical Education, Mayo Clinic College of Medicine</td>
</tr>
<tr>
<td>Dr. Travis McKenzie</td>
<td>Mayo Fellows' Teacher of the Year</td>
<td>Teacher of the Year by the Mayo Fellows' Association</td>
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<tr>
<td>Dr. Kaye Reid Lombardo</td>
<td>Bronze Award for winning patient education piece: Liver Problems and their surgical treatment</td>
<td>22nd Annual National Health Information Awards Program</td>
</tr>
<tr>
<td>Dr. Kaye Reid Lombardo</td>
<td>Leadership Program in Health Policy and Management Scholarship</td>
<td>American College of Surgeons/Society for Surgery of the Alimentary Tract</td>
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<tr>
<td>Dr. Melanie Richards</td>
<td>Silver Project</td>
<td>Mayo Quality Fellows Program, Mayo Clinic Quality Academy</td>
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## Plastic Surgery

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<tr>
<th>Recipient</th>
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<tbody>
<tr>
<td>Dr. Valerie Lemaine</td>
<td>Article feature</td>
<td>Mayo Alumni Magazine</td>
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<tr>
<td>Dr. Salvatore Lettieri</td>
<td>John E. Woods Teaching Award</td>
<td>Department of Surgery, Division of Plastic Surgery</td>
</tr>
<tr>
<td>Dr. Salvatore Lettieri</td>
<td>J. Kipp Charlton Physician Excellence Award</td>
<td>Maricopa Health Foundation</td>
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<tr>
<td>Dr. Steven Moran</td>
<td>2015 Emerald Literati Network Award for Excellence</td>
<td>Emerald Literati Network</td>
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<tr>
<td>Dr. Michel Saint-Cyr</td>
<td>Best resident paper by Anita Mohan, MD</td>
<td>American Society for Reconstruction Microsurgery</td>
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**Trauma, Critical Care and Surgery**

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<tr>
<th>Recipient</th>
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<tbody>
<tr>
<td>Dr. Mark Sawyer</td>
<td>Laparoscopic Ventral Hernia Pathway</td>
<td>Mayo School of Continuous Professional Development’s Quality Review Board</td>
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<tr>
<td>Dr. Scott Zietlow</td>
<td>Third Place Poster Presentation Award</td>
<td>Air Medical Transport Conference</td>
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<tr>
<td>Dr. Scott Zietlow</td>
<td>Best Paper Award in the Transport Medicine section. Paper presented by Aodhnait Fahy, BMBCh, PhD, Resident, Department of Surgery</td>
<td>American Association of Pediatrics</td>
</tr>
<tr>
<td>Dr. Scott Zietlow</td>
<td>Feature Article of the Month</td>
<td>Journal of Special Operations Medicine</td>
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**Thoracic Surgery**

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<tr>
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<tbody>
<tr>
<td>Dr. Shanda Blackmon</td>
<td>CTS Net Internet video award. Peroral Endoscopic Myotomy (POEM)</td>
<td>CTSNet</td>
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**Vascular Surgery**

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<tr>
<th>Recipient</th>
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<tbody>
<tr>
<td>Dr. Peter Gloviczki</td>
<td>Honorary Member</td>
<td>American College of Phlebology</td>
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<td>Dr. Peter Gloviczki</td>
<td>George Washington Award</td>
<td>Hungarian Medical Association of America, Hungarian Medical Association</td>
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<tr>
<td>Dr. Peter Gloviczki</td>
<td>Jorg Vollmar Lecturer</td>
<td>The German Vascular Society</td>
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<tr>
<td>Dr. Peter Gloviczki</td>
<td>Presidential Guest Lecturer</td>
<td>Western Vascular Society</td>
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<tr>
<td>Dr. Gustavo Oderich</td>
<td>Magna Cum Laude Award for Digital Poster</td>
<td>RSNA 2015</td>
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## 2015 Best Doctors—Minnesota Monthly

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<thead>
<tr>
<th>Name</th>
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<tr>
<td>Kevin Arce, D.M.D., M.D.</td>
<td>Jamie Bakkum-Gamez, M.D.</td>
<td>Karim Bakri, M.B.B.S.</td>
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<td>Judy Boughey, M.D.</td>
<td>Robert Cima, M.D.</td>
<td>Amy Degnim, M.D.</td>
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<td>Sean Dowdy, M.D.</td>
<td>Eric Dozois, M.D.</td>
<td>David Farley, M.D.</td>
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<td>Michael Farnell, M.D.</td>
<td>Julie Heimbach, M.D.</td>
<td>Tina Hieken, M.D.</td>
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<td>Steven Jacobson, M.D.</td>
<td>David Larson, M.D.</td>
<td>Valerie Lemaine, M.D.</td>
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<td>Samir Mardini, M.D.</td>
<td>Steven Moran, M.D.</td>
<td>Heidi Nelson, M.D.</td>
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<td>Francis Nichols, M.D.</td>
<td>Charles Rosen, M.D.</td>
<td>Elizabeth Stewart, M.D.</td>
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<td>Christopher Viozzi, M.D.</td>
<td>Dennis Wigle, M.D.</td>
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## Top Doctor  Castle Connolly Medical, Ltd

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<th>Name</th>
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<tr>
<td>Uldis Bite, M.D.</td>
<td>Haraldur Bjarneson, M.D.</td>
<td>Shanda Blackmon, M.D.</td>
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<td>Judy Boughey, M.D.</td>
<td>Thomas Bower, M.D.</td>
<td>Stephan Cassivi, M.D.</td>
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<td>Robert Cima, M.D.</td>
<td>Richard Daly, M.D.</td>
<td>Joseph Dearani, M.D.</td>
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<td>Amy Degnim, M.D.</td>
<td>Richard Devine, M.D.</td>
<td>David Farley, M.D.</td>
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<td>Peter Gloviczki, M.D.</td>
<td>Clive Grant, M.D.</td>
<td>James Jakub, M.D.</td>
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<tr>
<td>Lyle Joyce, M.D.</td>
<td>Michael Kendrick, M.D.</td>
<td>Samir Mardini, M.D.</td>
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<tr>
<td>David Nagorney, M.D.</td>
<td>Heidi Nelson, M.D.</td>
<td>Francis Nichols III, M.D.</td>
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<tr>
<td>John Pemberton, M.D.</td>
<td>Alberto Pochettino, M.D.</td>
<td>Charles Rosen, M.D.</td>
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<tr>
<td>Hartzell Schaff, M.D.</td>
<td>John Stulak, M.D.</td>
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2015 Featured Items
Leadership Announcements

First Arch Aneurysm Endovascular at Mayo Clinic Using WL Gore Device – Second Worldwide

On April 27, 2015 a Mayo Clinic team performed the first endovascular arch repair at Mayo Clinic, second worldwide, using a novel investigational Thoracic Branch Endoprosthesis manufactured by WL Gore®.

The patient is a 75-year-old high-risk male with enlarging aortic arch aneurysm. For this procedure, we collaborated with the Department of Radiology to use a 3D Print Model of the patient’s aortic arch, which was based on preoperative imaging. Using a fluid pump to simulate the hemodynamic conditions of the aortic arch, we implanted under fluoroscopic guidance the stent-graft into the patient’s 3D print model. Immediately after the simulation procedure, the patient was treated by percutaneous endovascular repair using the arch stent-graft with a side branch into the innominate artery.

The patient recovered well and was dismissed three days after the operation with no complications. A computed tomography angiography demonstrated widely patent stent with no endoleak.

This case exemplifies our innovative approaches to bring cutting edge technology and less invasive treatment options to our patients. More important, it is a great example of what can be achieved at Mayo Clinic with collaboration of multiple specialties (Vascular Surgery, CV Surgery, Radiology, CV Anesthesiology, Cardiology, Nursing) ancillary staff and WL Gore®.

Members of the team included Drs. Oderich (Vascular Surgery), Pochettino (CV Surgery), Pulido (CV Anesthesia), Frye (Cardiology), Matsumoto (Radiology), Erben, Wood, Mendes, Arun (DoS residents and fellows); Mr. Karl Bjellum RN (Nurse Manager for Vascular and Thoracic Surgery), Terrie Zirbes RN, Somsy Xayaosa RN, Shelly Larson RN, Jan Hofer RN (Physician Extender), Jill Evjen and Jean Wigham RN (Study Coordinators); Laurel Carlson RN, Brenda Mathews CST, Nikki Scheevel CST, Justin Guastad CST and Dean Fiedler CSA, Kevin Ness (Photographer), Keven Knudsen and John Wagner (Radiology Tech) and Viet Nguyen (Radiology Tech Student), Wendy Vokart (Autotransfusion), Zhen Ren (Perfusionist), Karen Mensink (Endovascular Core Supervisor); Karen Butterfield (WL Gore Arch Team Leader), Steve Vogel, Todd Johnson, Andrew Miller and Joe Burke (WL Gore Technical Support) and Austin Byrne (WL Gore Project Engineer).

Susan Hallbeck, Ph.D., Named Scientific Director in the Center for the Science of Health Care Delivery

In her role as Scientific Director of the Robert D. and Patricia E. Kern Center for the Science of Health Care Delivery, Dr. Hallbeck will partner with the Medical Director of the Program, Jeanne Huddleston, M.D. The Health Care Systems Engineering Program brings together expertise, both from data-driven and mathematical sciences as well as human-based sciences, to provide integrated solutions to today’s complex health care problems. The overall mission of the Program is to advance science through scholarship and innovation, and make significant impacts in practice through implementation, while educating future researchers and practitioners.
Virginia Miller, Ph.D., Named Director of the Women’s Health Research Center

Dr. Miller is a consultant in the Department of Surgery and has a joint-appointment with the Department of Physiology and Biomedical Engineering. She holds the academic rank of Professor of Surgery and Physiology.

Dr. Miller’s research focuses on how sex steroid hormones, such as estrogen and testosterone, influence vascular function in response to changes in blood flow or infection. She is the Principal Investigator of the grant that supports the Mayo Clinic Specialized Centers of Research (SCOR) on Sex Differences, which is one of 11 such centers across the country. She also serves as Research Director for the K12 grant that supports the Building Interdisciplinary Research Careers in Women’s Health training program.

Dr. Miller plays an active role in professional societies, including the Interdisciplinary Network on Cardiovascular Disease, within the Society for Women’s Health Research, and the Organization for the Study of Sex Differences. She serves on the editorial boards for several scientific journals, as well as grant review panels for the National Institutes of Health, the Office of Veteran Affairs and the American Heart Association.

Mark Allen, M.D. and Division of General Thoracic Surgery Awarded Max Chamberlain Award

Dr. Mark Allen and the Division of General Thoracic Surgery was awarded the Max Chamberlain award – the highest research award from the Society of Thoracic Surgeons (STS) for their work entitled “Comparison of the STS General Thoracic Surgery Database and the ACS NSQIP in General Thoracic Surgical Practice.” Dr. Mark Allen presented this on behalf of the division at the STS Plenary – it was the lead paper.

This is the second time the Division of General Thoracic Surgery has been awarded this honor. Four years ago the Division won for landmark research into the management of postoperative atrial fibrillation.

Amy Degnim, M.D. Named Co-Leader of Women’s Cancer Program

Dr. Amy Degnim has been named Co-Leader of the Women’s Cancer Program, joining co-leaders Sean C. Dowdy, M.D. and Matthew P. Goetz, M.D.

The Women’s Cancer Program is a highly interactive multidisciplinary research program comprising 79 basic and population scientists and clinical investigators from 16 departments at Mayo Clinic Rochester, Arizona and Florida.

The overall goal is to advance the understanding of, and management strategies for, breast and gynecologic cancers. Annual peer-reviewed funding to Women’s Cancer Program members is around $9 million, with about 2/3 from the National Cancer Institute.
Susan Hallbeck, Ph.D., C.P.E., P.E., Named Fellow by Human Factors and Ergonomics Society

Dr. Hallbeck was named a Fellow by the Human Factors and Ergonomics Society at their 58th Annual Conference in October 2015 in Chicago, Illinois. “It is a great honor to have been chosen as a Fellow by the Society. The recognition of my health care research and mentorship of students has been particularly gratifying,” said Dr. Hallbeck.

Tina Hieken, M.D. awarded Breast SPORE (Specialized Program in Research Excellence) Developmental Research Award

Tina J. Hieken, M.D., Associate Professor of Surgery received an award for “ERβ – Association with Breast Cancer Risk in Benign Breast Disease and Physiology in Nonmalignant Breast Epithelium.”

Martin Zielinski, M.D. Appointed to American Association for the Surgery of Trauma Multi-Institutional Trials Committee

Dr. Zielinski has been chosen to serve on the American Association for the Surgery of Trauma Multi-Institutional Trials Committee. The main goal of the AAST Multi-Institutional Trials Committee (MIT) is to facilitate the design and execution of multi-center projects. In this capacity the AAST-MIT enables researchers to collaborate with other centers. Typically, these collaborations include investigator-initiated projects, often without federal or industrial funding. Institutions rely on their own resources for participation. The AAST-MIT may help researchers identify suitable funding sources.

Enrollment Completion of Perceval Sutureless Aortic Heart Valve IDE Trial

The Sorin Group announced completion of enrollment of the Perceval Sutureless Aortic Heart Valve IDE trial. Enrollment was completed on schedule with the implantation of 300 patients. Rakesh Suri, M.D., DPhil is the U.S. Principal Investigator for the IDE trial. The purpose of the trial is to investigate the safety and effectiveness of the Perceval Aortic Heart Valve.
Publications

Prospective Randomized Trial on Botox Completed and Published

Dr. Zielinski’s study, “Botulinum Toxin a Induced Paralysis of the Lateral Abdominal Wall After Damage Control Laparotomy: A Multiinstitutional, Prospective, Randomized, Placebo Controlled Pilot Study,” has been published in the Journal of Trauma.

New Breast Cancer Risk Prediction Model More Accurate Than Current Model

A new breast cancer risk prediction model combining histologic features of biopsied breast tissue from women with benign breast disease and individual patient demographic information more accurately classified breast cancer risk than the current screening standard. Results of a Mayo Clinic study comparing the new model to the current standard, are published in the Journal of Clinical Oncology.

“Our new model more accurately classifies a woman's breast cancer risk after benign biopsy than the BCRAT,” Dr. Degnim says. The Breast Cancer Risk Assessment Tool (BCRAT) was developed by the National Cancer Institute and the National Surgical Adjuvant Breast and Bowel Project, and is currently the most commonly used model for predicting breast cancer risk in women with benign breast disease.

Ultrasound Evaluation of Axillary Nodes after Chemotherapy Can Guide Selection of Patients for Sentinel Lymph Node Surgery

Not all women with lymph node-positive breast cancer treated with chemotherapy before surgery need to undergo axillary lymph node dissection. Ultrasound is a useful tool for judging before breast cancer surgery whether chemotherapy eliminated cancer from the underarm lymph nodes. This secondary endpoint analysis from ACOSOG Z1071 was published in the Journal of Oncology.

The full article can be found on the Mayo Clinic News Network. More media outlets that have featured this story are KIMT/Affiliate and KTTC/Daily Rx.

Kitajima Prize Winner

Jay Bergquist, M.D. was selected as the winner of the Kitajima Prize which recognizes the best ISDS paper on malignant or open surgery by a presenter under 40 years old.

The manuscript has also been submitted to World J Surg: Bergquist JR, Thiels CA, Shubert CR, Habermann EB, Hayman AV, Zilinski MD, Mathis KL. Is chemotherapy or radiation therapy in addition to surgery beneficial for locally advanced rectal cancer in the elderly? A National Cancer Data Base (NCDB) study.
ACOSOG Z6051 Trial Reported

Drs. Heidi Nelson and David Larson, along with their colleagues, had their article, “Effect of Laparoscopic-Assisted Resection vs. Open Resection of Stage II Rectal Cancer on Pathologic Outcomes The ACOSOG Z6051 Randomized Clinical Trial” published in the Journal of American Medical Association.

Social Media Trend Setting

Drs. Juliane Bingener-Casey, Susan Hallbeck, and Cornelius Thiels’ abstract, “Surgical Never Events and Contributing Human Factors,” was a trend setting abstract on social media and was the third most downloaded paper from Surgery during the months of September, October and November 2015.

Perforated Peptic Ulcer

Dr. Bingener-Casey’s work with her colleagues on the Perforated Peptic Ulcer was recently featured in the Lancet. The article along with a video showcases how a perforated peptic ulcer is a common emergency condition worldwide and has a mortality rate of up to 30%. The research summarizes the evidence for perforated peptic ulcer management and identifies directions for future clinical research.

Menopause & CV Disease

Dr. Virginia Miller’s study was spotlighted on the American Physiological Society website. The article highlights how Dr. Miller’s study focuses on how genes may determine the side effects of menopausal hormone therapy and investigates influence of genes on cardiovascular risks of hormone therapy.

“Whether use of menopausal hormone treatments reduces the risk of cardiovascular disease is a controversial topic, and hormones are not recommended for primary prevention of cardiovascular disease,” Says Miller. “Our findings help explain the variability in responses to menopausal hormones specifically in the progression of atherosclerosis. As we move toward personalized management of menopause, these results are another small piece of the puzzle needed to direct therapy. We aren’t there yet, but to our knowledge, this is the first paper that has addressed the pharmacogenomics of menopausal hormone therapy relative to the progression of asymptomatic cardiovascular disease.”
Adi Fahy, B.M.B.Ch., Ph.D. (PGY-3) received the C Robert Chambliss Best Paper Award in the Transport Medicine section at the American Academy of Pediatrics Conference.

“Helicopter Transport of Injured Children – Excessive or Effective?”

Co Authors – Stephanie Polites, M.D.; Martin Zielinski, M.D.; Amy Glasgow; Christopher Moir, M.D.; Donald Jenkins, M.D.; Scott Zietlow, M.D.; Elizabeth Habermann, Ph.D.

Dr. Robert Cima along with David Berger from Baylor, Angela Bader at the Brigham and with colleagues at Elsevier their editorial team developed a multidisciplinary journal dedicated to the better understanding, describing and enhancing the evidence based approach to operating room safety, process improvement, and management. *Perioperative Care and Operating Room Management Journal* (www.pcorm.com) is intended to serve as a multidisciplinary, peer-reviewed source of information related to the administrative, economic, operational, safety, and quality aspects of the ambulatory and periprocedural care. Areas of interest include quality improvement process initiatives, process flow modeling, information management, efficient design, cost improvement, use of novel technologies, and management strategies. The goal is to create a platform that all the stakeholders in the OR from physicians, nurses, pharmacists, health systems engineers and our administrative partners can share their ideas and outcomes.

**R-01 Funding**

Dr. David Larson and his team obtained an R-01 award from the NIH on his project, “Secondary Use of EMRs for Surgical Complication Surveillance.”

Dr. Scott Nyberg received an R-01 grant that will provide five years of funding to produce the first genetically engineered double knockout (FAH-/-RAG2/-) pig. A second aim of the grant is to characterize the phenotype of these pigs. These new double knockout pigs will then be used to study transplantation of human hepatocytes, development of human liver, and regeneration of human liver. The pigs may also be used to produce human hepatocytes on a large scale for therapeutic and pharmacological applications. A new company, Liver Cell Therapies, Inc., has been formed through the Mayo Employee Entrepreneur Program (EEP) to commercialize this technology.
Other Funding

Dr. Rory Smoot has been awarded a Pilot and Feasibility Grant through the Mayo Clinic Center for Cell Signaling (C-Sig) for his proposal entitled “Platelet-Derived Growth Factor Deregulates Hippo Signaling in Cholangiocarcinoma.”

A project worked on by Drs. John Bergquist, Gregory Gores, Mark Truty and Thomas Helleday has been selected for funding by a 2015 Collaborative Research Grant between Mayo Clinic and the Karolinska Institutet. There was an overwhelming amount of applications from which only 9 were able to be funded. The success of this project is a testimony to the promising nature of the proposed collaboration. Grants were awarded based on project description, quality, feasibility and synergy, prospect for long-term collaborative research, education, or innovation.

Dr. Raymond Hickey is the recipient of the K01 Mentored Career Development Award. Dr. Hickey is an Assistant Professor under the mentorship of Dr. Scott Nyberg and Dr. Stephen Russell at Mayo Clinic. Dr. Hickey’s long-term career goal is to establish an independent research program focused on liver regenerative medicine. Inherited metabolic disorders of the liver are commonly characterized by absence or dysfunction of a single protein, normally expressed in liver cells, that leads to disease. The global prevalence of this group of disorders is estimated at one in one thousand births, with one third of children diagnosed in the first year of life. Presently, the only curative intervention for these disorders remains liver transplantation. A potential alternative strategy is hepatocyte transplantation. However, treatment is severely restricted by a shortage of donor hepatocytes, limited cell engraftment, and elicitation of an immune response against the transplanted allogeneic cells. Autologous cell transplantation, in which the patient’s own hepatocytes undergo ex vivo gene therapy prior to being retransplanted, is a potential curative therapy for these disorders. The objective of this proposal is to prevent liver failure in animal models of metabolic liver disease using a novel gene repair strategy in hepatocytes. The training period provided by the K01 Mentored Career Development Award will provide Dr. Hickey with the necessary skills needed for his independent career investigating novel mechanisms of gene and cell therapy for metabolic liver disorders.
Patrick Dean, M.D. obtained funding from the Center for Biomedical Discovery Pilot Grant program for his application entitled “Exploring the Role of Activated Macrophages in Kidney Allograft Rejection.”

Eric Dozois, M.D. and his team have received a Discovery Translational Award for their work on the Cryptoglandular Fistula Project. The project focuses on current surgical treatment strategies for patients with high cryptoglandular transsphincteric fistulas that put patients at a significant risk for fecal incontinence. Sphincter-sparing approaches, such as fistula plugs, are used to heal fistulas while preserving continence. Healing rates from this approach through are only achieved in 50-60% of patients. The hypothesis is that fistula plugs impregnated with a patient’s own mesenchymal stem cells will improve healing rates. This Discovery Translational Award will be used to fund FDA approved Phase I trial to determine the safety and feasibility of using mesenchymal stem cells bound to the Gore ® Bio-A® Fistula Plug in the management of patients with high transsphincteric cryptoglandular fistulas.

Dr. Tina Hieken and her team received a $75K CBD team science pilot award via a CTSA Grant from the National Center for Advancing Translational Science (NCATS), a component of the National Institutes of Health (NIH) for their project “ER Beta in Breast Cancer Prevention.”

Team members included John Hawse, Ph.D. (science PI), Amy Degnim, M.D. (co-PI) and Derek Radisky, Ph.D. (co-PI).

Dr. Mark Truty received grant funding from the Center for Clinical and Translational Science for a Team Science Pilot Award entitled “Evaluation of the Therapeutic Potential of Type I Phosphatidylinositol Phosphate Kinase Inhibitors in Pancreatic Cancer.”

This will be used to further the translational use of our Hepatobiliary and Pancreatic Cancer Patient-Derived Xenograft Program that he directs, one of the largest and one of the only surgeon-run such programs in the world that harnesses this personalized approach to cancer therapeutics.

Dr. Nyberg received a Minnesota Regenerative Medicine Grant for Translational Science Research. $500,000 to fund research to study liver regeneration after major liver resection. Of 90 proposals submitted, 6 were funded.

Investigators from the Department of Surgery are Scott L. Nyberg, M.D., Ph.D.; David Nagorney, M.D. and Harvey Chen, M.D.
Presentations

Mayo Clinic Physicians to Present Research Findings from Late-breaking Transplant Studies at American Transplant Congress

At the recent American Transplant Congress, Mayo Clinic transplant researchers presented findings from nearly 20 studies.

Of note, Dr. Mark Stegall was included in this exciting series of presentations. Dr. Stegall and his colleagues presented on the study, “Burden of Early Antibody-Mediated Rejection (AMR): Complications, Resource Utilization and Cost Differential in Treatment of AMR.”

Several Department of Surgery physicians presented at the annual Society of Surgical Oncology meeting that took place in March 2015.

- Dr. James Jakub presented results of a completed Prospective Multi-Institutional trial on minimally invasive inguinal lymph node dissections for melanoma. This particular study brought in melanoma surgeons from across the country to Mayo Clinic, Rochester to train on the novel procedure. The structured training consisted of didactics, viewing a DVD production of the procedure with live videos and custom animation as well as time in the Simulation Center and participation in a cadaver lab where attendees were trained on the procedure. The surgeons returned to their home institutions and enrolled patients into the study, prospectively collecting oncologic outcomes and adverse events which were submitted to Mayo Clinic, which served as the central site. This procedure was introduced for the first time in 2015 as a pre-course workshop for which Dr. Jakub was 1 of 4 proctors.

- Dr. David M. Nagorney presented “A Modern Approach to Hilar Cholangiocarcinoma.”

- Dr. Judy Boughey participated “The Great Debates in Breast Cancer” by discussing the topic “Is Sentinel Lymph Node Biopsy Accurate for Staging After Chemotherapy in Patients with Initial Node Positive Disease?”

- Chief Resident, Dr. Travis E. Groetz presented on “Pelvic Lymphadenopathy: Regional or Systemic Approach?”
  Mentor – Dr. James W. Jakub

- Dr. John Bergquist had a poster presentation on “Preoperative CA 19-9 Does Not Correlate with Loco-Regional Tumor Cell Burden in Resectable Pancreatic Adenocarcinoma.”
  Mentor – Dr. ????????
Dr. Maile Parker presented at the Western Trauma Association Meeting that took place in March 2015. Her paper, “Comparison of Fibrinolysis Before and After Tranexamic Acid in Trauma Patients: A 2-Year Single-Center Experience” was accepted for oral presentation. Mentor – Myung Park, M.D.

The American Society of Breast Surgeons

- AlHilli Z, Boughey JC, Hieken TJ
  “Increasing Use of Neoadjuvant Treatment for T1 and T2 HER-2 Positive Tumors”

- AlHilli Z, Hieken TJ, Hoskin TL, Boughey JC
  “Impact of Neoadjuvant Therapy on Pathologic Axillary Nodal Status in HER-2 Positive Patients with Clinically Node Negative Disease”

- Krajewski AC, Boughey JC, Degnim AC, Jakub JW, Jacobson SR, Hoskin TL, Hieken TJ
  “Expanded Indications and Improved Outcomes for Nipple-Sparing Mastectomy Over Time”

- Throckmorton A, Osian S, Scow J, Pruthi S, Hoskin T, Cha S, Dilaveri C
  “Return to Work After Breast Cancer”

- Glorioso J
  “Close Margins Correlate with Local Recurrence in a Mastectomy Population”
  Mentor – Dr. James W. Jakub

- AlHilli Z
  “Utilization of Multiple I-125 Radioactive Seeds in the Same Breast is Safe and Feasible: a Multi-Institutional Experience”
  Mentor – Judy C. Boughey, M.D.

- Murphy, B
  “How I Do It” Session – Nipple Release Video Presentation
  Mentor – Dr. James W. Jakub

- Hieken, T
  “Expanded Indications and Improved Outcomes for Nipple-Sparing Mastectomy Over Time”
CLINICAL RISK SCORE TO PREDICT PANCREATIC FISTULA AFTER PANCREATODUODENECTOMY: INDEPENDENT EXTERNAL VALIDATION FOR OPEN AND LAPAROSCOPIC APPROACHES - Christopher R Shubert, MD; Amy E. Wagie, MSHA; Michael B. Farnell, MD; David M. Nagorney, MD; Florencia G. Que, MD; KMarie Reid Lombardo, MD; Mark J. Truty, MD; Rory L. Smoot, MD; Michael L. Kendrick, MD Christopher Shubert, MD Mayo Clinic Rochester, MN

INTRAOPERATIVE MICROBREAKS REDUCES SURGEON MUSCULOSKELETAL PAIN AND IMPROVES PERFORMANCE - Denny Yu, PhD; Bethany Lowndes, MS; Hamid Zahiri, MD; Juliane Bingener, MD; Amro Abdelrahman, MBBS; Susan Hallbeck, PhD; Vedra Augenstein, MD; Erica Sutton, MD; Adrian Park, MD Bethany Lowndes, MS Mayo Clinic Rochester, MN

MELANOMA-DERIVED EXTRACELLULAR VESICLES AS DRIVERS OF IMMUNOSUPPRESSION - Rachel LG Maus, BS; Wendy Nevala, MS; Travis E Grotz, MD; Aaron S Mansfield, MD; James W Jakub, MD; Svetomir N Markovic, MD, PhD Rachel Maus, BS Mayo Clinic Rochester, MN

SUSTAINED PERFUSION OF A RE-ENDOTHELIALIZED REVASCULARIZED TISSUE ENGINEERED PORCINE LIVER IN VIVO IN ABSENCE OF SYSTEMIC ANTICOAGULATION - Shennen Mao, MD; Jaime Glorioso, MD; Faysal Elgilani, MD; Jeff Ross, PhD; Allan Dietz, PhD; and Scott Nyberg, MD PhD Shennen Mao, MD Mayo Clinic Rochester, MN

CD20+ IMMUNE CELL DETECTION IN BENIGN BREAST DISEASE - Muhammad A Arshad, MBBS; Daniel W Visscher, MD; Tanya L Hoskin; Rushin D Brahmblatt, MD; Alvaro Peña, MD; Melody L Stallings Mann, Ph.D; Erin E Miller; Linda M Murphy; Jodi M Carter, MD, Ph.D; Stacey J Winham, Ph.D; Keith L Knutson, Ph.D; Derek C Radisky,PhD; Amy C Degnim, MD Muhammad Arshad, MBBS Mayo Clinic Rochester, MN

REOPERATION FOR GROIN PAIN AFTER INGUINAL HERNIORRHAPHY: DOES IT REALLY WORK? - Philip Y Sun, MS; Twinkle K Pandian MD, MPH; Jad M Abdelsattar MBBS; David R Farley MD, FACS Philip Sun, Master of Science Mayo Medical School, Mayo Clinic Rochester, MN

DIFFERENT SURGICAL OUTCOMES AFTER ENDOSCOPIC TEP INGUINAL HERNIOPLASTY: COMPARING ST. MARY’S HOSPITAL WITH THE GONDA OUTPATIENT SURGERY CENTER - Moustafa M El Khatib, MBBS; TK Pandian, MD; Jad M Abdelsattar, MBBS; David R Farley, MD. Moustafa El Khatib, MBBS Mayo Clinic Rochester, MN

SELF-FIXATING MESH VERSUS PROLENE MESH WITH TACKING CLIPS: PRELIMINARY ANALYSIS - Yazan AlJamal MBBS, Jad Abdelsattar MBBS, Becca Gas MS,EeeLN Buckarma MD, David Farley MD Yazan AlJamal, MBBS Mayo Clinic Rochester, MN

PRIMING MODALITY AFFECTS KNOWLEDGE RETENTION IN SURGICAL TRAINEES: A RANDOMIZED PILOT STUDY - Eric J Finnesgard BA; Johnathon M Aho MD; T.K. Pandian MD, MPH; Michael L Kendrick MD; David R Farley MD Eric Finnesgard, BA Mayo Clinic Rochester, MN
DO IT YOURSELF! PERFORM TEP INGUINAL HERNIA REPAIR AT HOME - Moustafa M El Khatib, MBCh; Eeeln H Buckarma, MD; David R Farley, MD Moustafa El Khatib, MBCh Mayo Clinic Rochester, MN

PRE-HOSPITAL BLOOD TRANSFUSIONS: A 12-YEAR EXPERIENCE - Cornelius A Thiels, DO: Yaser M. Baghdadi, MD; Jennifer M. Leonard, MD, PhD; Asad J. Choudhry, MD; Cornelius A. Thiels, DO; Donald H. Jenkins, MD; Scott P. Zietlow, MD; Martin D. Zielinski, MD Mayo Clinic Rochester, MN

PREDICTING THE NEED FOR DEPENDENT CARE AFTER DISMISSAL IN GERIATRIC TRAUMA PATIENTS - Yaser M. K. Baghdadi, MD; Jennifer M. Leonard, MD, PhD; Asad J. Choudhry, MD; Cornelius A. Thiels, DO; Donald H. Jenkins, MD; Scott P. Zietlow, MD; Martin D. Zielinski MD Yaser Baghdadi, MD Mayo Clinic Rochester, MN

THE MAYO CLINIC EXPERIENCE WITH EARLY OUTCOMES FOLLOWING REPAIR OF SYMPTOMATIC NON UNION RIB FRACTURES - Brian Kim, MD; Henry Schiller, MD; David Morris, MD; William Cross, MD Janani Arun, MD Mayo Clinic Rochester, MN

CHEST WALL THICKNESS: SYSTEMATIC REVIEW AND META-ANALYSIS COMPARING ANATOMIC LOCATIONS IN NEEDLE THORACOSTOMY - Danuel V. Laan, MD; Trang N. Diem Vu, BS; Cornelius A. Thiels, DO; TK Pandian, MD; Henry J. Schiller, MD; M. Hassan Murad, MD; Johnathon M. E. Aho, MD Danuel Laan, MD Mayo Clinic Rochester, MN

TUBE THORACOSTOMY; A STRUCTURED REVIEW OF CASE REPORTS AND A STANDARDIZED FORMAT FOR REPORTING COMPLICATIONS - Johnathon M Aho, MD; Raaj K Ruparel, MD; Phillip G Rowe, MD; Rushin D Brahmbhatt, MD; Donald Jenkins, MD; Mariela Rivera, MD Johnathon Aho, MD Mayo Clinic Rochester, MN

EARLY DISCHARGES IN HELICOPTERED PEDIATRIC TRAUMA PATIENTS: PREDICTED BY LOWER ISS AND ABSENCE OF TACHYCARDIA - Aodhnait Fahy, BMBCh, PhD; Cornelius A. Thiels DO, MBA; Maile Parker, MD; Stephanie Polites, MD; Michael B Ishitani, MD; Christopher Moir, MD; Kathleen Berns, RN; Scott P Zietlow, MD; Donald Jenkins, MD; Martin Zielinski, MD. Aodhnait Fahy, BMBCh, PhD Mayo Clinic Rochester, MN

PANCREATICODUODENECTOMY FOR PANCREATIC NEUROENDOCRINE TUMORS: ARE COMBINED PROCEDURES JUSTIFIED? - Cornelius A Thiels, DO, Kristopher P Croome, MD, Danuel V Laan, MD, Jay R Bergquist, MD, Mark J Truty, MD Cornelius Thiels, DO, MBA Mayo Clinic Rochester, MN

INCREASING RATE OF CONTRALATERAL PROPHYLACTIC MASTECTOMY IS ASSOCIATED WITH INCREASED USE OF BREAST RECONSTRUCTION - Elizabeth Haberman, Ph.D., Jonathan Inselman, Judy Boughey, M.D. Rebekkah Warren, MD, PhD Mayo Clinic Rochester, MN

NIPPLE SPARING MASTECTOMY – INDICATIONS AND CONTRAINDICATIONS, RISKS AND BENEFITS - Sean C Dupont, MD; Judy C Boughey, MD; Rafael E Jimenez, MD; Tanya L Hoskin, MS; Tina J Hieken, MD Sean Dupont, M.D. Mayo Clinic Rochester, MN

PRE-OPERATIVE CA 19-9 DOES NOT CORRELATE WITH LOCO-REGIONAL TUMOR BURDEN IN PANCREATIC ADENOCARCINOMA - John R Bergquist, MD; Carlos A Puig, MD; Christopher R Shubert, MD; Mark J Truty, MD John Bergquist, MD Mayo Clinic, Department of Surgery, Division of Hepato-Pancreato-Biliary Surgery Rochester, MN
PATIENTS WITH IN-TRANSIT DISEASE HAVE A HIGH INCIDENCE OF OCCULT NODAL METASTASIS - Alexandra B Gonzalez, BS; William S Harmsen, MS; James W Jakub, MD; Alexandra Gonzalez, BS Mayo Clinic Rochester, MN

ACINAR CELL CARCINOMA OF THE PANCREAS: CREATION OF A SUCCESSFUL PATIENT-DERIVED XENOGRAFT ANIMAL MODEL AND A POPULATION-BASED STUDY OF THIS RARE TUMOR USING THE NATIONAL CANCER DATA BASE - Tommy Ivanics, MD; John R Bergquist, MD; Gang Liu, PhD; Lizhi Zhang, MD; Mark J Truty, MD Tommy Ivanics, MD Mayo Clinic Rochester, MN

THE ACUTE GENERAL EMERGENCY SURGICAL SEVERITY – GALLBLADDER (AGESS-GB) SCORE: A STANDARD CLASSIFICATION FOR THE SEVERITY OF GALLBLADDER DISEASE IN EMERGENCY GENERAL SURGERY - David S. Morris, MD, Matthew C. Hernandez, MD, Brittany L. Murphy, MD, Stephanie Polites MD, Donald H. Jenkins MD, Martin Zielinski MD Matthew Hernandez, MD Mayo Clinic Rochester, MN

READABILITY OF DISCHARGE SUMMARIES: WHAT LEVEL OF INFORMATION ARE WE DISMISSING OUR PATIENTS WITH? - Asad J Choudhry MBBS, Yaser M Baghdadi MD, Stephanie F. Heller MD, Donald H Jenkins MD, Martin D. Zielinski MD Asad Choudhry, MBBS Mayo Clinic Rochester, MN

EPITHELIAL CELL-SEEDED GRAFT IMPLANTATION RESULTS IN FULL-THICKNESS ESOPHAGEAL REGENERATION - Matthew Barron Ph. D, Johnathon Aho MD, Ellen Blanco, Steve Cassivi MD, Bill Carey MD Ph.D., and Dennis A. Wible MD Ph.D. Johnathon Aho, MD Mayo Clinic Rochester, MN

CATCH ME IF YOU CAN!...EARLY SIMULATION EFFORTS AFFECT FUNDAMENTAL SURGICAL SKILL ASSESSMENT SCORES - EeeLN H Buckarma, MD, Becca L Gas, MS, Jad M Abdelsattar, MBBS, Moustafa M El Khatib, MBBCch, TK Pandian, MD, Eric J Finnesgard, BA, David R Farley, MD Becca Gas, MS Mayo Clinic Rochester, MN

ERGONOMICS IN SURGICAL SIMULATION: AN EARLY STEP TOWARD SAVING FUTURE SURGEONS - Amro M Abdelrahman, MBBS; Denny Yu, PhD; Bethany R Lowndes, MS; EeeLN H Buckarma, MD; Jad M Abdelsattar, MBBS; Eric J Finnesgard, BA; Becca L Gas, MS; Moustafa M El Khatib, MBBCch; Susan Hallbeck, PhD. Amro Abdelrahman, MBBS Mayo Clinic Rochester, MN

Award winners from this meeting include the following:

Basic Science:
- Shennen Mao ($250)
- John Aho ($100)

Clinical:
- Chris Shubert ($250)
- Cornelius Thiels ($150)
- Matthew Hernandez ($100)
“Effect of Incision Location on Skin Necrosis Following Nipple-Sparing Mastectomy with Immediate Breast Reconstruction – Analysis of a Single Institution’s Early Experience”
Christine Oh, Sebastian Winocour, Paul Tran, Amy Degnim, Clive Grant, David Farley, Judy Boughey, Steven Jacobson, Valerie Lemaine

“A Systematic Review of Comparison of Autologous, Allogeneic and Synthetic Augmentation Grafts in Nipple Reconstruction” Sebastian Winocour, Anshuman Saksena, Christine Oh, Peter Wu, Alexis Laungani, Michel Saint-Cyr

“Maximizing the Volume of Extended Latissimus Dorsi Flap for Autologous Breast Reconstruction with Immediate Fat Grafting and Thoracoabdominal Advancement Flap” Aparna Vijayasekaran, Lin Zhu, Anita Mohan, Michel Saint-Cyr

“Lessons Learned from Aesthetic Abdominoplasty: Drain Free Donor Site Closure in Free Flap Breast Reconstruction and Impact on Patient Outcomes” Charalambos Rammos, Anita Mohan, Prakriti Gaba, John Schupbach, Michel Saint-Cyr

“Intrathoracic Muscle Flaps: A 20-year Experience of 437 Consecutive Patients”
Ziyad Hammoudeh, Amelia Van Handel, Arya Akhavan, Francis Nichols, Brian Carlsen, Steven Moran, Samir Mardini, Phillip Arnold
2015 Minnesota Surgical Society Fall Conference Wrap Up

Mayo Surgical Residents presented well at the recent Minnesota Surgical Society Fall Conference. They were polished, knew their data, stayed on time, and were well prepared for the questions. Congratulations to all who presented.

Congratulations to Mayo Clinic team of Moustafa ElKhatib and Adam Krajewski on winning the 2015 MSS Resident Jeopardy Competition.

1st Place Clinical Research
Intention to Treat Survival Among Stage III Pancreatic Cancer Patients Receiving Neoadjuvant Chemotherapy Compared to Surgery First and Adjuvant Chemotherapy: An Analysis of the National Cancer Database
Christopher Shubert, M.D.; John Bergquist, M.D.; Patrick Wilson; Michael Kendrick, M.D.; Rory Smoot, M.D.; Mark Truty, M.D., M.S.; David Nagorney, M.D.; Elizabeth Habermann, Ph.D.; Michael Farnell, M.D.
2nd Place Clinical Research
Laparoscopic Skill Assessment of Practicing Surgeons Prior to Enrollment in a Surgical Trial of a New Laparoscopic Procedure
Benjamin Zendejas, M.D., MSc; James Jakub, M.D.; Travis Grotz, M.D.; Alicia Terando, M.D.; Amod Sarnaik, M.D.; Charlotte Ariyan, M.D.; Mark Faries, M.D.; Sabino Zani, Jr., M.D.; Heather Neuman, M.D., M.S.; Nabil Wasif, M.D.; Jeffrey Farma, M.D.; Bruce Averbook, M.D.; Karl Bilimoria, M.D., M.S.; Jacob Allred; Douglas Tyler, M.D.; Mary Sue Brady, M.D.; Jeffrey Wayne, M.D.; David Farley, M.D.

3rd Place Clinical Research
Close Margins Correlate with Local Recurrence in a Mastectomy Population
Jaimie Glorioso, M.D.; Alexandra Gonzalez Juarrero; Brian Rodysill; William Harmsen; Jodi Carter, M.D., Ph.D.; Stephanie Childs, M.D.; Amy Degnim, M.D.; James Jakub, M.D.

1st Place Basic Science
Biomechanical Biaxial Esophageal Tissue Quantification Using Sonometry
Johnathon Aho, M.D.; Dennis Wigle, M.D., Ph.D.; Daniel Tschumperlin, Ph.D.; Matthew Urban, Ph.D.

Committee on Trauma Winner
Newly Diagnosed Swallowing Dysfunction in Elderly Trauma Patients
Danuel Van Laan, M.D.; TK Pandian, M.D.; David Morris, M.D.

Ca19-9 in Anatomically Resectable, Early Stage Pancreatic Cancer is Independently Associated with Decreased Overall Survival and an Indication for Neoadjuvant Therapy: An NCDB Study
John Bergquist, M.D.; Carlos Puig, M.D.; Christopher Shubert, M.D., Elizabeth Habermann, Ph.D.; Michael Kendrick, M.D.; David Nagorney, M.D.; Rory Smoot, M.D.; Michael Farnell, M.D.; Mark Truty, M.D., M.S.

Status of the Regional Nodal Basin Remains Highly Prognostic in Melanoma Patients with In-Transit Disease
Alexandra Gonzalez Juarrero; William Harmsen; Vera Suman, Ph.D.; James Jakub, M.D.
Outcomes of Combined Partial Hepatectomy and Cyst Fenestration for Massive Polycystic Liver Disease
Fouad Chebib, M.D.; Amber Harmon; Maria Irazabal Mira, M.D.; Yeonsoon Jung; Marie Hogan, M.D., Ph.D.; Patrick Kamath, M.D.; Vincente Torres; David Nagorney, M.D.

The 54th Annual Scientific Meeting of the Midwestern Association of Plastic Surgeons was held in Chicago at Northwestern Memorial Hospital, was on May 30, 2015. There was strong representation from the Division of Plastic and Reconstructive Surgery with the abstracts below presented:

Mathis, KL, Pemberton JH
“Clinical Effectiveness and Outcome of Diversion in Refractory Crohn Colitis with and without Perianal Fistula”

Ettinger K, Arce K
“Fluid Administration in Head and Neck Microvascular Reconstruction – Complications and Outcomes”

Yildirim Y, Viozzi C, Van Ess J
“Hypotensive Anesthesia is Associated with Shortened Length of Hospital Stay Following Orthognathic Surgery”

Bezak B, Viozzi C
“Comprehensive Genomic Profiling of Aggressive Central Giant Cell Lesion Identifies Targeted Therapy Treatment Option with Subsequent Response”

Han J, Viozzi C
“Does Accutane (Isotretinoin) Therapy Put Patients At Risk For Developing “Dry Socket” (Alveolar Osteitis) After Dental Extraction?”
• Yetzer J
  “Outcomes and Implementation of a Head and Neck Clinical Pathway”
• Arce K
  “Maxillofacial Reconstruction: Complications and Solutions in Complex Cases”
• Arce K
  “Maxillofacial Reconstruction: Lessons Learned in Traditional and Microvascular Techniques”
• Viozzi C
  “Effectiveness and Reliability of MMA in OSA in Patients With and Without Skeletal Deformities”

Awards

Team Science Awards

The Mayo Clinic Children’s Research Center is pleased to announce the recipients of the 2015 Team Science Awards.

Team Science Awardees

The goal of this program is to enhance collaborations between pediatric clinicians and scientists from all areas to accelerate research that will impact the health and health care of children. The following teams received awards:

Teams: Michael Stephens, M.D., (PI); William Faubion, M.D.; Eric Dozois, M.D.; and Allan Dietz, Ph.D. “A Pediatric Phase I Study of Autologous Mesenchymal Stromal Cell Coated Fistula Plug in Patients with Fistulizing Crohn’s Disease.”

Quality Improvement

Dr. Johnathon Aho’s Quality Improvement Project, “Outcomes from Tension Pneumothorax after Change in Thoracostomy Needle in Prehospital Setting” has been selected as an outstanding project for 2014. The awards will be recognized at the MSCPD Rochester Annual Faculty Awards and Recognition Dinner in April 2015.

2015 Distinguished Staff Awardees

Distinguished Clinicians
Michael B. Farnell, M.D.

Named Professorships
Joseph A. Dearani, M.D.
Sheik Zayed Professor of Cardiovascular Diseases Honoring George M. Gura, M.D.

Mark D. Stegall, M.D.
James C. Masson Professor of Surgery Research
Staff Who Achieved the Academic Rank of Professor between September 1, 2014 and August 31, 2015:
Donald Jenkins, M.D.
Francis C. Nichols, III, M.D.
Florence G. Que, M.D.

Staff Who Achieved the Academic Rank of Associate Professor between September 1, 2014 and August 31, 2015:
Patrick G. Dean, M.D.
Mark D. Sawyer, M.D.
John M. Stulak, M.D.
Martin D. Zielinski, M.D.

Visiting Professors

Twentieth Oliver H. Beahrs Visiting Professor of Surgery – March 18-21, 2015 – Dr. Kelly K. Hunt

Dr. Kelly K. Hunt from the University of Texas, MD Anderson Cancer Center presented for the Twentieth Oliver H. Beahrs Visiting Professor of Surgery event. Activities for this visit included a resident dinner, a luncheon and a consultant dinner. Dr. Hunt presented at the Breast Multidisciplinary Conference on “Incorporating Tumor Biology into an Improved Staging System for Breast Cancer” and at Surgery Grand Rounds on “Prognostic and Predictive Factors in Breast Cancer.”

Donald Church Balfour Visiting Professor – Scientist April 13-14, 2015 – Bryan White, Ph.D.

Bryan White, Ph.D. was here in April 2015 as the Donald Church Balfour Visiting Professor – Scientist. Dr. White is the Director of the Mayo Clinic/University of Illinois Strategic Alliance for Technology-Based Healthcare and Professor at the Carl R. Woese Institute for Genomic Biology. Dr. White directs the Mayo Illinois Alliance on the UIUC campus, working with the clinicians and scientists at Mayo Clinic and faculty and students at Illinois to advance technology enabled healthcare. He presented on “Computational Surgery – how the surgical practice and computational science can work together.”

Donald Church Balfour Symposium – December 18, 2015

David B. Hoyt, M.D. is the executive director of the American College of Surgeons and emeritus professor of surgery at the University of California, Irvine. Dr. Hoyt distinguished himself within the UCSD and UCI Departments of Surgery, having delivered numerous named lectures and has received multiple significant awards from his colleagues, as well as scientific organizations while serving in positions of leadership.

This year’s Balfour Symposium presentations were increased from six to eight trainee presentations and also added two oral staff presentations.
2015
Funding
## Funding Awards

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<th>Funding Type</th>
<th>2013</th>
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<td>Industry</td>
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### R01 Awards

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<tr>
<th>R01</th>
<th>Investigator</th>
<th>Title</th>
<th>Start Date</th>
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<tr>
<td>R01</td>
<td>Chia, N</td>
<td>Microbial Metabolic Toxicity Drives Colon Cancer</td>
<td>6/5/2014</td>
<td>5/31/2019</td>
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<tr>
<td>R01</td>
<td>Degnim, A</td>
<td>Molecular Discriminators in Benign Breast Tissue for Future Risk of ER positive and ER negative Breast Cancer</td>
<td>9/15/2014</td>
<td>8/31/2019</td>
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<tr>
<td>R01</td>
<td>Nyberg, S</td>
<td>Immunodeficient FAH-/- Pigs</td>
<td>7/8/2015</td>
<td>5/31/2020</td>
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<tr>
<td>R01</td>
<td>Miller, J</td>
<td>Role of SIRT6 in calcific aortic valve disease</td>
<td>1/4/2013</td>
<td>11/30/2017</td>
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<tr>
<td>R01</td>
<td>Miller, J</td>
<td>Role of osteogenic signaling in the pathogenesis of mitral valve regurgitation</td>
<td>9/1/2013</td>
<td>8/31/2017</td>
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<tr>
<td>R01</td>
<td>Larson, D co-PI</td>
<td>Secondary use of EMRs for Surgical Complication Surveillance</td>
<td>4/8/2015</td>
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### P Awards

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<th>Investigator</th>
<th>Title</th>
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<tr>
<td>P01</td>
<td>Miller, J</td>
<td>Cellular Senescence and Aging: Mouse Phenotyping and Pathological Assessment Core (Core B)</td>
<td>5/1/2012</td>
<td>4/30/2017</td>
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<td>P30</td>
<td>Miller, V</td>
<td>Sex-specific Risk for Vascular Dysfunction and Cognitive Decline</td>
<td>9/1/2012</td>
<td>5/31/2017</td>
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<td>P30</td>
<td>Smoot, R</td>
<td>Platelet-Derived Growth Factor Deregulates Hippo Signaling in Cholangiocarcinoma</td>
<td>9/1/2015</td>
<td>8/31/2016</td>
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### U Awards

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<tr>
<th>U01</th>
<th>Stegall, M</th>
<th>Intragraft expression to Predict Future GFR Decline in Kidney Transplantation</th>
<th>7/15/2011</th>
<th>6/30/2016</th>
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<tr>
<td>UH2</td>
<td>Miller, J</td>
<td>Therapeutic Strategy to slow progression of calcific aortic valve stenosis</td>
<td>6/18/2013</td>
<td>5/31/2016</td>
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### Other Extramural Awards

<table>
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<tr>
<th>K08</th>
<th>Park, M</th>
<th>Microvesicle production after trauma &amp; its Clinical Impact on Venothromboembolism</th>
<th>4/15/2010</th>
<th>3/31/2015</th>
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<tr>
<td>K12</td>
<td>Miller, V</td>
<td>Mayo Clinic Building Interdisciplinary Research Careers in Women’s Health</td>
<td>9/30/2015</td>
<td>7/31/2020</td>
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<td>K23</td>
<td>Bingener-Casey, J</td>
<td>Comparative Effectiveness of Novel Minimally Invasive Surgical Procedures</td>
<td>8/3/2012</td>
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## Extramural Grant Funding

### Cardiovascular Surgery

<table>
<thead>
<tr>
<th>Type</th>
<th>Name</th>
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<th>Start Date</th>
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<tbody>
<tr>
<td>Subaward</td>
<td>Schaff, Hartzell</td>
<td>Aortic Valve Operative Outcomes in Marfan Patients</td>
<td>2005-01-01</td>
<td>2031-12-31</td>
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<tr>
<td>Subaward</td>
<td>Daly, Richard</td>
<td>STICHES - Surgical Treatment for Ischemic Heart Failure</td>
<td>2011-05-23</td>
<td>2015-06-26</td>
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<tr>
<td>Subaward</td>
<td>Shen, Robert</td>
<td>Improved Patient Safety by Simulator Based Training in Cardiac Surgery</td>
<td>2011-05-01</td>
<td>2015-04-30</td>
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<tr>
<td>Industry</td>
<td>Daly, Richard</td>
<td>A chronic study to evaluate the NeoChord DS 1000 instrument in the delivery of sutures for edge to edge repair of the mitral valve in a sheep model</td>
<td>2011-01-13</td>
<td>2015-01-12</td>
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<tr>
<td>Industry</td>
<td>Daly, Richard</td>
<td>Artificial Mitral Valve Chordae Placement on a Beating Heart in Swine for Training Surgeons II</td>
<td>2014-03-11</td>
<td>2015-03-10</td>
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<tr>
<td>Industry</td>
<td>Suri, Rakesh</td>
<td>A randomized study comparing sizing, hemodynamic performance and left ventricular remodeling following aortic valve replacement with FDA approved St. Jude Epic Supra, Carpentier-Edwards Magna or the Sorin Mitroflow biological prostheses</td>
<td>2009-06-01</td>
<td>2015-05-31</td>
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<tr>
<td>Industry</td>
<td>Dearani, Joseph</td>
<td>CORMATRIX® ECM® TRICUSPID VALVE REPLACEMENT SAFETY AND EARLY FEASIBILITY STUDY</td>
<td>2015-06-01</td>
<td>2020-05-31</td>
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<tr>
<td>Industry</td>
<td>Dearani, Joseph</td>
<td>Long Term Follow-Up and Hemodynamic Evaluation of the Mitroflow Aortic Pericardial Heart Valve</td>
<td>2008-07-04</td>
<td>2016-07-03</td>
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<tr>
<td>Industry</td>
<td>Stulak, John</td>
<td>HeartMate III (HM III) Left Ventricular Assist System (LVAS)</td>
<td>2015-04-30</td>
<td>2017-04-29</td>
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<td>Industry</td>
<td>Stulak, John</td>
<td>Replacement Amendment #1 -PREVENtion of HeartMate II Pump Thrombosis through Clinical Management (PREVENT)</td>
<td>2014-08-29</td>
<td>2015-09-28</td>
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<tr>
<td>Industry</td>
<td>Schaff, Hartzell</td>
<td>Post-Approval Study Protocol of the St. Jude Medical Trifecta Valve</td>
<td>2011-12-15</td>
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<td>Industry</td>
<td>Pochettino, Alberto</td>
<td>GSK PPO116097: A Phase II, Randomized, Placebo-Controlled, Double-Blind (Sponsor Open) Study of GSK 1278863, a HIF-Prolyl Hydroxylase Inhibitor, to reduce Ischemic Events in Patients Undergoing Thoracic Aneurysm Repair</td>
<td>2014-01-06</td>
<td>2015-07-05</td>
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<td>Foundation</td>
<td>Joyce, David</td>
<td>LAOS III Left Atrial Appendage Occlusion Study</td>
<td>2014-09-01</td>
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<tr>
<td>Industry</td>
<td>Joyce, David</td>
<td>A Prospective, Single Arm, Multi-Center Clinical Study in Collaboration with the INTERMACS®Registry to Evaluate the Thoracotomy Approach Technique of the HeartWare HVAD® System</td>
<td>2015-01-30</td>
<td>2018-01-29</td>
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<tr>
<td>Industry</td>
<td>Joyce, Lyle</td>
<td>A Prospective, Randomized, Controlled, Un-blinded, Multi-Center Clinical Trial to Evaluate the HeartWare Ventricular Assist System for Destination Therapy of Advanced Heart Failure</td>
<td>2010-11-01</td>
<td>2018-10-31</td>
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<tr>
<td>Industry</td>
<td>Joyce, Lyle</td>
<td>Ablation For The Treatment Of Concomitant Atrial Fibrillation In Non-Paroxysmal Patients (ATTAC-AF)</td>
<td>2012-11-24</td>
<td>2017-11-23</td>
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<tr>
<td>Industry</td>
<td>Joyce, Lyle</td>
<td>A Prospective, Randomized, Controlled, Unblinded, Multi-Center Clinical Trial to Evaluate the Heartware Ventricular Assist Device System for Destination Therapy of Advanced Heart Failure</td>
<td>2013-10-17</td>
<td>2019-10-16</td>
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<td>Industry</td>
<td>Joyce, Lyle</td>
<td>A Prospective, Single Arm, Multi-Center Clinical Study in Collaboration with the INTERMACS®Registry to Evaluate the Thoracotomy Approach Technique of the HeartWare HVAD® System</td>
<td>2015-01-30</td>
<td>2018-01-29</td>
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<tr>
<td>Industry</td>
<td>Joyce, Lyle</td>
<td>A Multi-center, randomized study of external saphenous vein support using eSVS Mesh in CABG surgery: The eMESH 1 Study</td>
<td>2013-01-01</td>
<td>2017-12-31</td>
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</table>

**Colon and Rectal Surgery**

| Subaward | Nelson, Heidi | MINNESOTA MICROBIOME DATA ENGINE | 2014-07-29 | 2016-07-28 |

**Subspecialty General Surgery**

<p>| Subaward | Boughey, Judy | Z11102 - Impact of Breast Conservation Surgery on Surgical Outcomes and Cosmesis in Patients with Multiple Ipsilateral Breast Cancers (MIBC) | 2012-08-15 | 2019-08-14 |
| Subaward | Boughey, Judy | A11202 - A RANDOMIZED PHASE III TRIAL EVALUATING THE ROLE OF AXILLARY LYMPH NO NODE DISSECTION IN BREAST CANCER PATIENTS (cT1-3 N1) WHO HAVE POSITIVE SENTINEL LYMPH NODE DISEASE AFTER NEOADJUVANT CHEMOTHERAPY | 2013-10-01 | 2024-09-30 |
| Foundation | Boughey, Judy | 097517, I-SPY 2 TRIAL (Investigation of Serial Studies to Predict Your Therapeutic Response with Imaging And molecular Analysis 2) | 2010-12-01 | 2019-11-30 |
| NIH Training (T,F,K) | Bingener-Casey, Juliane | Comparative Effectiveness of Novel Minimally Invasive Surgical Procedures | 2012-08-03 | 2015-07-31 |
| Subaward | Jakub, James | A11104: Effect of Preoperative Breast MRI on Surgical Outcomes, Costs and Quality of Life of Women with Breast Cancer | 2015-01-01 | 2020-12-31 |
| Subaward | Hieken, Tina | TBCRC017, The Correlation of Radiographic Complete Response on Breast MRI with Pathologic Complete Response in Patients Receiving Neoadjuvant Systemic Treatment | 2014-03-01 | 2015-02-28 |
| Subaward | Degnim, Amy | ACOSOG Z1031: A Randomized Phase III Trial Comparing 16 to 18 Weeks of Neoadjuvant Exemestane (25 mg daily), Letrozole (2.5 mg), or Anastrozole (1mg) in Postmenopausal Women with Clinical Stage II an III Estrogen Receptor Positive Breast. | 2007-01-01 | 2020-12-31 |
| Foundation | Degnim, Amy | Immune biomarkers of breast cancer risk in benign breast tissue | 2011-10-19 | 2015-09-18 |
| Industry | Degnim, Amy | TRIAL OF DRAIN ANTISEPSIS AFTER TISSUE EXPANDER BREAST RECONSTRUCTION | 2011-03-14 | 2014-03-13 |
| Foundation | Hieken, Tina J | The Microbiome of Benign and Malignant Human Breast Tissue | 2014-03-01 | 2015-02-28 |
| Industry | Kellogg, Todd | Prospective, randomized, blinded parallel-group, multi-center trial to evaluate the safety and efficacy of the Maestro RC2 System in treating obesity | 2011-05-02 | 2016-10-01 |</p>
<table>
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<tr>
<th>NIH Research (R,M,N,P,S,U)</th>
<th>Smoot, Rory</th>
<th>Platelet-Derived Growth Factor Deregulates Hippo Signaling in Cholangiocarcinoma (Smoot P&amp;F)</th>
<th>2015-09-01</th>
<th>2016-08-31</th>
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<tr>
<td>NIH Research (R,M,N,P,S,U)</td>
<td>Nagorney, David</td>
<td>Mayo Translational PKD Center (MTPC) : Administrative Core</td>
<td>2010-09-30</td>
<td>2015-06-30</td>
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<tr>
<td>Industry</td>
<td>Que, Florencia</td>
<td>Amendment 1-Replacement EMPOWER Clinical Trial: Vagal Blocking for Obesity Control</td>
<td>2008-02-28</td>
<td>2014-02-27</td>
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**Oral and Maxillofacial Surgery**

| Subaward | Viozzi, Christopher | Impact of MMA on Health-Related and Functional Outcomes | 2014-01-01 | 2016-09-30 |

**Plastic Surgery**

| Industry | Mardini, Samir | Assessment of DIEP and recipient site neural anatomy and relation to dominant perforators in the anterior abdomen: A cadaveric anatomical study | 2015-04-17 | 2015-07-16 |

**Surgery Research**

<p>| Subaward | Chia, Nicholas | Functional Metabolomic Approach to Eradicate Tuberculosis | 2013-02-01 | 2015-08-31 |
| Subaward | Miller, Jordan | Development of Safer Soluble Guanylate cyclase (sGC) Activators to Treat Aortic Valve Calcification | 2015-02-01 | 2017-01-31 |
| Subaward | Miller, Jordan | Therapeutic Strategy to slow progression of calcific aortic valve stenosis | 2013-06-18 | 2016-05-31 |
| NIH Research (R,M,N,P,S,U) | Miller, Jordan | Cellular Senescence and Aging : Mouse Phenotyping and Pathological Assessment Core (Core B) | 2012-05-01 | 2017-04-30 |</p>
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<th>Grant Type</th>
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<td>NIH Research (R,M,N,P,S,U)</td>
<td>Miller, Jordan</td>
<td>Role of osteogenic signaling in the pathogenesis of mitral valve regurgitation</td>
<td>2013-09-01</td>
<td>2017-08-31</td>
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<tr>
<td>Other Federal</td>
<td>Miller, Jordan</td>
<td>Therapeutic Strategy to slow progression of calcific aortic valve stenosis</td>
<td>2013-06-18</td>
<td>2016-05-31</td>
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<td>NIH Training (T,F,K)</td>
<td>Miller, Virginia</td>
<td>Mayo Clinic Building Interdisciplinary Research Careers in Women’s Health</td>
<td>2015-09-30</td>
<td>2020-07-31</td>
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<td>Thoracic Surgery</td>
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<td>Subaward</td>
<td>Wigle, Dennis</td>
<td>Tissue Source Site (TSS) Networks in Support of the Cancer Genome Atlas (TCGA) Program</td>
<td>2012-02-01</td>
<td>2015-03-31</td>
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<tr>
<td>Subaward</td>
<td>Wigle, Dennis</td>
<td>Adjuvant Lung Cancer Enrichment Marker Identification and Sequencing Trial (ALCHEMIST)</td>
<td>2014-10-01</td>
<td>2017-09-30</td>
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<td>Subaward</td>
<td>Wigle, Dennis</td>
<td>Metformin as a chemoprevention agent in non-small cell lung cancer</td>
<td>2012-06-01</td>
<td>2015-05-31</td>
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<td>Subaward</td>
<td>Wigle, Dennis</td>
<td>A Phase III Randomized Trial of Lobectomy vs. Sublobar Resection for Small (&lt;=2cm) Preipheral Non-Small Cell Lung Cancer</td>
<td>2007-11-01</td>
<td>2016-10-31</td>
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<tr>
<td>Industry</td>
<td>Blackmon, Shanda</td>
<td>Pilot Study Evaluating the Effects of Intrapleural Cryotherapy on Tumor Infiltrating Lymphocytes in Malignant Pleural Mesothelioma using Cryospray Therapy</td>
<td>2015-01-05</td>
<td>2017-01-04</td>
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### Industry

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<tr>
<th>Industry</th>
<th>Blackmon, Shanda</th>
<th>Training for the study: Pilot Study Evaluating the Effects of Intrapleural Cryotherapy on Tumor Infiltrating Lymphocytes in Malignant Pleural Mesothelioma using Cryospray Therapy</th>
<th>2015-05-01</th>
<th>2015-05-31</th>
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<tr>
<td>Industry</td>
<td>Blackmon, Shanda</td>
<td>Replacement Amendment #1 The Emprint Ablate and Resect Study in Patients with Metastatic Lung Tumors</td>
<td>2015-05-01</td>
<td>2016-04-30</td>
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<tr>
<td>NIH Research (R,M,N,P,S,U)</td>
<td>Shen, Robert</td>
<td>Pathobiology of the Enteric System: Project 2: Mechanisms of Gastric Dysfunction in Chronic Caloric Restriction</td>
<td>2010-08-01</td>
<td>2015-07-14</td>
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<td>Industry</td>
<td>Shen, Robert</td>
<td>Airtight: A Prospective Controlled Post-Approval Study of NeoMend ProGEL Pleural Air Leak Sealant in the Treatment of Visible Pleural Air Leaks after Standard Pleural Closure</td>
<td>2011-07-29</td>
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### Transplant Surgery

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<tr>
<th>Subaward</th>
<th>Nyberg, Scott</th>
<th>Bridge to Liver Regeneration</th>
<th>2015-05-01</th>
<th>2017-04-30</th>
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<tr>
<td>Subaward</td>
<td>Nyberg, Scott</td>
<td>Novel Biomaterials for Liver Tissue Engineering</td>
<td>2011-02-01</td>
<td>2015-08-31</td>
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<tr>
<td>Subaward</td>
<td>Taner, Timucin</td>
<td>A 36 month multi-center, open label, randomized, comparator study to evaluate the efficacy and safety of everolimus immunosuppression treatment in liver transplantation for hepatocellular carcinoma exceeding Milan criteria</td>
<td>2014-10-01</td>
<td>2020-09-30</td>
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<tr>
<td>Subaward</td>
<td>Taner, Timucin</td>
<td>Polyclonal Tregs to Promote Tolerance in Pediatric Liver Transplant Recipients</td>
<td>2015-02-01</td>
<td>2018-01-31</td>
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<tr>
<td>Industry</td>
<td>Stegall, Mark</td>
<td>A single center, open-label study to determine the safety &amp; efficacy of a dosing of eculizumab added to conventional treatment in the prevention of acute humoral rejection (AHR) in positive crossmatch deceased donor kidney transplantation (+XMatch DDKTx).</td>
<td>2010-04-01</td>
<td>2011-03-31</td>
</tr>
<tr>
<td>Industry</td>
<td>Stegall, Mark</td>
<td>To establish the burden of Antibody Mediated rejection (AMR) in terms of direct medical costs, hospital resource utilization and clinical outcomes as compared to similar patients who do not experience AMR (i.e. Incremental difference)</td>
<td>2014-12-15</td>
<td>2015-12-14</td>
</tr>
<tr>
<td>Industry</td>
<td>Stegall, Mark</td>
<td>Eculizumab; Solaris: A Randomized, Open-Label, Multicenter Trial to Determine Safety and Efficacy of Eculizumab in the Prevention of Antibody Mediated Rejection (AMR) in Living Donor Kidney Transplant Recipients Requiring Desensitization Therapy</td>
<td>2011-09-15</td>
<td>2017-09-14</td>
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<tr>
<td>Industry</td>
<td>Nyberg, Scott</td>
<td>Replacement (Internal Budget Error) Miromatrix/Mayo Transplantable Liver Project (Nyberg)</td>
<td>2015-01-01</td>
<td>2016-12-31</td>
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<tr>
<td>NIH Research (R,M,N,P,S,U)</td>
<td>Dean, Patrick</td>
<td>Mayo Translational PKD Center (MTPC) : Administrative Core</td>
<td>2010-09-30</td>
<td>2015-06-30</td>
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Trauma, Critical Care and General Surgery

| Subaward | Zielinski, Martin | Prehospital Resuscitation On Helicopter Study | 2015-01-01 | 2017-12-31 |
| Subaward | Zielinski, Martin | Prehospital Tranexamic Acid Use for Traumatic Brain Injury | 2014-01-01 | 2015-12-31 |
### Foundation
- **Zielinski, Martin**
  - The Biomechanical Effects of Flaccid Paralysis Induced by Botulinum Toxin A after Damage Control Laparotomy: A Randomized Clinical Trial
  - Start: 2011-07-01
  - End: 2015-06-30

### Subaward
- **Park, Myung**
  - Analysis and Characterization of Trauma-Induced Coagulopathy
  - Start: 2013-09-30
  - End: 2018-06-30

- **Park, Myung**
  - Analysis and Characterization of Trauma-Induced Coagulopathy
  - Start: 2014-07-01
  - End: 2015-06-30

### NIH Training (T,F,K)
- **Park, Myung**
  - Microvesicle production after trauma & its Clinical Impact on Venothromboembolism
  - Start: 2010-04-15
  - End: 2015-03-31

### Other Federal
- **Park, Myung**
  - Microvesicle production after trauma & its Clinical Impact on Venothromboembolism
  - Start: 2010-10-01
  - End: 2015-12-31

### Vascular Surgery
- **Kalra, Manju**
  - Randomized, Multicenter, Controlled Trial to Compare Best Endovascular versus Best Surgical Therapy in Patients with Critical Limb Ischemia
  - Start: 2014-11-25
  - End: 2019-11-24

- **Kalra, Manju**
  - Clinical Evaluation of the Safety and Effectiveness of Autologous Bone Marrow Aspirate Concentrate (BMAC) for the treatment of Critical Limb Ischemia due to Peripheral Arterial Occlusive Disease
  - Start: 2012-01-01
  - End: 2016-12-31

- **Oderich, Gustavo**
  - COOK upfront FTE Clinical Outcomes and Quality of Life Measures in Patients Treated for Complex AAA with Fenestrated Stent Grafts
  - Start: 2013-06-21
  - End: 2014-06-20

- **Oderich, Gustavo**
  - National Principal Investigator Agreement - Cook
  - Start: 2012-02-01
  - End: 2017-01-31

- **Oderich, Gustavo**
  - Unrestricted Education Grant to Fund Advanced Aortic Clinical Research Fellow
  - Start: 2015-05-04
  - End: 2016-05-03

- **Oderich, Gustavo**
  - Replacement Amendment #2 - Zenith Low Profile AAA Endovascular Graft
  - Start: 2010-02-01
  - End: 2017-01-31

- **Oderich, Gustavo**
  - Zenith® p-Branch™ Pivotal Study
  - Start: 2015-09-01
  - End: 2020-08-31
<table>
<thead>
<tr>
<th>Industry</th>
<th>Oderich, Gustavo</th>
<th>Zenith TX2 Low Profile TAA Endovascular Graft Clinical Study</th>
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<tbody>
<tr>
<td>Industry</td>
<td>Oderich, Gustavo</td>
<td>Replacement - Amendment #1 - Clinical Study to Evaluate the Safety and Effectiveness of the Zenith® Branch Endovascular Graft-Iliac Bifurcation with the Zenith® Connection Endovascular Covered Stent</td>
<td>2011-04-25</td>
<td>2016-04-24</td>
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<tr>
<td>Industry</td>
<td>Oderich, Gustavo</td>
<td>Zenith p-Branch Multicenter Study</td>
<td>2012-12-15</td>
<td>2017-12-14</td>
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<tr>
<td>Industry</td>
<td>Oderich, Gustavo</td>
<td>Evaluation of the GORE Excluder Iliac Branch Endoprosthesis for the Treatment of Common Iliac Artery Aneurysms or Aorto-Iliac Aneurysms</td>
<td>2014-02-13</td>
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DoS Research Profiles
Guerard W. Byrne, Ph.D.
Surgery Research

BACKGROUND

Dr. Byrne is a coinvestigator in the Department of Surgery Xenotransplantation program directed by Dr. Christopher McGregor. Dr. Byrne has an extensive background in mammalian genetic engineering with an emphasis on developing methods of conditional gene regulation and the development of genetically modified swine for experimental cardiac xenotransplantation (cXTx). He has worked both in biotechnology and academic institutions and is a recognized leader in the immunobiology of xenograft rejection and in the characterization of xenoreactive antibodies and their contribution to xenograft rejection and calcification of clinical bioprosthetic tissue.

AIMS/GOALS

Our primary goal is to improve patient care by advancing the efficacy of cXTx and developing new novel cardiovascular therapies and devices based on technologies developed for cXTx.

FINDINGS TO DATE

Our cXTx research program has made fundamental discoveries which have advanced our understanding of xenograft rejection, enhanced xenograft survival and contributed broadly to other biomedical fields. Key finds are:

- Early development of binary gene regulation which is now a standard paradigm for transgenic gene regulation commonly used today.

- Development of transgenic pigs expressing human complement regulatory proteins (hCRPs). Expression of hCRPs creates an intrinsic barrier to complement activation and effectively eliminated hyperacute rejection in cXTx. Donor pigs expressing hCRPs are universally considered a bedrock genetic background for future clinical cXTx.

- Discovery of spontaneous intercellular exchange of GPI-linked membrane proteins. This unexpected transfer of GPI-linked hCRPs from recipient blood cells to donor endothelium is a mechanism of xenograft accommodation and has broader implications on the functions of GPI-linked proteins in development, parasitology and immunology.

- Development of α-galactosidase (GGTA-1) mutated pigs (GTKO) which do not produce the dominant xenogeneic antigen α-Gal.

- Identification of a new immunogenic non-Gal xenogeneic carbohydrate antigen encoded by the pig B4GALNT2 transferase.

- Discovery of anti-Gal antibody induced calcification of fixed bioprosthetic porcine tissue.

CLINICAL IMPLICATIONS

Immense progress has been made in cXTx which is now poised for proof-of-principle preclinical studies. Success in xenotransplantation has the potential to revolutionize transplant medicine by eliminating the shortage of donor organs. Our recognition of the role of anti-Gal antibody in calcification of bioprosthetic heart valves (BHVs) provided the first clinically feasible mechanism for premature age-dependent BHV calcification and degeneration. This has spurred widespread interest in developing Gal-free BHVs from GTKO pig tissues which would be resistant to this antibody induced calcification. These new
GTKO BHVs would provide improved durability and offer alternative therapies to younger patients which could avoid the need and associated risks of long-term anticoagulation.

FUTURE PLANS

We plan to continue developing new porcine donor genetics for application in cXTx and as source material for new replacement heart valves. We are actively pursuing commercial development of a new Gal-free BHV.

REFERENCES/PUBLICATIONS


BACKGROUND

Colorectal cancer is common (142,570 new cancers annually) and lethal (51,370 cancer deaths each year), and has plausible connections to several microbial agents. If our hypotheses are proven correct, we can identify microbiomes that cause cancer and find ways to quantify that risk by using a combination of modern computational and sequencing techniques.

AIMS/GOALS

The proposed project will explore the hypothesis that sulfate-reducing bacteria (SRBs) in colon can therefore lead to colon cancer unless their ability to generate hydrogen sulfide is attenuated by a competing metabolism such as methanogenesis. To test this, we will combine metabolic, regulatory, and evolutionary modeling with high throughput genomic technologies to explore the relationship between SRBs, methanogens, and the gastrointestinal microbial community in colorectal cancer and normal colonoscopy patients. We propose to conduct metagenome sequencing and assembly to study the possible interactions between the microbiome and hydrogen sulfide production based on the metabolic and regulatory networks of both microbes and tumors. If successful, we will have generated models that are capable of predicting the levels of various metabolite byproducts including toxic DNA damaging agents that impact the incidence of CRC and quantified the relationship between DNA damage and multiple subtypes of cancer.
FINDINGS TO DATE

We have generated the infrastructure for metagenome assembly and expanded metabolic modeling capabilities and have published some of our resulting genomes as well as a paper on our automated metabolic modeling tools. In addition, we have recently had accepted a publication regarding the effects of different fecal collection protocols. These will all serve as groundwork for investigating our central hypothesis.

CLINICAL IMPLICATIONS

If successful, we will be able to attenuate that risk my manipulating the gut microbiome using antibiotics, probiotics, or prebiotics. This would radically change colon cancer prevention.

FUTURE PLANS

Our next steps are to build reliable community metabolic models and to examine hydrogen-sulfide production in these models.

Elizabeth B. Habermann, Ph.D.
Surgery Research

BACKGROUND

The work of Elizabeth B. Habermann, Ph.D., a health services researcher, utilizes secondary data to research surgical care and patient outcomes, including complications and survival. Her research employs both internal institutional data and national data sources including the National Cancer Data Base, SEER cancer registry data, Medicare, SEER-Medicare, American College of Surgeons-National Surgical Quality Improvement Program (ACSNSQIP), Nationwide Inpatient Sample, and University Healthsystem Consortium data. She has extensive experience working on multidisciplinary teams and frequently collaborates with surgeons, other physicians and other health care professionals and scientists. As the Robert D and Patricia E Kern Scientific Director for Surgical Outcomes at the Mayo Clinic Robert D and Patricia E Kern Center for the Science of Healthcare Delivery, she directs a team of four data analysts experienced in data manipulation and analysis to answer clinical questions.

AIMS/GOALS

Dr. Habermann aims to collaborate with surgeons and mentor surgical trainees in answering clinical questions using secondary data that will impact the care of surgical patients. This type of data is both sufficient in answering a variety of clinical questions and useful in providing hypothesis generating or pilot data for future prospective research.
FINDINGS TO DATE

Elizabeth B. Habermann has over 75 peer-reviewed publications in surgical, cancer, and medical journals.

CLINICAL IMPLICATIONS

Dr. Habermann’s research describes the current state of surgical patient care at the Mayo Clinic and nationally, and identifies opportunities for improvement. She works closely with surgeons to design and execute research that informs interventions in care. By continually monitoring the current quality of surgical care and the benefits of interventions, surgical care of patients at the Mayo Clinic and elsewhere will improve.

FUTURE PLANS

Surgeons, other clinicians, and surgical trainees interested in collaborating on this type of research should contact Dr. Habermann. She is most interested in research topics that will have a direct impact on clinical practice and patient outcomes.

REFERENCES/PUBLICATIONS


Surgery Research
Department of Surgery Research Profile

Susan Hallbeck, Ph.D.
Surgery Research

BACKGROUND
Dr. Hallbeck is a Health Care Systems Engineer focusing her research in Surgery.

AIMS/GOALS
Her aim is to create an effective and safe environment in the OR for both providers and patients. To create that safe environment, she has been working on several surgical research projects in 2015 including:

- Usability of laparoscopic instruments (Stryker funded)
- Quantification of Postures in the OR
- Characterization of OR Workload
- Microbreaks: an Intervention for awkward, static posture in the OR (Multi-site study)
- Sentinel Events in the Surgical Practice
- Prediction of Surgical Duration based on Patient Factors
- Development of a training tool risky ergonomic postures (DoS Innovation Incubator and NIOSH funded)

Her aims for 2016 include continuing her work on risk prediction models for OR staff and interventions such as microbreaks (data collection underway with the web-app).

FINDINGS TO DATE
The findings to date are in the papers below and in manuscripts submitted.

Usability of laparoscopic tools has been a topic that Dr. Hallbeck has studied for over a decade. She has recently looked at the ports, tools and workload for single port surgery and analyzed a commercial tool for usability. We identified the single port with the most flexibility to allow better access with lower force for the surgeon. We also determined that some of the new “ergonomic” tools are not ergonomic at all and may be worse than a straight tool or that they are too complex to be used in an ergonomic way by the surgeon. The Workload in the OR project found that single-site surgery was significantly more physically demanding for the surgeon and the first assistant. In addition, the surgeon had a trend toward increase in mental demand. As a result of this study, manual single-site surgery has ceased at Mayo and moved toward robotic, which we are currently studying.

Creating a physical risk model for the surgeon based on their postures has started with data collection and analysis with partners at Karolinska Institutet.

Due to the findings of the workload and the risk model, we found that trainee surgeons are also in risky postures as they learn their rote technical skills in the lab. We are developing a training tool to alert the trainee when they are in a risky posture for an unacceptable amount of time and we will work toward training in good habits prior to their exposure in the OR.

CLINICAL IMPLICATIONS
The impact of ergonomic usability and workload on the surgeon can be enormous. If there is a mismatch between the demand the tools and tasks require and their human capacity, injury or illness can occur that limit the longevity of their surgical career.
FUTURE PLANS

In addition to continuing the current work, Dr. Hallbeck will be looking at non-routine events in the OR, studying the workload in robotic surgery and testing out the web app version of the Microbreaks in the OR in 2016.

REFERENCES/PUBLICATIONS


Surgery Research Department of Surgery Research Profile
Raymond Hickey, M.S., Ph.D.
Surgery Research

BACKGROUND
After completing my graduate studies at Oregon Health & Sciences University, I began my postdoctoral training at Mayo in 2012 under the mentorship of Scott Nyberg, Stephen Russell and Yasuhiro Ikeda. During this time, my research has focused exclusively on liver-directed regenerative medicine. Specifically, my research interest has been on developing novel gene and cell therapies for metabolic liver diseases. During this time, I have been able to expand and develop a unique skill set that includes in vivo and ex vivo gene manipulation with viral vectors, stem cell and differentiated cell transplantation, and noninvasive cell imaging in small and large animals using nuclear imaging.

AIMS/GOALS
The long-term goal of my research is to demonstrate that ex vivo gene therapy in hepatocytes to be a bona fide regenerative treatment for patients with metabolic liver disease. The short-term goals are to demonstrate efficacy and safety of this approach in small (mouse) and large (pig) models of metabolic liver disease using both gene addition and gene correction strategies.

FINDINGS TO DATE
In the past four years, I have been part of a multidisciplinary research team that has generated and characterized the first genetically-engineered large animal model of a liver disease (hereditary tyrosinemia type 1). With this porcine model, we have demonstrated that ex vivo liver-directed gene therapy with a lentiviral vector to be a potential alternative clinical therapy to organ transplantation. Furthermore, we have been able to show that the sodium-iodide-symporter (NIS) gene can be used to longitudinally trace cells in vivo after injection using PET and SPECT imaging in mice and pigs, demonstrating for the first time noninvasive 3-dimensional imaging of regenerating tissue in individual animals over time.

CLINICAL IMPLICATIONS
The efficacy and safety of ex vivo gene therapy has been clearly demonstrated in the hematopoietic field, in which dozens of patients have recently undergone successful autologous cell therapy using lentiviral vectors.

Therefore, successful completion of these studies in preclinical models will lead directly to bringing this regenerative therapy to the clinic to treat the multiple metabolic liver disorders that are currently only curable by organ transplantation.

FUTURE PLANS
My future plans are focused on developing a program of independent translational science investigation in gene and cell therapy for liver disease. I plan to accomplish this by completing my short-term goals of demonstrating successful ex vivo gene therapy in animal models.
REFERENCES/PUBLICATIONS


Christopher G A McGregor, M.D.
Surgery Research

BACKGROUND

Having initiated the heart transplant program at Mayo Rochester in 1988, by 2000, 2 out of every 3 heart transplant recipients at Mayo, Rochester could be expected to live 10 years after transplant. These encouraging outcomes, however, could not be extended to the many patients needing this life saving therapy and thus the wider public health due to the chronic shortage of donor organs. With Institutional support, I and colleagues (Principal Coinvestigator Dr. Guerard Byrne) began a major internationally recognised program in Cardiac Xenotransplantation in 1999 which has been externally funded since.

AIMS/GOALS

The clear aim of the Mayo xenotransplantation program has been, from its beginning, to bring Cardiac Xenotransplantation to patient care. We also aim to apply platform technologies developed for Cardiac Xenotransplantation to create new cardiac and surgical devices, in the first instance a new generation of more durable biological heart valves for use in younger patients.

FINDINGS TO DATE

Over the last 20 years we have made great progress. Prior to 1994 xenotransplanted organs functioned for minutes only. By 2014, we reported at Mayo that xenotransplanted hearts can fully sustain the circulation orthotopically in a nonhuman primate for two months (remains longest survival in the world). Our Xenotransplantation research program has also made fundamental discoveries which
have advanced our understanding of xenograft rejection, enhanced xenograft survival and contributed broadly to other biomedical fields including identification of a new immunogenic non-Gal xenogeneic antigen encoded by the pig B4GALNT2 transferase and demonstrated anti-Gal antibody induced calcification of fixed bioprosthetic porcine tissue.

**CLINICAL IMPLICATIONS**

The current transplant waiting list in the U.S. is 120,000 patients with only 28,000 transplants being performed annually, many of which are now living donors. Approximately 20 patients die on the waiting list each day. Without donor constraints, which successful xenotransplantation could, at least in part, address, it is estimated that 100,000 transplants could be done each year in the U.S. Our recognition of the role of anti-Gal antibody in calcification of bioprosthetic heart valves (BHV) provided the first clinically feasible mechanism for premature age-dependent BHV calcification and degeneration. This has spurred widespread interest in developing Gal-free BHVs from GTKO pig tissues which would be resistant to this antibody induced calcification. These new GTKO BHVs would provide improved durability and offer alternative therapies to younger patients which could avoid the need and associated risks of long-term anticoagulation.

**FUTURE PLANS**

We plan to continue developing new porcine donor genetics to further advance Cardiac Xenotransplantation and as source material for new replacement heart valves. We are actively pursuing commercial development of a new Gal-free Biological heart valves. The initial clinical application of Cardiac Xenotransplantation appears plausible within the next 5 years.

**REFERENCES/PUBLICATIONS**

- Preclinical heterotopic intrathoracic heart xenotransplantation: a possibly useful clinical technique Abicht, J-M; Mayr, T; Reichart, B; Buchholz, S; Werner, F; Lutzmann, I; Schmoeckel, M; Bauer, A; Thomann, M; Langenmayer, M.H; Nadja; Pohla; Heike; Herzog, R; McGregor, CG; Ayares, D; Wolf, E; Klymiuk, N; Bäehr, A; Kind, A; Hagl, C; Ganswindt, U; Belka, C; Guethoff, S; Brenner, P. Xenotransplantation. In Press, 2015. Manuscript ID XEN-15-O-0041.R2
Severe aortic valve stenosis portends 5-year event-free survival of less than 25%, with surgery or percutaneous valve replacement being the sole options for treatment. Numerous reports have demonstrated that mechanisms mediating valve calcification can be initiated or progress by processes that either resemble osteogenesis or resemble amorphous ectopic calcification secondary to cellular apoptosis and/or necrosis. Such observations suggest that initiation and progression of valve calcification is an active process that may be targeted therapeutically.

AIMS/GOALS

Our program aims to identify novel mechanisms that contribute to valvular calcification by leveraging high-throughput screening of human tissue, robust animal models of valve stenosis, and in vitro model systems of cell differentiation and calcification. We predominantly focus on novel pathways that are therapeutically viable, with an ultimate goal of moving from “Bench-to-Phase II Trial” as rapidly as possible.

FINDINGS TO DATE

Over the past 6 years, our research group has generated compelling data implicating roles for reactive oxygen species, nitric oxide signaling, epigenetic modifications, and senescent cell burden in the pathogenesis of calcific aortic valve disease. We have also taken the first steps to translating our findings in fundamental biology to clinical practice by conducting phase I and Phase II clinical trials in humans using activators of nitric oxide signaling.

CLINICAL IMPLICATIONS

Our work has profound implications for the manner in which patients with calcific aortic valve disease are managed. By developing novel therapeutic strategies to slow progression of valvular calcification and fibrosis, we aim to delay or prevent the need for surgical intervention in patients with mild to moderate valvular stenosis.

FUTURE PLANS

We are not only working on novel therapeutic strategies to slow progression of valve disease which stem from our ongoing discovery work, but are also initiating parallel translational studies in humans and experimental models of myxomatous mitral valve disease.
Virginia M. Miller, Ph.D.
Surgery Research

BACKGROUND
For over 25 years, research in my laboratory has been directed toward understanding the factors and mechanisms involved in vascular remodeling which contribute to development and progression of cardiovascular disease across the life-span of an individual including: genetic influences (sex chromosome and autosomes), alterations in the hormonal milieu, influences of inflammation resulting from infection and mechanical forces of the blood against the vascular wall. Our work has taken an integrated approach by evaluating the physiological interactions among the autonomic nervous system, cells and cell-derived products in the blood and components of the blood vessel wall (the endothelium and vascular smooth muscle). I am currently Principal Investigator for the NIH-funded Building Interdisciplinary Careers in Women's Health (BIRCWH). As such, I am responsible for developing interdisciplinary mentoring and training activities for junior investigators. As Director of Mayo Clinic’s Women’s Health Research Center, I am also the Principle Investigator for the NIH funded Mayo Clinic Specialized Center of Research on Sex Differences.

AIMS/GOALS
Understand how sex-specific factors (pregnancy related disorders and menopause) contribute to development of cardiovascular disease and cognitive decline in women as they age.

Identify a set of noninvasive tests and biomarkers that can provide early identification for women at risk for accelerated development of cardiovascular disease and cognitive decline.

Mentor the next generation of researchers in topics of sex- and gender-based medicine.

FINDINGS TO DATE
Menopausal hormone treatments given within three years of menopause relieve menopausal symptoms including mood, depression and sleep but do not accelerate development of cardiovascular disease or impair cognition over a four year period.

Variants in genes associated with innate immunity influence a woman’s response to menopausal hormone treatments.

Microvesicles derived from activated cells circulating in the blood, differ between men and women across the life span.

CLINICAL IMPLICATIONS
Our research provides evidence for understanding physiological consequences of conditions specific to women that contribute to life-long risk for chronic diseases. This evidence is required in order to prevent chronic diseases in women and to optimize their care.

FUTURE PLANS
Continue to investigate sex- and gender-differences in cardiovascular disease.

Continue to develop programs to integrate evidence of sex- and gender-differences into all aspects of research and medical education.
REFERENCES/PUBLICATIONS

Original Research:


BACKGROUND

My medical research interests are broad and can be categorized as the investigation of human healthy and diseased states in an evolutionary and ecological framework. I am particularly interested in studying cancer microniches and their relevance to the etiology and progression of the disease. My main area of focus has been in endometrial cancer, as it represents a great platform to study the disease in its early manifestations, with adequate access to surgical controls (benign hysterectomies).

AIMS/GOALS

The long-term goals of my research are to elucidate carcinogenic mechanisms and provide new insights and innovative approaches to the early detection of risk factors for the development of cancer and translate findings into targeted preventive actions. The short-term goals are to test a proposed microbially induced endometrial cancer hypothesis.

FINDINGS TO DATE

We have found that the vaginal and uterine microbiome of patients with endometrial cancer is statistically distinct from that of patients afflicted with a benign uterine condition. Furthermore, we have found two microbes (Atopobium vaginae and Porphyromonas sp.) significantly associated with samples recovered from endometrial cancer patients.

CLINICAL IMPLICATIONS

Based on the pathogenic profile of the identified microorganisms we have generated a step-wise carcinogenic hypothesis where Atopobium vaginae facilitates the host intracellular infection by Porphyromonas sp., leading to the dysregulation of the Hypoxia Inducible Factor (HIF), a well-known angiogenic complex and a hallmark of endometrial cancer. The confirmation of our hypothesis would allow for an actionable target for primary prevention of the disease.

FUTURE PLANS

We will pursue the testing of our hypothesis through collaboration with the Biomarker Discovery Program and the development of experimental endometrial cell tissue lines with the DLMP. We have also assembled a one-of-a-kind instrument – Optofluidics platform – that we will use to add experimental resolution and reduce the level of artificial manipulations when testing our hypothesis. We are collaborating with MIT/Broad Institute to leverage our technical capabilities and single-cell whole genome sequencing.

REFERENCES/PUBLICATIONS:

Juliane Bingener-Casey, M.D.
Subspecialty General Surgery

BACKGROUND
The research of Juliane Bingener, M.D., a minimally invasive and gastrointestinal surgeon, evaluates minimally invasive surgical procedures, patient reported outcomes and surgical team workload by conducting clinical trials using patient centered research methods and database analysis.

AIMS/GOALS
The long-term goal of her research program is to utilize novel technology to improve patient outcomes by reducing the impact of surgery on patients’ quality of life.

FINDINGS TO DATE

Novel techniques: Dr. Bingener developed a novel approach from bench to bedside for perforated peptic ulcers, the transluminal endoscopic omental patch. Lessons learned have now been translated to expand minimally invasive treatment options for patients with benign GE-Junction lesions.

Perioperative patient reported outcomes predict serious postoperative complications: Secondary analysis of the COST trial (Clinical Outcomes of Surgical Therapy) (NCCTG 93-46-53) revealed that patient QOL at baseline is an important predictor for grade 3 complications. High preoperative pain scores and fatigue on postoperative day 2 were correlated with readmission.

Patient fatigue is a powerful discriminator of patient outcomes: Dr. Bingener led a NIH-funded double blinded RCT to compare novel minimally invasive procedures to each other. Patient fatigue on day 5 discriminated between the procedures and severe fatigue was correlated with high IL-6 cytokine levels.

Sentinel events and human factors: Cognitive factors (e.g. confirmation bias, focus on a single issue) were the three most common causes of never events in the surgical and procedural practice, more frequent than communication.

CLINICAL IMPLICATIONS
Both patient-report outcomes and surgical team workload affect patient outcome. Perioperative patient reported outcomes are meaningful predictors of surgical outcomes and can be used at the bedside for assessment, shared decision making and the design of interventions including novel technology and techniques.

FUTURE PLANS
Dr. Bingener and her team are developing a patient centered app to integrate quality of life interventions, physical fitness, preoperative nutrition and anemia into preoperative management (iPREHAB).

Together with the Health Systems engineering group we are working to measure and optimize cognitive workload in the surgical practice and see opportunities as Mayo Clinic transitions to a new electronic health record.

REFERENCES/PUBLICATIONS
- Bingener J, Sloan JA, Novotny PJ, Pockaj BA, Nelson H. Perioperative patient-reported outcomes predict serious postoperative complications: a secondary analysis of the


Amy C. Degnim, M.D.
Subspeciality General Surgery

BACKGROUND

Through my training and career, I have developed clinical and research expertise in high risk breast lesions, biomarkers of breast cancer, and breast cancer risk prediction. I lead the Mayo Clinic Benign Breast Disease Cohort research team, a study of ~13,000 women with benign breast biopsies among whom ~1200 developed later breast cancer. This research effort focuses on investigating histologic and genomic tissue biomarkers of breast cancer risk, toward a better understanding of premalignant changes and critical factors in breast carcinogenesis.

As a breast surgeon, I also have an interest in reducing surgical complications related to breast surgery, especially surgical site infection.

AIMS/GOALS

- To develop improved breast cancer risk prediction models based on histologic and molecular markers, and therefore improve utilization of effective breast cancer prevention therapies

- To understand the immune microenvironment in normal and benign breast tissues and changes associated with increased breast cancer risk

- To investigate the relationship of the breast microbiome with the immune microenvironment

- To improve clinical management of high risk lesions diagnosed on core needle biopsy

- To pursue novel vaccine approaches for the prevention of breast cancer
To develop methods for reduction of surgical site infection related to drain antisepsis

FINDINGS TO DATE

• Developed a new model for predicting breast cancer risk after a benign breast biopsy that performs better than the standard Breast Cancer Risk Assessment Tool (Gail model).

• In women with atypical hyperplasia, longterm risk is 1–2% per year and is stratified by the number of foci of atypical hyperplasia present within the biopsy tissues.

• Identified a gene signature of breast cancer risk in women with a common abnormality called sclerosing adenosis, and on a similar gene signature of risk for atypical hyperplasia.

• There is a mucosal immune system in normal breast tissue, and breast tissues with benign disease appear to have increased inflammation. Quantities of dendritic cells and B cells specifically appear to be associated with risk of breast cancer.

• The breast tissue has an endogenous microbiome, which is the presumed source of the breast mucosal immune system and which may also contribute to breast cancer risk.

• Drain antisepsis measures are associated with reduced colonization of surgical drains, which in turn is associated with lower risk of surgical site infection.

CLINICAL IMPLICATIONS

Improved ability to predict risk accurately for individual women will have dramatic consequences for both breast cancer screening and prevention, allowing tailored management that will maximize benefits across the population while reducing costs and toxicities of screening and prevention therapies. Our stratification of risk in women with atypical hyperplasia allows identification of women with a >25% lifetime risk of breast cancer, where management may be altered. In addition, gene signatures of risk will be similar. The finding of a mucosal immune system in normal/premalignant breast tissues indicates that critical immunologic machinery is present for a prevention vaccine to be effective. If microbial patterns are identified that are associated with breast cancer risk, this may be amenable to targeted antimicrobial or vaccine prevention therapies, leading to a profound reduction in breast cancers.

FUTURE PLANS

• Investigate genomic signatures of risk specifically for ER+ and ER- breast cancer. Incorporate genomic risk signatures into our clinical risk prediction tool.

• Pursue functional studies and further characterization of the immune system in premalignant breast tissues.

• Continue work to understand the breast microbiome and its possible association with breast carcinogenesis.

REFERENCES/PUBLICATIONS


Subspecialty General Surgery
Department of Surgery Research Profile


David R. Farley, M.D.
Subspecialty General Surgery

BACKGROUND

Although my 15 years as Mayo Clinic-Rochester’s General Surgery Program Director are now nearly 5 years behind me, I remain committed to training young men and women to be exceptional surgeons. With the luxury of 0.2 FTE to teach, train, assess, and remediate students, residents, and fellows, I remain passionate and committed to Mayo’s educational efforts but concerned the lack of surgical and patient care repetitions will ‘allow’ our graduates to regress to the mean.

AIMS/GOALS

- To create an engaging, functional, and efficient surgical curriculum that better prepares Mayo trainees BEFORE they start EVERY surgical rotation or experience.

- Offer surgical repetitions (online, simulation center, at home models, etc.) to facilitate long term memory and skill acquisition for surgical learners.

- Create and utilize reliable, valid, and efficient assessment tools that delineate to learner and staff the strengths and weaknesses of examinees.

- Create and utilize reliable, valid and efficient remediation strategies that improve trainee performance and self-confidence.

- Develop online, simulation, and hands-on resources that generate revenue to help provide funds to support this educational mission.
FINDINGS TO DATE

The preliminary efforts of the Farley Innovative Research Surgical Team (FIRST) suggest that: “repetition remains the Mother of Learning”, millennial learners engage with hands-on and online learning tools, and objective assessment of surgical learners is not only possible, but necessary.

CLINICAL IMPLICATIONS

Better prepared trainees will 1) learn and retain more knowledge, 2) perform surgical and patient care tasks better, 3) improve staff satisfaction, and 4) enhance patient outcomes.

FUTURE PLANS

Expand the online website to include all Mayo Clinic Department of Surgery Surgeons. Provide online and hands on courses for Mayo Clinic Health System surgeons and those within the Mayo Network and beyond. Additional educational efforts directed to patients themselves is currently a work in progress.

REFERENCES/PUBLICATIONS


Subspecialty General Surgery
Department of Surgery Research Profile

Michael B. Farnell, M.D.
Subspecialty General Surgery

BACKGROUND
My research interests are in the clinical sphere. I have interests in the surgical management of pancreatic disease including but not limited to malignancy, cystic disease of the pancreas, and chronic pancreatitis.

AIMS/GOALS
The aims of my research are to improve outcomes for patients undergoing surgical management of pancreatic disease and to determine the role of neoadjuvant chemotherapy in the management of patients with borderline and locally advanced pancreatic adenocarcinoma.

The goals of the research are to improve decision-making, decrease surgical complication rates, and improve outcome following various surgical procedures for both benign and malignant pancreatic disease. Further define the role of venous resection and reconstruction for borderline resectable pancreatic cancer.

FINDINGS TO DATE
• Pancreatoduodenectomy for chronic pancreatitis results in good pain relief and quality of life
• Postpancreatectomy hemorrhage is often best managed with endovascular techniques
• CT scanning preoperatively can be used to predict the risk of post Whipple anastomotic leak

CLINICAL IMPLICATIONS
The use of neoadjuvant therapy in patients with borderline resectable and locally advanced disease may allow a larger pool of patients presenting with pancreatic cancer to undergo potentially curative surgery. Fistula risk scoring is currently being used to implement a fistula mitigation strategy post Whipple resection.

FUTURE PLANS
• Continue to investigate surgical outcomes for patients with borderline resectable and locally advanced malignancy
• Utilize the National Cancer Database to determine outcomes of neoadjuvant therapy in patients with stage III pancreatic cancer
• Implement a prospective study assessing measured versus estimated blood loss in patients undergoing both open and laparoscopic Whipple resection

REFERENCES/PUBLICATIONS
Tina J. Hieken, M.D.
Subspecialty General Surgery

BACKGROUND
My research interests are diverse and include clinical and translational investigations focused on breast cancer and melanoma.

AIMS/GOALS
- Understanding the relationship of the human microbiome and breast cancer. We are investigating the microbiome in human breast tissue to explore differences in benign and malignant disease states with the goals of creating a microbiome-based approach to risk prediction, prevention and enhancement of therapeutics.
- Benign breast disease. In an effort to enhance breast cancer risk stratification and to develop individualized risk-reduction strategies, we are investigating molecular markers of breast cancer risk.
- Using advanced imaging modalities and adhesion molecule signatures to facilitate individualized surgical management of breast cancer and melanoma patients. One aim is preoperative assessment of nodal disease burden to tailor surgical treatment.

FINDINGS TO DATE
- Our pilot work has established the existence of a distinct breast tissue microbiome, clearly different from that of skin tissue, from sterile intraoperatively-collected specimens.
We have demonstrated a reduced risk of future breast cancer in women with atypia with high ER Beta expression, generating the hypothesis that ER Beta may play a role in mitigating future breast cancer risk in women with benign breast disease.

We have demonstrated that nodal ultrasound and cross-sectional imaging predicts nodal disease burden in women with breast cancer. We support our investigator colleagues in applying a cellular adhesion molecule based risk-prediction signature to guide surgery for clinically node-negative melanoma patients.

**CLINICAL IMPLICATIONS**

Breast cancer and melanoma both remain significant public health challenges. Efforts to identify at-risk patients to individualize care and tailor surgical treatment have the potential to improve quality of life and cancer-specific outcomes for hundreds of thousands of breast cancer and melanoma patients.

Better characterization of biomarkers for breast cancer risk has the potential to benefit hundreds of thousands of women and supports a risk-stratified approach to screening. Our work could identify novel strategies both to decrease risk and improve treatment response, including identification of new targeted therapies and vaccines.

**2015 REFERENCES/PUBLICATIONS**


James W. Jakub, M.D.

Subspecialty General Surgery

BACKGROUND

Dr. Jakub’s major area of interest is oncologic surgery with a focus primarily on breast cancer and melanoma. Much of my recent research has been focused on evaluating the immunologic perturbations of SLNs in an attempt to identify the immuno-modulators released by the primary tumor that are responsible for the immunosuppressive effects. His team is exploring ways the tumor and immune system interact and identifying ways to intercede and restore the host regional immune response. He has been a leader in disseminating the technique of minimally invasive inguinal lymph node dissection for melanoma and radioactive seed localized breast surgery. He has led a multi- institutional prospective study training surgeons in this technique and evaluating the role of minimally invasive inguinal lymph node dissections in melanoma.

AIMS/GOALS

• Standardizing best practice across the service line
• Minimizing the effects of breast and melanoma surgery by decreasing surgical morbidity
• Identifying immuno-modulators released by the primary tumor and restoring host tumor immunity
• Individualizing management of in-transit disease in melanoma
Subspecialty General Surgery
Department of Surgery Research Profile

FINDINGS TO DATE

- The Safety and Feasibility of Minimally Invasive Inguinal Lymph Node Dissection (SAFE-MILND) trial is a multi-institutional prospective trial presented at the 2015 Society of Surgical Oncology meeting. Two manuscripts have been published in JACS and Annals of Surgery in 2016. Two additional abstracts are forthcoming. This trial has demonstrated:
  - the procedure is non-inferior to the open approach
  - this method of training surgeons on a new technique is effective
  - Viewing 1 minute segments of a procedure is as informative of surgical prowess as watching the entire procedure
  - baseline laparoscopic technical skills can be measured, translated into early outcomes for a new surgical technique and should be considered when entering patients in a surgical trial

Sentinel lymph nodes in patients with melanoma are immunosuppressed:
  - even when histologically negative
  - this immunosuppression precedes and is a prerequisite for nodal metastasis
  - the immunosuppressive effects travel from primary tumor through the lymphatics to the SLN
  - a prospective randomized intervention trial is now accruing to determine if we can reverse these effects

Nodal status in patients with in-transit disease in melanoma:
  - is strongly prognostic
  - SLN biopsy to identify occult nodal metastasis should be strongly considered
  - patients with macroscopic nodal disease should undergo neoadjuvant systemic therapy

CLINICAL IMPLICATIONS

- Decreasing morbidity of inguinal node dissections through a minimally invasive approach
- By establishing structured preoperative training for surgeons in practice we can allow them to safely adopt new procedures, mitigate the learning curve and allow surgeons to overcome the steep part of the learning curve outside of their first operative patients
- Better prognosticating patients with in-transit melanoma and allowing a more evidence based treatment approach based on risk of recurrence and death
- Photographs of the operative field following a lymphadenectomy are an objective measure of operative quality.
- Defining single best practice algorithms for the majority of patients we care for

FUTURE PLANS

- Identify the molecules released by the primary tumor that are responsible for regional immunosuppression and identify ways to intervene to reverse the host immune immuno- subversion caused by cancer
- Developing a nomogram to predict the likelihood of DCIS being upstaged to invasive cancer
- Decreasing seromas and drain days in patients undergoing regional lymph node dissections
- Continue to work to standardize best practice within the section, across the service line and across the Mayo sites
REFERENCES/PUBLICATIONS


BACKGROUND

My area of research interest includes the areas involved with both endocrine and metabolic surgery. These include thyroid, parathyroid, adrenal, functional neuroendocrine pancreas, obesity and related comorbid conditions. I have particular interest in adrenal surgery and related research. One area of interest currently is the identification and management of adrenal incidentalomas at Mayo.

AIMS/GOALS

- Refine and develop surgical approaches to patients with both benign and malignant neoplasms of the endocrine organs including thyroid, parathyroid, adrenal, and pancreas.
- Develop and promote clinical algorithms that improve outcomes for patients diagnosed with adrenal neoplasms
- Identify lapses and develop algorithms allowing for appropriate management of patients with incidentally discovered adrenal neoplasms

FINDINGS TO DATE

- 4% of patients who undergo CT of the abdomen will an incidentally discovered adrenal neoplasm (incidentaloma). It is unclear as to what percent of these adrenal incidentalomas are appropriately characterized and workup based on current guidelines. Many of these neoplasms will meet criteria for surgical removal based on size and/or functional status.
Subspecialty General Surgery
Department of Surgery Research Profile

CLINICAL IMPLICATIONS

- Identifying what percent of patients with incidental discovered adrenal masses that are not appropriately worked up will allow us to better design an algorithm to better capture these patients and perform appropriate workup in a prospective manor.

FUTURE PLANS

- Retrospectively study current algorithm to capture and workup adrenal incidentalomas found on trauma CT scans at Mayo.
- Implement and prospectively study an algorithm to prevent missing these patients and preventing inappropriate workup and management.

David M. Nagorney, M.D.
Subspecialty General Surgery

BACKGROUND

HPB Surgical Fellow under Dr. L. H. Blumgart, Royal Postgraduate Medical School, Hammersmith Hospital, London. Clinical interest/research focused on interface between complex hepatobiliary resection for malignancy and liver transplantation.

AIMS/GOALS

- To improve outcomes in patients undergoing combined hepatobiliary resections for bile duct cancer/primary and metastatic hepatic malignancies.
- To evaluate outcomes of hepatobiliary resections or liver transplantation using Mayo and National databases.
- To promulgate concurrent resection of primary gastrointestinal diseases and hepatic metastases.

FINDINGS TO DATE

- Survival after HB resections and liver transplantation is equivalent for de novo hilar cholangiocarcinoma for node-negative disease and greater than liver transplantation for node-positive disease.
- Survival after liver transplantation is greater than resection in patients with hepatocellular cancer.
- Survival and endocrinopathy control after liver resection for metastatic neuroendocrine cancer is equivalent or better than that for liver transplantation.
CLINICAL IMPLICATIONS

- Hilar cholangiocarcinoma – if survival with resection continues to improve (i.e., increased operative safety, adjuvant therapy, etc., liver transplantation for de novo hepatocellular carcinoma will decrease with increases in organ availability.
- Hepatocellular – limits the role of resection for HCC and expand role for other liver-directed therapy.
- Colorectal metastases – concurrent resection liver mets and primary colon cancer decreases hospital stay, cost and time off for chemotherapy.

FUTURE PLANS

- Promote/foster interinstitutional studies on HPB malignancies.
- Promote adjuvant and neoadjuvant therapy for HC, HCC and metastatic hepatic malignancies.

REFERENCES/PUBLICATIONS

Subspecialty General Surgery
Department of Surgery Research Profile


Melanie L. Richards, M.D.
Subspecialty General Surgery

AIMS/GOALS

Minimally invasive surgical techniques must be equivalent or surpass the current standards to be accepted in clinical practice. Research in these techniques must assess efficacy, safety and cost-effectiveness.

FINDINGS TO DATE

My research focus has been to evaluate these aspects in endocrine surgery. Our current projects include:

- Robotic single-site adrenalectomy (we were the first to report on this technique).

- Utilization of multi-modality imaging in the localization of parathyroid disease.

- Identification of the most accurate and cost-effective strategy to identify metastatic papillary thyroid cancer in the lateral neck.

- Assessment accuracy of ultrasounds for determining single or multifocal lateral neck metastasis in PTC to identify if there is a cohort of patients who may benefit from a limited neck dissection or other minimally to invasive techniques such as ethanol ablation.
Rory Smoot
Subspecialty
General Surgery

BACKGROUND
Cholangiocarcinoma is a devastating disease process with limited treatment options. Mayo Clinic has been at the forefront of battling this disease at the clinical and basic research level. My research interests focus on identifying molecular derangements in cholangiocarcinoma tumors. Identification of these derangements has given us insight into targeted therapies that may be available. We have developed multiple preclinical models of cholangiocarcinoma, including patient derived xenografts, allowing interrogation of therapeutic strategies.

AIMS/GOALS
• Identify aberrant signalling pathways in cholangiocarcinoma
• Target these aberrant pathways
• Translate benchtop findings for preclinical models and early clinical trials

FINDINGS TO DATE
The research group I am involved in has identified multiple aberrant signaling pathways in cholangiocarcinoma. Currently we are focused on the crosstalk between receptor tyrosine kinases and the developmental Hippo pathway. We have identified significant activation in cholangiocarcinoma cell lines and human tumors of this developmental pathway, which appears to be at least in part due to inputs from receptor tyrosine kinases.

This crosstalk has allowed us to target these pathways in preclinical models and has demonstrated efficacy. Preliminary phase 2 studies are being designed to evaluate inhibition of these pathways as a therapeutic strategy.

CLINICAL IMPLICATIONS
A large proportion of human cholangiocarcinoma tumors (50-80%) have been demonstrated to have aberrant hippo pathway signaling. This may serve as a biomarker for targeted therapies and open up new avenues of treatment for patients with this devastating disease.

FUTURE PLANS
• Continue evaluating and dissecting the regulation of aberrant pathways in cholangiocarcinoma
• Phase 2 trial in metastatic disease evaluating targeted therapy for cholangiocarcinoma
Dr. Geoffrey B. Thompson is Section Head of Endocrine Surgery at Mayo Clinic and Professor of Surgery within the Mayo Clinic College of Medicine. In addition, he is the Senior Associate Dean for Faculty Affairs in Mayo Medical School.

- Dr. Thompson’s principal research interest has been in the area of surgical disorders of the thyroid, parathyroid, and adrenal glands, as well as pancreatic and gastrointestinal neuroendocrine tumors. He has a particular interest in caring for pediatric patients and familial endocrine syndromes. Dr. Thompson is also interested in faculty development as it relates to undergraduate medical education. He is the author of more than 170 peer-reviewed publications and book chapters and serves on four editorial boards. Below is a list of recent publications.

**REFERENCES/PUBLICATIONS**


Dr. Judy C. Boughey is Division Chair Surgery Research – Subspecialty General Surgery. My research efforts are diverse across the field of breast cancer and breast surgery and include research projects on prophylactic mastectomy, frozen section in breast cancer; clinical trials on the management of the axilla after neoadjuvant chemotherapy and on breast cancer genomics and patient derived xenografts to advance drug development; and outcomes analysis using National Cancer Data Base (NCDB).

**AIMS/GOALS**

- To advance the care of the surgical patient with breast cancer
- To tailor management of the axilla after neoadjuvant chemotherapy based on response to chemotherapy (National PI of Z1071 and A11202 NCI funded clinical trials)
- To evaluate use of breast conserving therapy for women with multiple ipsilateral breast tumors (National PI of Z11102 NCI funded clinical trial)
- To advance drug development in high risk breast cancers resistant to current chemotherapy
- To demonstrate value of frozen section analysis of breast margins

**FINDINGS TO DATE**

- ACOSOG Z1071 was a prospective clinical trial open at 136 institutions which showed a false negative rate of sentinel lymph node biopsy of 12.6% for SLN after neoadjuvant chemotherapy for breast cancer.
• Review of the Mayo Clinic Rochester breast surgery practice has shown re-operation rate after lumpectomy of 3% which is significantly lower than national average.

• Beauty – Breast Cancer Genome Guided therapy trial enrolled 140 patients with high risk breast cancer being treated with neoadjuvant chemotherapy and obtained tumor for sequencing and patient derived xenografts.

We have demonstrated that:
• Deleterious variants in cancer susceptibility genes are highly prevalent in patients with invasive breast cancer referred for neoadjuvant chemotherapy undergoing exome sequencing and that detection of these variants impacts medical management.
• Patient derived xenograft take rate overall was 24.2% and varied according to breast cancer subtype but not by response to chemotherapy. In vivo testing of novel agents based upon sequencing demonstrated antitumor activity.

CLINICAL IMPLICATIONS

Results of ACOSOG Z1071 were published in JAMA in 2012 and this work has changed the approach to the axilla across the US and internationally for many patients with node positive breast cancer treated with neoadjuvant chemotherapy. Frozen section analysis of breast margins remains routine at MCR. Publications and associated media coverage have raised awareness of the benefit of this approach and brought additional patients to MCR.

FUTURE PLANS

• Develop Beauty 2 protocol (with collaboration with pharma) which will provide access to novel agents for patients with chemoresistant disease based on genomic sequencing and information from Beauty 1.

• Alliance A011202 is a prospective clinical trial which is underway comparing axillary radiation to axillary dissection for women with residual node positive disease identified by sentinel node surgery after neoadjuvant chemotherapy.

• Analysis of 5 year follow up data from Z1071 which will be available in 2016.

REFERENCES/PUBLICATIONS


Colon and Rectal Surgery
Department of Surgery Research Profile

David W. Larson, M.D.
Colon and Rectal Surgery – Division Chair

BACKGROUND
My research is focused on specific areas within the specialty of Colon and Rectal Surgery including: minimally invasive surgery, complex cancers and inflammatory bowel disease. Initially my focus has been on Standardized Pathways and Postoperative Recovery, as well as a focus on work in Electronic Medical Record (EMR), Informatics and Natural Language Processing.

AIMS/GOALS

- Develop and define best practices regarding minimally invasive surgery for the treatment of complex rectal and colon cancers as well as IBD, maximizing quality of life and long term survival while reducing complications.

- Improving overall processes of care, standardizing to best value reduction of waste and improving outcomes.

- Utilizing Advanced Natural Language Processing and Informatics approaches in the current Electronic Medical Record to allow new information to become accessible, meaningful and actionable.

FINDINGS TO DATE

- Multiple publications demonstrating the value of standardized care and the improvement of postoperative outcomes and length of stay as well as cost.

- Advancements in the technical outcomes using minimally invasive approaches including robotics within the field of rectal cancer, as well as colon cancer.

- RO1 Grant Fund in concert with Health Science Research using National Language Processing with the current EMR.

CLINICAL IMPLICATIONS

- With standardization of practice, the opportunities avail themselves to improve practice on a continuous basis through additional randomized clinical controlled trials which the division has implemented over 2015.

- Advancement of minimally invasive techniques to a larger and greater patient population including advanced malignancies.

- Using informatics approaches as well as Natural Language Processing and improving the ability to utilize data in provider workflow to allow it to become meaningful, actionable and accessible.

- Partnering with our side companies to leverage new technologies in hydration and robotic surgery.

FUTURE PLANS

- Capitalize on the standards of practice to allow for experimentation through randomized clinical controlled trials.

- Continue through RO1 Funding to develop automated processes utilizing Natural Language Processing to improve provider understanding of patient states and allow for automation to maximize meaningful clinical information.

- Advance IP with ongoing collaboration with outside firms.

- Increase the exposure of cancer and the Mayo Brand across the U.S., as well as internationally.
Eric J. Dozois, M.D.
Colon and Rectal Surgery

BACKGROUND

My research has been focused on specific areas within the specialty of colorectal surgery including surgical innovation and clinical outcomes in patients with complex pelvic tumors, young onset colorectal cancer and inflammatory bowel disease.

AIMS/GOALS

- Develop and refine surgical approaches to patients with both benign and malignant complex pelvic tumors that reduce complications, improve quality of life and maximize long-term survival
- Develop and promote clinical algorithms that improve cancer outcomes in patients and their families with young onset colorectal cancer
- Determine if fistula plugs coated with autologous mesenchymal stem cells will improve fistula healing young onset colorectal cancer
- Develop and test a continence device in patients with permanent stomas to improve their quality of life

FINDINGS TO DATE

- Patients with advanced recurrent rectal cancer that are typically considered unresectable (aorto-iliaic involvement, high sacral and re-recurrence) can have up to 40% 5-year survival if an R0 resection can be achieved
- Patients with benign presacral tumors (tailgut cysts, schwannomas) have good quality of life and low recurrence rates when an organ-sparing approach is used
• Phase I data suggest that a greater than 90% healing rate can be achieved using a stem cell coated fistula plug in patients with fistulizing perianal Crohn’s disease.
• Early (animal) data suggest that an implantable continence device is safe, effective and ready for human trials.

CLINICAL IMPLICATIONS
• Increase inclusion criteria in patients with advanced recurrent rectal cancer.
• Tailored approach to patients with benign and malignant presacral tumors improves cancer outcomes and quality of life.
• Stem cell coated fistula plugs may prove to be a safe, highly effective sphincter sparing approach to the management of both IBD and non-IBD perianal fistulas which will address a significant current clinical gap in fistula treatment.
• An easy to use continence device for patients with permanent stomas will have a dramatic impact on quality of life.

FUTURE PLANS
• Prospectively study outcomes in patients with complex pelvic tumors including quality of life measures following surgery.
• Begin Phase II trials using stem cell coated fistula plugs in adults with Crohn’s disease.
• Begin I trials in pediatric patients with fistulizing Crohn’s disease.
• Begin Phase I trials in adult patients with cryptoglandular perianal fistulizing disease.
• Begin human trials using continent stoma device.
• Review the impact on surgical decision making and family counseling in young onset colorectal cancer who had preoperative biochemical testing for Lynch Syndrome.

REFERENCES/PUBLICATIONS
Scott R. Kelley, M.D.
Colon and Rectal Surgery

BACKGROUND

I have a broad interest in all aspects of colon and rectal surgery, as well as surgical history and education. Projects I am currently working on include: collaborative quality improvement project with gastroenterology to increase colonoscopy preparation compliance, defining rates of urinary retention in colon and rectal surgery patients, developing a protocol for a Phase III study evaluating the utility of a new sphincter sparing radially (360°) emitting diode laser fiber (“FiLaC™”, Biolitec, Germany) for closure of fistula in ano.

AIMS/GOALS

- To advance the care of patients colon and rectal cancer
- Increase compliance rates for bowel preparation for colonoscopy
- To advance technological developments for treatment of fistula in ano
- To define a true rate for urinary retention following colon and rectal surgeries
- To mentor trainees

FINDINGS TO DATE

- Currently 10% of patients at Mayo Clinic, Rochester present for a colonoscopy with a poor or inadequate bowel preparation, which results in aborting the procedure after sedation, completing another prep, and rescheduling. This leads to significant patient dissatisfaction including the downstream effect of friends and family members.

- Fistula in ano prevalence rates of 12.3 cases per 100,000 for men and 5.6 cases per 100,000 for women, with an overall prevalence of 8.6, have been documented. Treatment is challenging and healing rates have not improved significantly since the 1970’s even though we have multiple procedural options to choose from. A new sphincter sparing radially (360°) emitting diode laser fiber was recently introduced and has shown promising results in small studies with healing rates ranging from 71 to 88%. Fistula Laser Closure (FiLaC) has yet to be performed or studied in the United States, and has only been evaluated in small series.

- Urinary retention following colon and rectal surgery ranges from 2% to 49% in the literature, although there is no clear definition of what constitutes urinary retention. Postoperatively if a patient requires a single in and out bladder catherization, or is discharged requiring ongoing catherizations, per ICD-9 terminology they are considered to have urinary retention. Randomly reviewing 20 of those charts revealed 2 patients requiring ongoing urinary catherizations after discharge. A definition of urinary retention should only include those patients discharged home requiring ongoing urinary catherizations.

CLINICAL IMPLICATIONS

- Improving the quality of bowel preparation can increase colonoscopy completion, polyp detection rate, patient satisfaction, and decrease cost (repeat endoscopy, prep, anesthesia, etc.) and procedural time.
• Finding a better treatment (healing rate) for fistula in ano will significantly affect patient outcomes and quality of life including symptoms of pain and discomfort, persistent drainage, issues with perianal hygiene, recurrent perianal abscesses, and sepsis.

• Defining a true rate of urinary retention will impact how we define urinary retention in the era of institutional publishing of surgical complications.

FUTURE PLANS

• Continue advancing care of patients with colon and rectal surgery
• Mentor trainees

REFERENCES/PUBLICATIONS


Kellie L. Mathis, M.D.
Colon and Rectal Surgery

BACKGROUND

I completed the Clinical Investigator Training Program at Mayo Clinic during my residency training and went on to complete a Master’s degree in clinical and translational science.

AIMS/GOALS

• To improve outcomes in patients undergoing colon and rectal surgery
• To understand risk factors for surgical site infections and particularly anastomotic leaks and to utilize these findings to prevent anastomotic leaks and surgical site infections
• To evaluate cancer outcomes in colon and rectal cancer using Mayo data as well as national data (NCDB, OPTUM)
• To enroll patients in clinical trials relevant to CRS
• To mentor residents and fellows in clinical research

FINDINGS TO DATE

• Surgical quality surrogates (and particularly the “12 lymph node” count) among Mayo patients and also in an international randomized controlled surgical trial do not correlate with cancer outcomes. We believe that when surgical technique is standardized, the lymph node count and other surrogates are less contributory.

• In our recent NCDB rectal cancer work, we found that elderly patients (octogenarians) with rectal cancer rarely receive neo-adjuvant chemoradiation and/or adjuvant chemotherapy. The majority of this was not
explained by comorbidity or frailty. We also found that patients who receive chemo +/- radiation therapies (adjusted for comorbidity) have improved overall survival.

- We studied Mayo patients with primary colorectal cancer considered to be unresectable elsewhere due to local invasion. In many cases, using a multimodal and multidisciplinary approach, the tumors became resectable and 5 year survival outcomes were superior to those reported in the literature.

CLINICAL IMPLICATIONS

- We believe that lymph node count is less important than surgical technique in patients with colon cancer. Educating
- Octogenarians with rectal cancer are not being offered and/or are not accepting adjuvant therapies that improve survival. Education of surgeons, providers, and patients is necessary to improve the acceptance of adjuvant chemotherapy as well as neoadjuvant strategies.

FUTURE PLANS

- Continue to use NCDB as well as institutional data to study colon and rectal cancers in the extremes of age. We are currently working on projects in the elderly, patients with early onset disease, and female patients with colorectal cancer diagnoses during pregnancy.
- Use databases to form a predictive model for anastomotic leak and surgical site infection in colorectal surgical procedures
- Develop and implement new procedures or modifiable risk factors to prevent anastomotic leak and SSI
- Study short and long term outcomes in patients with inflammatory bowel diseases
- Continue to mentor young residents as well as colorectal surgery fellows in outcomes research

REFERENCES/PUBLICATIONS

Heidi Nelson, M.D.
Colon and Rectal Surgery

BACKGROUND
Dr. Nelson is the Fred C. Andersen Professor of surgery and chair of the Department of Surgery at Mayo Clinic and past chair of the Division of Colon and Rectal Surgery. She is director of the Microbiome Program through Mayo’s Center for Individualized Medicine – a program examining the impact of diet and exercise through the microbiome on colon cancer. She served as GI program leader and as a member of the Advisory Committee of the Mayo Clinic Cancer Center and was Vice Chair of the North Central Cancer Treatment Group and then served as Group Co-Chair of American College of Surgeons Oncology Group. She was the national PI and NCI-grant PI for the NIH-funded colon cancer trial. Dr. Nelson has been faculty for the AACR/ASCO Methods in Clinical Cancer Research Workshop, a member and then chair of two NIH (NCI) study sections including, Subcommittee H (Cooperative Group Study Section), Clinical Oncology (CONC) and a member of the NCI Clinical Trials Advisory Committee.

AIMS/GOALS
• Dr. Nelson’s goals have focused on advancing the care of patients with colorectal cancer through the advancement of new technologies, standardization, novel clinical trial design and biologic studies.

FINDINGS TO DATE
• Results were reported from two international trials testing laparoscopic versus open colectomy for colon cancer and laparoscopic protectomy for rectal cancer. As a byproduct of the laparoscopic studies we developed best surgical practices and started to define standards for the surgical approach to colon and rectal cancer. Some of the publications below provide the data and support of specific standards and others are the guidelines themselves. The possibility of implementing novel clinical trial designs to generate high quality data emerged from experiences with both national cancer databases and clinical trial databases. Participation in studies examining the impact of diet and exercise and colon cancer prompted engagement in microbiome work and R01 funding supports human investigations into the microbiome and metabolomics in colon cancer specifically the mutagenic effects of hydrogen sulfide.

CLINICAL IMPLICATIONS
• These findings will help reduce the cancer burden and treatment burden in patients with colon and rectal cancer, or those at risk for these malignancies.

FUTURE PLANS
• Continued focus areas include: 1) Reducing the impact of surgery without compromising cancer care; 2) studying environmental factors that contribute to the development of colorectal cancer; and 3) improving patients’ lives and cancer outcomes.

REFERENCES/PUBLICATIONS
• Nelson H, Sargent DJ, Wieand HS, et al; Clinical Outcomes of Surgical Therapy Study Group. A Comparison of Laparoscopically Assisted and Open Colectomy for Colon


John H. Pemberton, M.D.
Colon and Rectal Surgery

BACKGROUND
I have been with the Department of Surgery, Division of Colon and Rectal Surgery for 31 years performing clinically-based/lab-based research for the first 15 years of my experience and for the last 15 years I have continued to contribute to the literature with outcome studies and with the editorship of numerous texts and authorship of texts as well. My main areas of interest have been inflammatory bowel disease, colorectal cancer, and motility disorders of the colon and rectum.

AIMS/GOALS
The aims of my research have always been to advance the care of patients with colon and rectal cancer, inflammatory bowel disease, and motility disorders of the colon and rectum and understanding particularly the normal mechanisms and abnormal mechanisms in those patients. The desire to refine the operation and understand the physiology after ileoanal anastomosis has formed a central part of my research career as well. The final aim of course is to mentor trainees and young staff.

FINDINGS TO DATE
My bibliography shows the “findings to date” of all of the work that has been done. Current studies in progress with the IRB are:

- 30 Year IPAA outcomes
- Pouch excision outcomes
- Outcomes following STR and IRA for CD
- PMVT as an indicator for PSI-12 (quality project with Dr. Welton from Stanford)

CLINICAL IMPLICATIONS
The clinical implications have been fairly interesting in that (1) we have established motility disorders as a major foundation of colorectal surgery; (2) we have understood the physiology of ileoanal anastomosis; and (3) we have begun to understand the best outcome drivers for rectal cancer.
Thoracic oncology. Dr. Wigle’s team has a number of basic and translational interests in thoracic malignancies. The application of genomic biomarkers for the molecular staging of non-small cell lung cancer (NSCLC) is an emerging field with the promise of clinical translation. At a more basic level, we are interested in the molecular steps transforming a normal bronchial epithelial cell through dysplasia to malignancy. A number of modern genomic, proteomic, and model organism technologies are used in these studies.

Aerodigestive Regenerative Medicine. Understanding of the molecular mechanisms involved in growth and development of the normal lung, airway, and esophagus are fundamental to harnessing these processes for clinical tissue regeneration. The team uses a number of animal model organisms for this work, and is interested in the potential utility of stem cells for regenerative therapeutics.

AIMS/GOALS

- Clinical translation from biologic understanding of thoracic malignancy and thoracic organ regeneration.

REFERENCES/PUBLICATIONS

Mark S. Allen, M.D.
General Thoracic Surgery

BACKGROUND
One year in CV lab at Massachusetts General Hospital.

AIMS/GOALS
• Advance knowledge of thoracic surgery.

CLINICAL IMPLICATIONS
• Improved patient care.

FUTURE PLANS
• Continue to work with medical students, residents, and colleagues to advance science.

REFERENCES/PUBLICATIONS

Dr. Blackmon is establishing a research program for esophageal conduit patients and has done work on cancer survivorship. A meticulous collector of her own data, Dr. Blackmon hosts clinical databases on all aspects of her thoracic malignancy patients. She serves as principal investigator on a number of industry-sponsored clinical trials in lung cancer. She holds an IDE on a novel self-expanding stent under evaluation for complex esophageal problems. Her research has received funding by intramural competitive programs, industry, national oncology groups and local foundations.

AIMS/GOALS

• To develop an app that follows and detects problems for patients who have undergone esophageal reconstruction

• To develop a treatment pathway for patients with lung tumors that effectively predicts which patients are best treated with ablation, surgery, or radiation

• To pioneer the development of new devices that enhance minimally invasive surgery (POEM, 3-D printing, endoluminal esophageal surgery, and VATS surgery)
FINDINGS TO DATE

• Early development of the CONDUIT protocol and analysis has been published in ATS comparing a standard gastric conduit against a long-segment pedicled super-charged jejunal interposition. Funding from the Survey center is allowing a Mayo patient series to currently be tested.

• As a high enroller in the EMPRESS Trial, patient series of microwave ablated tumors analysis is underway.

• Multiple publications including 3-D printing, 5-D printing, POEM outcomes, endoluminal management of event and training, EMR outcomes, and minimally invasive techniques

CLINICAL IMPLICATIONS

• Patient in the future can be monitored by the CONDUIT app and early detection of problems based on normative data can predict which patients are in need of assistance, counseling, or intervention

• Tumors of the lung will be managed with a more parenchymal-sparing approach rather than open surgery and lobectomy as a standard first intervention.

• More patients will have minimally invasive surgery and access to novel technology when appropriate.

FUTURE PLANS

• Prospectively test in a randomized trial the following:

  • Ablation versus surgery for primary lung cancer (ENB-guided bronchoscopic ablation using a CT-OR)

  • Ablation versus surgery for metastatic colorectal cancer to the lung (ENB-guided bronchoscopic ablation using a CT-OR)

  • Outcomes of different esophageal conduit techniques using the CONDUIT app to compare outcome differences (anastomosis device, pyloric drainage technique, conduit drainage and decompression after surgery, different approaches)

  • POEM versus Laparoscopic Heller Myotomy

REFERENCES/PUBLICATIONS


Stephen D. Cassivi, M.D.
General Thoracic Surgery

BACKGROUND
In parallel with his surgical training, Dr. Cassivi obtained postgraduate research training at the University of Toronto in the Thoracic Surgical Research Laboratory where he collaborated in the initiation of the gene therapy research program and earned a Master of Science degree in the area of transplantation and molecular biology. He is certified from the Royal College of Physicians and Surgeons of Canada as a Clinical Investigator. Dr. Cassivi’s clinical and research activities span the breadth of thoracic surgery with a specific expertise in minimally invasive surgery and clinical outcomes and risk assessment research.

AIMS/GOALS
- Developing evidence-based standardized clinical pathways for the treatment of patients with thoracic surgical diseases
- Developing quality and safety metrics for surgical practices with a specific interest in reducing readmissions following surgical procedures.
- Development of simple to use risk assessment tools in the field of thoracic surgery.
- Development of innovative tools to assist in the field of minimally invasive thoracic surgery.

FINDINGS TO DATE
- Clinical Pathways: Dr. Cassivi has worked to develop, study and publish on the utility, safety and effectiveness of clinical pathways in areas such as esophageal and lung cancer surgery. An example of this is his Mayo Clinic team’s research on an alternative postoperative pathway for patients after esophagectomy, which demonstrated decreased postoperative complications and decreased length of stay.
- Quality and Safety Metrics in Surgery: Dr. Cassivi’s research team has lead in the area of quality metrics in thoracic surgery. His team was the first to publish a set of patient-centered quality metrics following pulmonary resection. Dr. Cassivi’s team has gone on to analyze the issue of readmission to hospital following various thoracic surgical procedures. Dr. Cassivi’s report on the safety of air flight after lung surgery is the largest series to date and provides the first evidence-based guidelines for managing these patients.
- Surgical Risk Assessment Tools: Dr. Cassivi and his team have developed risk assessment tools for various thoracic surgery areas such as esophagectomy, interstitial lung disease and major postoperative cardiovascular complications.
- Innovative Tools for Minimally Invasive Thoracic Surgery: Dr. Cassivi’s research into surgical innovations has led to a number of device prototype developments and subsequent patents. As examples of this, he has developed a device to facilitate brachytherapy for minimally invasive surgery. He has also teamed up with Dr. Dennis Wigle, another Mayo Clinic thoracic surgeon, to develop and patent a device to treat Barrett’s esophageal dysplasia by endoscopic mucosectomy.
CLINICAL IMPLICATIONS

• The development of easily applied surgical risk assessment tools along with streamlined clinical pathways matched to relevant quality and safety metrics will help to guide clinicians toward improvements in the outcomes and value for patients undergoing thoracic surgical interventions.

• The development of tools to improve the performance and safety of minimally invasive thoracic surgery will expand the reach of these surgical procedures to more patients and surgeons.

FUTURE PLANS

• Extending the principles and findings of current clinical pathway research to other areas of thoracic surgery and investigating the potential for cross-over of best practices to other areas of the surgical practice.

• Working with the expanding field of information technology and data management to develop tools for more real-time reporting of quality metrics defined in the research to date.

• Broadening the scope of current research to other areas of thoracic surgery and developing user-friendly mobile applications for the risk assessment tools developed to date.

• Pursuing further collaborative opportunities with surgical industry partners.

REFERENCES/PUBLICATIONS


Stephanie F. Heller, M.D.
Trauma, Critical Care, & General Surgery

BACKGROUND

I have a strong interest in the field of surgical education research. In my role as Program Director I am at all times searching for the best way to help surgical residents gain both cognitive and technical skills. These are adult learners and many of our common misperceptions about education do not serve us the best when it comes to training surgical residents. We strive to find new ways to both educate and to assess performance.

From a clinical standpoint, my intense interest is in the field of management of noninflammatory bowel related enterocutaneous fistulae. These are an incredibly complex group of patients with long surgical courses and very poor quality of life. We are looking at opportunities for improving their perioperative care and optimizing outcomes for takedowns.

AIMS/GOALS

- To create cutting edge surgical simulation curriculum for interns.
- To use skills lab based assessment tools to properly stratify resident performance.
- To develop technical skills training in the simulation center to augment the experience of surgical residents.
- Optimize preop and perioperative care of patients with enterocutaneous fistulae.
- Develop cutting edge approach to control of the abdominal wall in patients with enterocutaneous fistulae.

- Optimally manage abdominal effluent in fistula patients.

FINDINGS TO DATE

- Our program has developed several low cost, but high fidelity technical skill models in our simulation centers. These have been used to improve technical skills in surgical residents.
- We have used a semiannual technical skill assessment tool (X-games) to stratify resident performance.
- We have developed a year-long surgical intern technical skill curriculum which has been used to offset the reduced experience seen by interns with the new duty hour regulations.
- Patients with enterocutaneous fistulae benefit from the lowest morbidity and mortality ever reported.

CLINICAL IMPLICATIONS

- We can improve the training of a surgical resident with outside of the OR training opportunities.
- We can identify the struggling resident earlier in training and design specialized educational events to improve their performance.
- While our morbidity or mortality for our patients with enterocutaneous fistulae is outstanding, there are opportunities for improvement with regard to management of the abdominal wall during the definitive takedown and in management of the patient more optimally in an outpatient setting during the preoperative period.

FUTURE PLANS

- Continue to develop low cost, high fidelity models which replicate as many technical skills as possible in our skill center.
• Continue to use our X-games assessment results to help us identify at-risk residents in need of more aggressive education intervention. Develop interventions which improve performance.
• Optimize the outpatient management of patients with complex enterocutaneous fistulae.
• Minimize the abdominal wall complications in patients with enterocutaneous fistula takedown.

REFERENCES/PUBLICATIONS


Dr. Donald Jenkins
Trauma, Critical Care, & General Surgery

BACKGROUND
I have studied resuscitation strategies extensively for pre-hospital use of plasma in combat, austere and civilian settings, including issues related to timing of and ratio of resuscitation blood products in massive transfusion and hemostatic resuscitation early in the hospital phase of care of injured patients with hemorrhage.
I also serve on the steering committee of the Trauma Hemostasis and Oxygenation Research Network, advancing the concepts and science in remote damage control resuscitation.

AIMS/GOALS
• Limit the occurrence of trauma induced coagulopathy
• Minimize morbidity and mortality related to hemorrhage in trauma
• Minimize morbidity related to transfusion
• Evaluate novel resuscitation strategies that have the potential to alter care such as the use of refrigerated platelets and cold stored whole blood

FINDINGS TO DATE
• Leukocyte reduced (filter) whole blood has a poor coagulation profile
• Providing plasma in the pre-hospital setting is safe and limits need for massive transfusion
Cold stored platelets have very good function as compared to room temperature platelets and agitation does not improve their function.

Universal donor AB plasma is not necessary in pre-thawed plasma; A plasma is just as safe and efficacious.

**CLINICAL IMPLICATIONS**

In remote and austere circumstances, the number one cause of preventable death due to injury is hemorrhage. When proper hemostasis cannot be achieved, coagulopathy ensues worsening hemorrhage, acidosis and leads to hypothermia which further worsens the coagulopathy. Interrupting this cycle by providing a hemostatic resuscitation as early as possible will prevent some deaths due to hemorrhage. Studying this in the pre-hospital setting in our rural environment stands to change clinical practice in this patient subset forever and globally.

**FUTURE PLANS**

- Study pre-thawed cryoprecipitate function over time and add to the hemostatic resuscitation scheme
- Study utility and cost-effectiveness of cold stored whole blood and platelets in terms of hemostatic resuscitation, limiting donor exposure and morbidity and mortality
- Study the use of a continuous hemoglobin detection monitor to influence transfusion in near real time
- Study the use of pre-reconstituted tranexamic acid and its role in hemostatic resuscitation

**REFERENCES/PUBLICATIONS**

BACKGROUND

- There are anatomic constraints to stabilization of rib fractures that impose unique technical challenges.
- There is a growing experience with surgical stabilization of rib fractures (SSRF); the impact of SSRF on pulmonary function continues to be examined.
- There is a growing experience with surgical stabilization of rib fractures (SSRF); the decision to stabilize both sides of a flail chest or convert the flail into a stable segment with uni-flail stabilization continues to be debated.
- There is a growing experience with surgical stabilization of rib fractures (SSRF); with operative intervention there are associated complications.
- There is a growing experience with surgical stabilization of rib fractures (SSRF); a subgroup of patients is coming forward in the era of operative rib fracture care – patients with symptomatic nonunion of rib fractures

AIMS/GOALS

- We aimed to investigate the surgical reach for stabilization provided by use of a 90 degree drill and screwdriver.
- Identify PFT trends & outcomes of SSRF patients
- Examine outcomes of patients who have undergone complete vs partial flail chest stabilization
- Examine risk factors associated with hardware infection; define management strategy / care pathway for individuals who develop hardware infection.

FINDINGS TO DATE

- The most cephalad rib fracture stabilized and total number of ribs stabilized was increased with use of the 90 degree instrumentation.
- Improved TLC and FRC with SSRF patients
- Equivalent outcomes between Complete vs Partial stabilization groups. No patient in the Partial stabilization group required intervention / operation to complete the stabilization
- Hardware infection is uncommon. Hosp LOS was longer in this group of patients and they required intense wound / operative care with planned return to the operating room for hardware extraction after bony union documented.
- The use of compression reduction plates and autologous bone graft results in bony union and relief of nonunion-associated symptoms.

CLINICAL IMPLICATIONS

- Increased number of ribs undergoing anatomic stabilization translates to improved analgesia, healing, physiologic function.
- Enhanced pulmonary function s/p SSRF
- Further enhance operative knowledge base for the technical approach to flail chest injuries
- There will be a growing body of patients who suffer this complication; favorable outcomes can be achieved.
- Growing list of indications for SSRF
REFERENCES/PUBLICATIONS


Erica A. Loomis, M.D.
Trauma, Critical Care, & General Surgery

BACKGROUND

As a member of the TCGS division I have a broad number of interests but to date my main focus has been on improving our understanding of fluid resuscitation in ICU patients and enhancing and restructuring of our acute care surgery service in an effort to optimize the care of these patients and the educational opportunities available to our trainees. I am also interested in evaluating outcomes with the regionalization acute care surgery similar to trauma referral regionalization. I am working on two clinical research projects the first evaluating outcomes following extraction of infected implantable cardiac devices-this review has been completed and presented at a local meeting; publication pending. The second IRB approved study examines how we evaluate volume status in the critically ill patient, comparing hemodynamic changes with recruitment maneuvers to IVC diameter changes with positive inspiratory pressure. In addition I assisted as a physician reviewer for a performance improvement project examining “near miss” clinical situations for hospitalized patients.

AIMS/GOALS

- With regard to my active IRB trial we have hypothesized that hemodynamic responses to alveolar recruitment maneuvers will correlate clinically with sonographic measurements of the inferior vena cava (IVC) to determine intravascular volume status. Specific aim 1: To assess the correlation
of the change in systolic blood pressure with the change in the IVC Distensibility Index. Specific aim 2: To estimate the sensitivity, specificity, negative predictive value, and positive predictive value of a hypovolemic response defined by the systolic blood pressure measurements pre to post-resuscitation by the ICU team. The hypovolemic response using the IVC Distensibility Index definition will be considered the gold standard definition of hypovolemic.

- Regarding the restructuring of our acute care surgery service we have revamped the resident and staff coverage for these patients. A new website has been developed. The more global goal of this will be to develop practice management guidelines and pathways to expedite patient care and improve overall patient flow through the hospital setting in our loco-regional health care system.

- The study examining clinical outcomes following extraction of infected implantable cardiac devices is complete and pending publication submission. This project resulted in the development of a practice management guideline which includes wound culture, complete capsulectomy, pulse lavage and placement of a negative pressure wound therapy device at the time of CIED extraction. Two days later, wounds are irrigated and undergo delayed primary closure. We found that with use of this procedure we were able to achieve more rapid primary wound closure than in years preceding. There was no increase in perioperative morbidity. Time to device reimplantation trended towards a decrease with the use of this practice management guideline but did not reach statistical significance.

- The bedside patient rescue project is entering its next phase of development and should hopefully be available for widespread clinical deployment in the near future.

FINDINGS TO DATE

- Our ICU trial examining hemodynamic responses to alveolar recruitment maneuvers is still in enrollment phase. Our goal is 50 patients over the next year, to date (over the last 8 weeks) we have enrolled 6.

- We have already seen improvements in patient flow with the restructuring of our acute care surgery service. Our chief residents are accruing more cases and clinical exposure. We will plan on putting together the data from this and hope for publication early next year.

- The study examining clinical outcomes following extraction of infected implantable cardiac devices is complete and has been presented; manuscript is pending submission. This project resulted in the development of a practice management guideline which includes wound culture, complete capsulectomy, pulse lavage and placement of a negative pressure wound therapy device at the time of CIED extraction. Two days later, wounds are irrigated and undergo delayed primary closure. We found that with use of this procedure we were able to achieve more rapid primary wound closure than in years preceding. There was no increase in perioperative morbidity. Time to device reimplantation trended towards a decrease with the use of this practice management guideline but did not reach statistical significance.

CLINICAL IMPLICATIONS

- Improvement in the management of fluid resuscitation in ICU patients and a better understanding of a patient’s fluid status with a simpler bedside test. This pilot trial will serve a stepping stone for a broader future clinical trial.

- Improved clinical experience for our patients and our trainees. Improved patient flow in regards to the acute care surgery practice at both the in hospital level with a reduction in morbidity, mortality and length of stay, and the referral pattern from our loco-regional health system.

- Decreased number of operative interventions and time to primary wound closure without increased risk of infection complications seen in the cardiac device explant study has led
to improved patient flow in this population and great overall satisfaction for patients and clinicians.

FUTURE PLANS

- Complete ICU pilot trial and prepare for full prospective trial once data analysis is complete.
- Continue expanding our acute care surgery service reach and grow our clinical pathways and practice management guidelines.
- Set up clear guidelines for management of common diseases seen in the acute care surgery population and better utilize our loco-regional health care system resources.

REFERENCES/PUBLICATIONS


David S. Morris, M.D.
Trauma, Critical Care, & General Surgery

BACKGROUND

I have an interest in trauma systems, particularly rural trauma system development and integration. I am also interested in applying the lessons learned during trauma system development to emergency general surgery.

AIMS/GOALS

- Readmission rates for trauma and emergency surgery patients
- Severity scoring for emergency general surgery
- Dissemination of hemostasis techniques to non-medical personnel (law enforcement, educators, etc.)
- Improve throughput in regional hospitals that transfer patients to Level I centers
- Frailty measurement in trauma patients

FINDINGS TO DATE

- Unlike CPR, which has been broadly applied to the general public, training of non-medical personnel in hemostasis techniques is in its infancy.
- Law enforcement officials are increasingly being called on to perform immediate life-saving bleeding control, both in active shooter/mass casualty incidents and in “routine” calls, such as motor vehicle crashes, and interpersonal violence episodes.
• Readmission rates for trauma patients in urban areas are low, ~4%, but the true rate may be higher – patients who seek care at hospitals other than the initial institution are difficult to track.
• Elderly trauma patients have a rate of newly diagnoses dysphagia that is 6 times higher than other hospitalized patients.

CLINICAL IMPLICATIONS

• If bleeding control can be accomplished earlier, presumably resuscitation will be positively affected.
• Pre-hospital use of tourniquets and hemostatic gauze have extremely low morbidity and are easily learned by non-medical personnel.
• Dysphagia may be an objective marker of frailty in elderly patients.

FUTURE PLANS

• Prospective validation of emergency general surgery severity scoring systems
• Prospective screening program for dysphagia in elderly trauma patients
• Incorporation of dysphagia into a frailty scoring system for trauma patients

REFERENCES/PUBLICATIONS


Mariela Rivera, M.D.
Trauma, Critical Care, & General Surgery

BACKGROUND

My research efforts at Mayo Clinic include fistula practice, trauma research, with an emphasis on ICU monitoring and chest tube complications. Within the general surgery practice, I have collaborated along with the cardiovascular, anesthesia, and surgery teams investigating high lactate levels as markers for severity in cardiovascular surgery patients.

AIMS/GOALS

• To advance the care of fistula patients.
• Advance the care of ICU, Trauma, and General Surgery patients that require fluid resuscitation, identify better ways of assessing fluid status and management.
• Within the General Surgery Division and Trauma, identify the real chest tube complications and how we can translate this information to better teach our residents and providers the placement of chest tubes.
• Collaborate with other specialties within the Surgery Department to advance patient care.

FINDINGS TO DATE

• Within the fistula practice, we have evaluated around 100 patients within our practice and identify excellent outcomes within this difficult population. This manuscript will be ready for publication by early 2016.
• Within the trauma and StO2 practice, we identified that StO2 <65 is a marker for requiring blood transfusions. This information has helped develop the use of
StO2 in the prehospital setting and currently we are analyzing data of StO2 in the ICU setting. Publication of that information should be available for publication in early 2016 as well.

- Chest tube placement: We have developed a standardized format to report complications with the expectation to have better data to identify the real complications of this common procedure with the final goal to identify how we can better educate our residents and providers.

- An analysis within the ICU practice and analysis of ARDS in the trauma population has been done. An abstract has been published and presented in the International Surgery week, where we found a decreasing trend of ARDS in this specific population.

- Within the combined publication with CV surgery and anesthesia, we identified that patients with severely high lactate levels don’t survive, an interesting finding within the cardiovascular literature.

CLINICAL IMPLICATIONS

- Improve ICU care understanding better patient’s physiology and fluid status
- Better training should translate in less complications and better patient care and outcomes
- Advance and improve fistula care with better outcomes
- Understand CVS population and the role of surgery with high lactate level

FUTURE PLANS

- Will continue working with the chest tube data and report our own complications with the standardized format that we suggested, again continue working toward better education to our providers and we will expect future publications within this subject along with Dr. Farley and the education team.

- StO2 ICU analysis should show how StO2 could benefit fluid resuscitation in the ICU care, both to trauma and nontrauma patients. Pending analysis for publication.

- ARDS study will be broadened to include patients up to the year 2014 to see if we still see the same decreasing trend observe until 2010. We are expecting to publish this information.

- Will continue with working along with other colleagues within Department of Surgery that we worked with in order to collaborate with publications.

REFERENCES/PUBLICATIONS

Martin D. Zielinski, M.D.
Trauma, Critical Care, & General Surgery

BACKGROUND
Dr. Zielinski is board certified in Surgery with subspecialty boarding in Surgical Critical Care. As the Medical Director for Trauma Clinical Research for both the adult and pediatric Mayo Trauma Centers, his efforts have focused on improving outcomes of injured patients as well as those with emergency surgical conditions. Due to such a diverse field, he has focused his efforts on the management of small bowel obstructions, damage control laparotomy, early identification of urinary tract infections, and hemorrhage. He is currently NIH funded to define and reduce the incidence of packed red blood cell over-transfusion during hemorrhage. Through this award, he has defined the Hemoglobin Transfusion Target, a novel method which provides a target to transfuse hemorrhaging patients. In addition, he partners with multiple other clinicians and scientists to advance these areas of research, particularly with the use of secondary data sets.

AIMS/GOALS
- To ensure hemorrhaging patients have equal access to blood by:
  - limiting unnecessary blood product transfusions
  - expanding possible blood donors
  - Initiating a warm fresh whole blood donation program
- To ensure at least 95% primary fascial closure after damage control laparotomy
- To predict the need for operative intervention correctly in 95% of patients with small bowel obstruction
- To determine an effective method of diagnosing urinary tract infections on admission in elderly trauma patients using meta-proteomics and other emerging microbiome techniques.

FINDINGS TO DATE
- There is at least a 7% incidence of packed red blood cell over-transfusion and 9% rate of packed red blood cell under-transfusion
- Patients who reach a hemoglobin level between 8.0 and 12.0 g/dL 24 hours after hemorrhage control have an approximately three times lower mortality than patients who are above or below this range.
- Group A plasma is a safe alternative to Group AB plasma when used as a universal plasma source
- 14% of elderly trauma patients have a urinary tract infection on admission
- The same enzymes contributing to the synthesis of leukotrienes LTB4 and LTC4, mediators of inflammation and pain, are found in the urine of patients with urinary tract infections and asymptomatic bacteriuria.
- Despite the lack of reimbursement, there is a baseline rate of urinary tract infection development of about 4% with is not preventable in elderly trauma patients.
- Relaxation of the lateral abdominal wall with botulinum toxin does not improve rates of primary fascial closure after damage control laparotomy
Protocolization of the management of patients with small bowel obstruction decreases the need for operative exploration by 17%.

**CLINICAL IMPLICATIONS**

- Utilization of a non-invasive hemoglobin monitor is being incorporated into practice to reduce over- and under-transfusion of packed red blood cell events.
- Use of Group A Plasma has expanded the blood supply and is being incorporated throughout the country.
- Urinalysis is routinely checked on admission of elderly trauma patients to determine if they have a urinary tract infection and whether this infection was the cause of their trauma.
- The small bowel obstruction protocol has been incorporated into all sites within Mayo Clinic including Florida, Arizona, and the Health System.

**FUTURE PLANS**

- Perform a clinical trial studying whether the use of a non-invasive hemoglobin monitor will reduce the rates of packed red blood cell over-transfusion and whether this practice can reduce blood product consumption in hemorrhaging patients.
- Travel abroad and team with 3rd world providers and the WHO to determine the possibilities of incorporating warm fresh whole blood programs in under-served areas without access to blood.
- Refine the Hemoglobin Transfusion Target definition for various hemorrhaging populations using secondary datasets.
- Develop microbiome based tests to differentiate asymptomatic bacteriuria from urinary tract infections.

**REFERENCES/PUBLICATIONS**

BACKGROUND
I am a plastic and reconstructive microsurgeon with a clinical practice focused on the treatment of damage to the upper and lower extremities after traumatic injury or cancer. I view the laboratory as an extension of clinical practice where the focus is to find new and better ways to treat patients with these conditions. In the lab, we are working on engineering tissues to replace those that are lost due to accident, injury, or surgical resection.

AIMS/GOALS
We utilize animal models to engineer tissue to replace composite musculoskeletal tissue and skin. Specifically, we are exploring ways to maintain the integrity of the vascular system while completely removing cells that could be a source of tissue rejection, immunologic reaction, and/or infection. We then restore the tissue to its native form through recellularization. Thus, enabling this tissue to be transplanted to an animal (ultimately a patient) where it would replace essential tissue that has been lost and yet resistant to rejection.

FINDINGS TO DATE
Utilizing a rat model, we have successfully decellularized an abdominal skin and subcutaneous flap, while maintaining the integrity of the extracellular matrix and vascular system. We have also been successful applying this approach to a muscle flap in the rat.

CLINICAL IMPLICATIONS
For decades now, tissue engineering has promised to change treatment and conditions ranging from major organ failure to diabetes mellitus to traumatic tissue loss. However, the field has failed to deliver on these promises. The reason for failure is the need to engineer a vascular network to provide nutrient exchange to the particular tissues. Overcoming this obstacle, would result in making good on the promises of the field of tissue engineering.

FUTURE PLANS
The current challenge lies in the process of recellularization of the tissues and restoring it to its original form and function. We are working on infection prevention and optimizing the conditions for this process of recellularization.

REFERENCES/PUBLICATIONS
Valerie Lemaine, M.D., M.P.H.
Plastic Surgery

BACKGROUND
After completing her surgical training, Dr. Lemaine pursued a clinical outcomes research fellowship at Memorial Sloan-Kettering Cancer Center and a Master of Public Health at Columbia University, focusing on developing patient-reported outcome measures in plastic surgery and reducing preventable postsurgical complications.

AIMS/GOALS
- To develop a standardized tool to assess the severity of mastectomy skin flap necrosis in women undergoing mastectomy and immediate breast reconstruction
- To improve physical well-being in women undergoing breast reconstruction
- To improve outcomes in patients undergoing breast reconstruction surgery
- To understand risk factors for preventable complications in breast reconstruction surgery, with a focus on surgical site infections and mastectomy skin flap necrosis
- To develop evidence-based standardized clinical pathways for perioperative care of patients undergoing breast reconstruction surgery

FINDINGS TO DATE
- The SKIN Score is a standardized tool to assess the severity of mastectomy skin flap necrosis, and was developed by breast and plastic surgeons. It is easy to use at the point of care and externally validated.
- A systematic review of the literature shows that botulinum toxin A injections in the pectoralis major muscle in women undergoing breast surgery with implants may alleviate postoperative pain and muscle spasms.
- Enhanced-recovery pathways are safe and effective in microsurgical breast reconstruction

CLINICAL IMPLICATIONS
- The development of tools to standardize the assessment of postsurgical complications will expand our ability to meaningfully compare outcomes on a larger scale and ultimately improve patient outcomes.
- The development of standardized enhanced-recovery pathways has reduced length of hospital stay and opioid consumption postoperatively

FUTURE PLANS
- Continued focus areas include: 1) Compare breast reconstruction approaches using clinical and claims data 2) Continue to advance care in reconstructive surgery 3) Improve patients’ lives and surgical outcomes

REFERENCES/PUBLICATIONS


Basel Sharaf, D.D.S., M.D.
Plastic Surgery

BACKGROUND

My research efforts are diverse across the field of plastic and reconstructive surgery, microsurgery, lymphedema surgery, craniofacial reconstruction, virtual surgical planning and wound healing.

AIMS/GOALS

- To advance the reconstructive care of the surgical patients requiring complex reconstruction
- To advance the reconstructive care of microtia patients through virtual surgical planning
- To advance the care of craniofacial trauma through virtual planning and 3D printing technology
- To advance the surgical care of lymphedema through implementing multidisciplinary approach to provide evidence-based surgical approaches and advancing anatomic knowledge of lymphatics
- To develop regenerative strategies for bone tissue engineering as an adjunct to traditional reconstructive surgery

FINDINGS TO DATE

- Virtual surgical planning and 3D printing is feasible for management of complex craniofacial trauma
- 3D printing of ear molds for cartilage framework reconstruction is feasible clinically
CLINICAL IMPLICATIONS

• Validate pre-operative and post-operative measures for lymphedema surgical patient’s to assess efficacy of lymphedema surgery. By standardizing these measures, outcome studies on surgical lymphedema will be more comparable in the surgical literature.

• Offer microtia patients a patient-specific approach to aid in cartilage framework fabrication and symmetric reconstruction of congenital ear deformity based on the normal existing ear.

FUTURE PLANS

• Apply for external funding assess and validate pre and post-operative clinical parameters for lymphedema patient’s outcome measures.

• Develop 3D printing clinical model for microtia patients to improve reconstructive outcomes

• Continue to improve virtual surgical planning and 3D printing for complex maxillofacial trauma patients

REFERENCES/PUBLICATIONS

Chaim Leker Locker, M.D.
Cardiovascular Surgery

My main interest is the subject of Complete arterial CABG with the use of bilateral internal thoracic arteries, comparison of multi arterial CABG vs conventional CABG with the use of LIMA and Saphenous vein grafts, and comparison of CABG, esp. multi arterial grafting vs percutaneous coronary interventions (PCI).

COMPETENCY IN MEDICAL KNOWLEDGE

Among MVCAD patients undergoing coronary revascularization, surgical revascularization with multiple arterial grafts conferred a substantial long-term survival benefit compared with conventional CABG and PCI.

CLINICAL COMPETENCY IN PATIENT CARE

Treatment recommendations in MVCAD need to be based on patient-shared decision making and multidisciplinary input (heart team) in selection of coronary revascularization options.

TRANSLATIONAL OUTLOOK

As the rates of multiple arterial CABGs stayed steadily very low, there is need for defining its use as a quality metric in coronary surgery and for marked increase in multiple arterial programs.

Further studies are warranted to define patient’s subgroups that benefit mostly from different revascularization methods.
Randall R. DeMartino, M.D.
Vascular & Endovascular Surgery

BACKGROUND
Dr. DeMartino’s work focuses on health care delivery research in vascular surgery. Specifically, his work centers on using registry and secondary data to describe variation in clinical care, optimize patient selection, and understand the impact of specific treatments on outcomes. His research utilizes the Vascular Quality Initiative, American College of Surgeons-National Surgical Quality Improvement Program (ACSNSQIP), Nationwide Inpatient Sample, and Medicare claims data to accomplish these tasks.

AIMS/GOALS
• Identify variation in vascular care to target improvement initiatives
• Defining the component of surgical episodes of care
• Optimizing health care delivery through pathway development
• Comparative effectiveness research
• Development of the Vascular Quality Initiative at Mayo Clinic to harmonize and improve the care for patients with vascular disease across the enterprise.

FINDINGS TO DATE
Dr. DeMartino has over 30 peer-reviewed manuscripts that focus on optimizing patient selection, identifying process improvements in vascular care and outcomes in vascular surgery.

CLINICAL IMPLICATIONS
Dr. DeMartino’s research seeks to understand the variation of care with vascular disease to identify best practices for dissemination. For example, appropriate medical treatment at the time of vascular surgery is associated with reduced late mortality. A national effort is currently underway to improve medical management in this setting based on these data.

FUTURE PLANS
Dr. DeMartino will continue to explore and define optimal processes in care through registry and secondary data and translate them into practice on the regional and national level. In addition, he is currently seeking funding to study the epidemiology of specific vascular diseases using the Rochester Epidemiology Project. Finally, he is seeking to enrich clinical registry data with claims data to strengthen the assessments of long-term outcomes with detailed patient level data.
REFERENCES/PUBLICATIONS


Peter Glovickzki, M.D.
Vascular & Endovascular Surgery

BACKGROUND
Abdominal aortic aneurysms (AAA) are common, each year an estimated 190,000 new cases are diagnosed; over 1.1 million Americans have AAA. Rupture is the most frequent and lethal complications. To prevent rupture, each year over 50,000 AAAs are repaired in the United States. Open surgical repair (OR) used to be the gold standard, but in the last two decades endovascular repair (EVAR) has been used with increasing frequency; currently 75% of the AAAs are repaired with EVAR. EVAR conferred early survival advantage over OR in multiple randomized controlled trials but factors affecting long term outcome in consecutive patients who undergo operation in the real world are not well known. Supported by the endowment of the Roberts Professorship, we established the Mayo Clinic Aortic Registry to institute current standards for repair and study this important and deadly disease.

AIMS/GOALS
Our objectives are to study associations between clinical variables, demographic factors, early complications and long term outcome after EVAR and OR of AAAs. To help patient selection for future repairs, we compared results of OR with EVAR in matched cohorts using propensity score modeling.

FINDINGS TO DATE
Data of 1534 patients who underwent AAA repair at our institution during a 12 year period were analyzed. We observed that early mortality was similarly low after both EVAR
and OR, significantly different from all except one large randomized controlled trial. EVAR had fewer early complications, but it was associated with late all-cause mortality and reinterventions and had a small but definite risk of late rupture. Significantly increased mortality at 5 years was no longer observed when operations were performed after 2005. High risk, advanced age, cancer history, and AAA size predicted late all-cause mortality. We found that clinical presentation predicts early mortality and complications; age predicts both early and late mortalities after EVAR. Although women had an increased rate of complications and reinterventions, women did not have significantly higher mortality than men after EVAR.

**CLINICAL IMPLICATIONS**

Our studies failed to confirm early or late survival benefit for EVAR vs OR. EVAR, however, has shorter hospitalization, less early complications and faster return to normal activities. Because of EVAR, we are able to repair more AAAs, even in high risk patients. Based on our data we recommend improved surveillance, longer follow-up, and prospective analysis of factors affecting late death after AAA repair.

**FUTURE PLANS**

Future goals include studying specific aneurysm, device and surgeon related factors that influence long term outcome after OR and EVAR. Physician reported data will be complemented by patient reported quality of life assessments before and after interventions for AAA. Our goal is also to fuse the data of the Mayo Clinic Aortic Registry with the prospectively collected data of the Vascular Quality Initiatives (VQI) of the Society for Vascular Surgery database and to collect and report joint data of the three Mayo Clinic campuses.

**REFERENCES/PUBLICATIONS**

Manju Kalra, M.B.B.S.
Vascular & Endovascular Surgery

BACKGROUND
Research efforts during my career have focused on evaluating the clinical outcomes of the various treatments for peripheral arterial disease, aortoiliac aneurysms and mesenteric arterial disease. I, along with my colleagues have strived to provide benchmarks for best practices in the treatment of these conditions for comparison as newer, less invasive options have become available and been investigated.

Most recently I have focused my efforts on studying the incidence and treatment of peripheral arterial disease in Olmsted County, long-term outcomes in a 20 year population based study through the Rochester Epidemiology Center. I am also the Site Principal Investigator for an NIH sponsored study to prospectively evaluate treatment of peripheral arterial disease in patients with critical limb ischemia Randomized, Multicenter, Controlled Trial to Compare Best Endovascular versus Best Surgical Therapy in Patients with Critical Limb Ischemia. Funded by National Heart, Lung, and Blood Institute. (U01 HL 107407)

In a another population based study on aneurysmal disease spanning 3 decades have sought to evaluate the prevalence and incidence of rupture of abdominal aortic aneurysms as well as modes of identification, surveillance and treatment and cost effectiveness of open and endovascular repair.

AIMS/GOALS
- Identify criteria that direct the choice of initial mode of revascularization in patients with peripheral arterial disease presenting with lower extremity claudication as well critical limb ischemia
- Evaluate factors that affect long-term outcomes following lower extremity revascularization so as to provide guidelines for choice of initial therapy
- Based upon long-term results identify anatomical and patient based factors that predispose to continued aortic enlargement and need for further more proximal aortic intervention during the patient’s lifetime following open repair of juxta/pararenal aortic aneurysms so as to provide guidelines for selecting patients who would benefit from initial, more extensive repair with fenestrated / branched endografts
- Evaluate the extent of implementation and effectiveness of the Medicare sponsored ultrasound screening program for detection of abdominal aortic aneurysms in the Olmsted County population
- Study the long-term cost effectiveness of open and endovascular repair of abdominal aortic aneurysms

FINDINGS TO DATE
- In addition to traditional risk factors associated with limb loss in patients with peripheral arterial disease such as diabetes, end stage renal disease, congestive heart failure we identified initial endovascular revascularization and significant obesity as significant risk factors
- There was an increasing prevalence of significant obesity in the Olmsted County population over the 20 year period
- Endovascular first revascularization is associated with significantly worse limb related outcomes in the longterm in patients with CLI and more re-intervention in claudicants.
- Same findings as (3) persisted after propensity score based analysis was
performed to correct for selection bias in the population based study

- The proportion of AAAs diagnosed on US screening has increased with Medicare recommended USS guidelines but the vast majority are still discovered incidentally in the Olmsted County population based study. Screening diagnosis was associated with less frequent need for urgent repair

- Incidence of ruptured abdominal aortic aneurysms has decreased significantly in the last decade of a 30 year populated based study

- Growth of remnant paravisceral aortic segments following open juxtarenal aortic aneurysm repair is slow and only a minority of patients require re-intervention during their lifetime.

- Although hospital readmission rates are similar following endovascular and open abdominal aortic aneurysm repair, outpatient resource utilization is significantly higher following endovascular repair

CLINICAL IMPLICATIONS

- The findings of these population based and single center large volume experience studies can guide clinical practice with more informed procedure selection in patients with peripheral arterial disease and aortic aneurysms

- Open/hybrid lower extremity revascularization is likely the gold standard in patients with critical limb ischemia based on long-term outcomes and should be considered in all good risk patients

- Duplex ultrasound screening detection of abdominal aortic aneurysms allows for a greater proportion of planned, elective repairs and all male patients (as well as younger men and women with a positive family history) over the age of 65 who have ever smoked should undergo this as per Medicare Guidelines

- Patients should be selected for initial fenestrated / branched endografts based upon medical co-morbidities and not ectasia of the paravisceral aorta alone

- A patients age and longevity need to be taken into consideration before recommending endovascular repair of abdominal aortic aneurysms as these will affect the length of follow-up and health care utilization in the long-term

FUTURE PLANS

- Further update the data in the 20 year population based studies and continue propensity score based analysis of outcomes and risk factors to keep up with technological advances and newer treatments introduced into contemporary practice

- Obtain data from the Vascular Quality Initiative database to compare our population based results, especially treatment selection algorithm and outcomes with national practice in patients with peripheral arterial disease

- Obtain Medicare Claims Data to complete the follow –up and incidence of re-interventions in patients undergoing abdominal aortic aneurysm repair at Mayo but may have further intervention elsewhere

REFERENCES/PUBLICATIONS

Gustavo S. Oderich, M.D.
Vascular & Endovascular Surgery

BACKGROUND
My research has focused on assessment of outcomes of endovascular repair of complex aortic aneurysms using fenestrated and branched stent-grafts. Since 2006, an aortic research program has been developed which includes >20 ongoing industry-sponsored clinical trials and two physician-sponsored investigational exemption protocols. In addition to the clinical trials section, the program is also involved in device development with collaboration with industry partners, engineers and colleagues from the Mayo Clinic Regenerative Medicine division. A single-center prospective, non-randomized study is currently investigating use of fenestrated and branched endografts to treat pararenal and thoracoabdominal aortic aneurysms (TAAAs).

AIMS/GOALS
• Evaluation of early (30-day) mortality and major adverse events
• Evaluation of stent-graft related outcomes including endoleak, aneurysm sac changes, device migration, stenosis and aneurysm rupture
• Evaluation of quality of life questionnaires
• Patient survival
• Freedom from secondary re-interventions, aneurysm rupture, any cause and aneurysm-related mortality
• Investigation of neuro-monitoring to prevent spinal cord injury during extensive TAAA repair
• Development of a pre-operative aortic wall thrombus score system
• Comparison with outcomes of open surgical repair

FINDINGS TO DATE
A total of 167 patients were consented for inclusion in the study. Of these, 115 patients had successful implantation of the fenestrated and branched endograft and 52 wait for device implantation. There has been no 30-day mortality and no aneurysm rupture or conversion to open repair. Major adverse events occurred in 19% of the patients. The clinical data on the first 100 patients has been recently analyzed and submitted for presentation in the 2016 Vascular Annual Meeting in Washington, DC in June 2016.

<table>
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<th>30-day outcomes</th>
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<tr>
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CLINICAL IMPLICATIONS
Preliminary analysis of the first 100 patients enrolled in the study demonstrate that fenestrated and branched endografts for Pararenal and TAAAs can be safely performed with low rate of major adverse events compared to historical results of open surgical repair.
Currently at the Mayo Clinic approximately 80% of the patients with TAAAs are treated by total endovascular approach, reserving open repair to those patients who have genetically triggered aortic diseases or are young, fit or unsuitable to endovascular approaches. Comparative outcomes of open endovascular repair were also submitted for presentation at the vascular annual meeting. Endovascular repair was performed in older patients with more comorbidities and higher comorbidity severity scores. Overall 30-day mortality at the Mayo Clinic was 8% for open surgical repair and 3.5% for endovascular repair from 2007 to 2016 in 303 consecutive patients.

FUTURE PLANS

In addition to our efforts to continue the ongoing industry- and physician-sponsored trials, collaborations with Regenerative Medicine are currently underway to develop a novel bio stent that will promote integration with the aortic wall, thereby minimizing the risk of late endoleaks. Our plan is to finalize a prototype and validate deployment in a 3D print model, followed by investigation in animal study within 2016.

REFERENCES/PUBLICATIONS

D. Dean Potter, Jr., M.D.
Pediatric Surgery

BACKGROUND

My research interest is based on outcomes data pertaining to the surgical care of children. Specifically, I have focused on innovative techniques such as minimally invasive surgery, disease processes such as pediatric inflammatory bowel disease, and process improvement for the care of injured children. Future goals include development of novel devices and biogenetically engineered tissue to improve the management of neonatal surgical disease.

AIMS/GOALS

- Continue to define the role of minimally invasive techniques for the care of pediatric surgical patients.
- Work collaboratively with pediatric gastroenterology to improve the care of children with inflammatory bowel disease.
- Participate in the development of national guidelines for the care of injured children.
- Continue to develop a device to treat long gap esophageal atresia.
- Co-investigate the use of engineered esophageal grafts for the repair of esophageal atresia.

FINDINGS TO DATE

- Long-term outcomes of ileal pouch anal anastomosis is excellent. >90% have a functioning pouch over 20 years with improved quality of life.
- Single-incision laparoscopic resection for patients with inflammatory bowel disease is safe and effective options. Decrease hospital stay is a clear benefit.
- Unpublished data – a patentable prototype device for the single stage repair of esophageal atresia in neonates is able to complete a compression anastomosis in rabbit intestine.

CLINICAL IMPLICATIONS

- Improve the care and outcomes for children with inflammatory bowel disease. Currently, these patients may have delayed presentation for surgical resection due to the fear of the long term outcomes related to resection or reconstruction. With long term studies investigating the function of these reconstructions and short term studies evaluating the potential benefits to resection (improved growth, resolved anemia, etc.), surgical management may become an earlier option for many patients.
- It has been estimated that 25-30% of injured children are cared for by pediatric specialists. By developing standardized treatment protocols, the expertise of pediatric specialists maybe disseminated to critical access providers.
- Treatment of pure gap esophageal atresia involves prolong hospital stays and significant surgical morbidity due to tension on an anastomosis. By developing novel devices or conduits, we aim to improve the outcomes for these neonates and their families.

FUTURE PLANS

- Collaborate with Dr. Wigle and the center of regenerative medicine to develop a potential esophageal graft for the treatment of esophageal atresia.
• Work with the office of translation to practice to further modify and develop a novel esophageal anastomotic device for the treatment of pure esophageal atresia.

• Continue to work with the guidelines committee of the Pediatric Trauma Society to develop a guideline on either the initial management of blunt abdominal trauma or the management of acute spinal cord injury in children.

• Investigate the outcomes of total abdominal colectomy for the treatment of severe pediatric Crohn’s colitis.

REFERENCES/PUBLICATIONS


Kevin Arce, D.M.D., M.D.
Oral & Maxillofacial Surgery

BACKGROUND
My research interests are diverse and include clinical outcomes in malignant and benign maxillofacial pathology, risk estimation for complex maxillofacial reconstruction, the impact of fluid administration in maxillofacial surgery and medical education.

AIMS/GOALS
- To improve outcomes in patients undergoing maxillofacial surgery
- To evaluate the impact of intraoperative fluid administration in maxillofacial reconstruction
- Develop an effective tool for clinical reasoning in oral and maxillofacial surgery

FINDINGS TO DATE
- Two retrospective studies have been completed assessing the validity of risk stratifying metrics in patients undergoing head and neck reconstruction with free fibular flaps and the findings have been summarized in two manuscripts currently in different phases of publication. Another retrospective study evaluating the impact of perioperative fluid administration on the rates of postoperative complications following head and neck reconstruction with fibular free flaps has also been completed and manuscript submitted.
- The ACS NSQIP Surgical Risk Calculator is not a useful risk stratifying metric among patients undergoing major head and neck reconstruction with microvascular fibular free flaps.

CLINICAL IMPLICATIONS
- Risk estimation tools can help guide individualized patient care by facilitating informed treatment decisions and assisting in the selection of complex treatment options. The ability to preoperatively risk stratify patients undergoing maxillofacial reconstructive surgery is not yet fully achieved. The development and validation of future risk calculators in complex maxillofacial reconstruction remains important in the current healthcare climate with its focus on cost containment, value, and quality improvement. The judicious administration of fluids to patients undergoing microvascular free tissue transfer to the head and neck is warranted in order to prevent postoperative complications.

FUTURE PLANS
- Multi-institutional, randomized clinical trial to assess the impact of fluid administration on head and neck free flap reconstructions
- Develop a predictive model for wound complications and free tissue transfer failures in patients with mandibular osteoradionecrosis.

Despite validation within numerous other surgical specialties, the Surgical Apgar Score is not useful as a metric for risk stratification among patients undergoing major head and neck reconstruction with fibular free flaps.

Liberal fluid administration is associated with increased rates medical/surgical complications following head and neck reconstruction with fibular free flaps.

Fluid volume predicting any postoperative complication in patients undergoing fibular free flap reconstructions was identified at 5500 mL and a cut point for fluid volume predicting major postoperative complications has been identified at 7000 mL.
• Develop SCRIPT Concordance Testing as a measure of clinical reasoning in maxillofacial pathology
• Improve outcomes in patients with head and neck cancers with emerging immunotherapy

REFERENCES/PUBLICATIONS

BACKGROUND
I have focused mainly on three areas of oral and maxillofacial surgery: osteoradionecrosis (ORN) of the jaws secondary to head and neck radiation, dentoalveolar surgery in the medically-compromised patient, and temporomandibular joint surgery.

AIMS/GOALS
• Identify ORN risk by anatomic region in patients who have undergone head and neck radiation
• Develop and promote clinical algorithms that improve functional and pain outcomes in patients with temporomandibular disorders that require surgery
• Identify an effective treatment protocol for radiation therapy for temporomandibular joint heterotopic ossification
• Develop and promote clinical algorithms for safe treatment of the medically-compromised patient undergoing dentoalveolar surgery

FINDINGS TO DATE
• Patients developing ORN appear to have lower risk in the anterior mandibular sites that are further from the main dose of radiation
• Thrombocytopenic patients undergoing dental extraction may be safe without platelet transfusion when platelets are 20,000 or above.
• Dental extraction in the profoundly neutropenic patient appears to be safe
CLINICAL IMPLICATIONS

- Patients with a history of head and neck radiation may be better stratified in terms of risk for ORN based on site of radiation and dose delivered. This understanding will facilitate dentoalveolar and reconstructive surgery in this patient population.

- Transfusion of platelets in the thrombocytopenic patient undergoing dental extraction may be considered preoperatively in patients with counts below 20,000. Postoperative transfusion as needed may be considered for patients with platelet counts 20,000 or above. Otherwise, local hemostatic measures are likely adequate.

FUTURE PLANS

- Prospectively study outcomes in patients undergoing head and neck radiation who require dental extraction or dental implant treatment.

- Prospectively study outcomes in patients undergoing proton head and neck radiation who require dental extraction or dental implant treatment.

- Evaluate differences in recurrence for heterotopic ossification of the TMJ in patients receiving 1 dose vs 5 doses of radiotherapy

- Prospectively evaluate bleeding in thrombocytopenic patients when preoperative platelet transfusion is withheld for patients at or above 20,000 platelets and local measures alone are utilized for hemostasis.

SELECTED REFERENCES/PUBLICATIONS


Jacob G. Yetzer, D.D.S., M.D.
Oral & Maxillofacial Surgery

BACKGROUND

My research focus includes an array of clinical applications and outcomes involving benign and malignant disease of the maxillofacial region as well as reconstructive techniques for complex defects. This includes the advancement of multidisciplinary reconstruction of the maxillofacial skeleton making use of virtual surgical planning and 3D printing techniques. The goal of these endeavors is to ultimately improve the reconstructive outcome while decreasing time to completion as well as minimizing the number of surgeries the patient must undergo.

AIMS/GOALS

- Collaborate with colleagues in the Maxillofacial Prosthetics and Radiology Departments in order to develop an in-house, rapid turnaround virtual surgical planning protocol that allows for coordination of surgical resection, osseous free flap contouring, implant placement and prosthetic delivery in a single operation through the use of 3D printed surgical guides.

- Continue to develop the understanding of benign and malignant disease of the head and neck by answering clinical questions based on evaluation of clinical data

- Use outcome measures to refine clinical pathways for the optimization of care and cost measures of patients undergoing major head and neck reconstruction
FINDINGS TO DATE

Thus far, our group has identified appropriate software models and printing techniques in order to provide a coordinated, single-stage surgery including resection of the mandible or maxilla, osseous free flap reconstruction, precision placement of dental implants and immediate prosthetic placement from start to finish. We have identified appropriate surgical candidates and are ready to implement the process.

CLINICAL IMPLICATIONS

Advanced technology has already been leveraged for reconstruction of the maxillofacial region. As these techniques become more refined, we will continue to push the envelope in terms of accuracy and speed with which these procedures can be accomplished. This will greatly facilitate patient outcomes in this anatomically and functionally complex region in such a manner as to allow single stage treatment of patients’ disease process together with reconstruction of resultant skeletal, soft tissue and dental defects.

FUTURE PLANS

Continued refinement of these applications will likely include the incorporation of more elegant prelaminated flaps and make further use of techniques in the field of tissue regeneration.
Transplant Surgery
Department of Surgery Research Profile

Patrick G. Dean, M.D.
Transplant Surgery

BACKGROUND
Kidney transplantation is the best therapy for patients with end-stage kidney disease. However, many patients do not gain the maximal benefit from this therapy. Our overall goals are to increase access to preemptive kidney transplantation and to maximize the survival of kidney allografts.

AIMS/GOALS
- Provide increased access to kidney transplantation, especially preemptive living donor kidney transplantation
- Explore the role of activated macrophages in kidney allograft rejection
- Further define the interactions between donor specific antibody and the allograft

FINDINGS TO DATE
- Preemptive kidney transplantation occurs in only 17% of recipients overall and 31% of living donor kidney transplant recipients nationwide. Almost one third of nonpreemptive living donor recipients were dialyzed for less than 1 year.
- Positive crossmatch kidney transplantation results in an inflammatory gene expression profile in the allograft early after transplantation, prior to the development of histologic changes.
- Activate macrophages can be found in kidney allografts with acute cellular rejection.

CLINICAL IMPLICATIONS
- Significant national and local efforts should be devoted to increasing the access of patients to preemptive kidney transplantation.

• Activated macrophages may be a target for therapeutic interventions designed to prevent or treat acute rejection of kidney allografts.

FUTURE PLANS
- Quantify healthcare utilization in preemptive kidney transplantation compared to non-preemptive kidney transplantation
- Explore the role of activated macrophages in kidney allograft rejection
- Develop a rodent model of kidney transplantation to investigate cellular and antibody-mediated rejection
- Develop novel therapeutic agents to decrease the intensity of cellular rejection and to attenuate the production of donor specific antibodies

REFERENCES/PUBLICATIONS
Julie K. Heimbach, M.D.
Transplant Surgery

BACKGROUND
Dr. Heimbach completed a 1 year NIH sponsored basic science research fellowship during surgical residency at the University of Colorado, with a focus on ischemia-reperfusion injury. Following residency in general surgery, she completed a transplant surgery fellowship and currently serves as the surgical director of liver transplantation at Mayo Clinic in Rochester, MN. Her primary interests are in liver transplantation for hilar cholangiocarcinoma, living donor transplantation, and issues of obesity and liver transplantation.

AIMS/GOALS
- Optimize outcomes for patients undergoing neoadjuvant chemo radiotherapy and liver transplantation
- Improve treatment strategies and long-term outcomes for patients with obesity related end-stage liver disease
- Improved outcomes for living liver donors and recipients

FINDINGS TO DATE
- We have identified the risk factors for protocol fall-out and disease recurrence following neoadjuvant chemoradiotherapy and liver transplantation for patients with hilar cholangiocarcinoma.
- We have developed a novel therapy which combines liver transplantation with gastric sleeve, with the aim of improving long-term post-transplant outcomes.
- We have followed living liver donors and living kidney donors in the long-term to ensure there are no unexpected findings related to donation.

CLINICAL IMPLICATIONS
- Based on the identification of the risk factors for recurrence, we have initiated a cancer-center protocol for adjuvant therapy for patients who are identified to be at high risk for recurrence. We also hope to be able to improve response and expand access if we can further delineate the mechanisms of response neoadjuvant therapy.
- We have demonstrated sleeve gastrectomy combined with liver transplantation is safe and provides excellent weight loss. Further research is needed to determine optimal patient selection and durability of therapy.
- We have improved our clinical protocols are working to improve our operative technique for patients following living donor surgery.

FUTURE PLANS
- Long-term follow up study for patients with recurrent PSC to determine possible etiologies for PSC and hilar cholangiocarcinoma development.
- Randomized controlled trial for patients with obesity related liver disease comparing combined liver transplant and sleeve gastrectomy, with staged liver transplant followed by sleeve gastrectomy at a delayed interval.
- Identification of etiology and development of novel treatment strategies for recipients who develop biliary strictures following living donor liver transplantation.

REFERENCES/PUBLICATIONS
Scott L. Nyberg, M.D., Ph.D.
Transplant Surgery

BACKGROUND
I am uniquely trained as a transplant surgeon and a biomedical engineer. My laboratory has extensive expertise in basic research and development of biomedical devices. One focus is the isolation and cultivation of primary hepatocytes for use in cellular therapies of liver disease. We have designed and tested several bioartificial liver devices including our current device - the Spheroid Reservoir Bioartificial Liver (SRBAL). In parallel, we have genetically engineered pigs with a homozygote deficiency in fumarylacetoacetate hydrolase (FAH-/-). These pigs are the first large animal model of a hereditary metabolic liver disease, hereditary tyrosinemia type 1 (HT1). In a third area of research, we have tissue engineered a transplantable liver using a decellularized pig liver scaffold.

AIMS/GOALS
- The overall goal of my research program is to develop cell-based therapies for the treatment of patients with liver failure and metabolic liver disease.

FINDINGS TO DATE
- In a pre-clinical (porcine) model of drug-induced acute liver failure (ALF), survival of untreated control ALF pigs was 0% while survival of ALF pigs treated with the Spheroid Reservoir Bioartificial Liver was 100%.
- FAH-/- pigs demonstrate complete liver repopulation with normal hepatocytes after Ex Vivo Gene Therapy.
- FAH-/- pigs serve as in vivo incubators for production of human hepatocytes.
- FAH-/- pigs facilitate maturation of human induced pluripotent (iPS) stem cells to hepatocytes.
- Tissue engineered liver grafts remain perfused in vivo for over 3 weeks in a porcine model of axillary transplantation.

CLINICAL IMPLICATIONS
- Phase 1/2 clinical testing of the Spheroid Reservoir Bioartificial Liver is in development.
- Plans are underway for clinical testing of Ex Vivo Gene Therapy in children with metabolic liver disease.
- Though several years from clinical application, a tissue engineered liver would address the shortage of donor livers.

FUTURE PLANS
- We have new funding from the Minnesota Regenerative Medicine program to study liver regeneration in pigs after 80% hepatectomy under treatment of the Spheroid Reservoir Bioartificial Liver.
- We have new funding (R01 grant) to clone an immunodeficient FAH-/- pig and study expansion and differentiation of human liver cells in these pigs.
- A new NIH R42 grant is in preparation to study human liver development in chimeric FAH-/- pig embryos.

REFERENCES/PUBLICATIONS
Transplant Surgery
Department of Surgery Research Profile


- Nyberg S, Grompe M, Lillegard J, Hickey R. FUMARYLACETOACETATE HYDROLASE (FAH)-DEFICIENT PIGS AND USES THEREOF, New patent issued in United States, China and Japan

- Nyberg S. METHOD FOR TREATING BLOOD OR PLASMA USING HEPATOCYTE SPHEROIDS, New patent issued in United States.

Mark D. Stegall, M.D.
Transplant Surgery

FOCUS AREAS
- Identifying the mechanisms of late renal allograft loss through genomics and detailed longitudinal follow-up
- Understanding the mechanisms of antibody production and developing therapies to deplete anti-HLA antibody in transplant recipients
- Developing of international research consortia to facilitate the development of new therapies for renal transplant recipients (both solitary kidney and kidney-pancreas recipients)
- Use of computational biology in large datasets to model transplant outcomes

SIGNIFICANCE TO PATIENT CARE

Our research group is focused on improving the outcomes of transplant recipients. Specifically, we are interested in developing new therapies to address two important issues: 1) long-term renal allograft damage and 2) antibody barriers to successful transplantation. In addition to these laboratory-based projects, we have developed an international research consortium (The Multicenter Transplant Alliance, MTA) to facilitate innovative multi-center clinical trials. Our group serves as the coordinating center for the MTA which includes the three Mayo sites and 5 other centers. Dr. Stegall also serves as research mentor to several Mayo junior staff. We have collaborations with groups within Mayo and worldwide. All of this means that patients who come to any Mayo site for a transplant have access to all types of cutting edge therapy if they need it.
PROFESSIONAL HIGHLIGHTS

Primary Appointment: Department of Surgery
Joint Appointment: Department of Immunology
Academic Rank: Professor of Surgery
James C. Masson Professor of Surgery Research
Clinician Investigator, Department of Surgery
Paul I. Terasaki Clinical Science Award, 2011
American Society of Histocompatibility and Immunogenetics
Councilor, American Society of Transplant Surgeons
Chair, Transplant Therapeutics Consortium, American Society of Transplant Surgeons
Director, Multicenter Transplant Alliance

SERVICE

Former Chair, Division of Transplant Surgery
Former Director, Kidney and Pancreas Transplant Program
Transplant Center Research Committee
Research Mentor to: Carrie Schinstock, MD (NIH KL-Award); Timucin Taner, MD (Dickson Award and Mayo Career Development Award); Elizabeth Lorenz, MD and Lynn Cornell MD.

PUBLICATIONS

Timucin Taner, M.D., Ph.D.
Transplant Surgery

BACKGROUND

My research interest is focused on understanding the alloimmune responses in solid organ transplantation, particularly in the setting of liver transplantation. Our ongoing projects are aimed at linking the clinical outcomes to underlying immune mechanisms by investigating transplant recipients’ innate, humoral and cellular alloimmune responses, as well as genetic profiles.

AIMS/GOALS

- Understanding the role of HLA-antibodies in liver transplantation
- Identifying the mechanism through which the liver allograft modulates the host immune responses.
- Ascertaining the differences between alloimmune responses to different organ transplants, using comparative immunobiology

FINDINGS TO DATE

- In the only prospective study to date, we showed the incidence and course of HLA-antibodies in liver transplant patients
- Based on protocol biopsies, we established that the simultaneously transplanted liver plays an immunoprotective role on kidney and heart allografts
- We have recently demonstrated that the allograft genetic signature differs in liver transplant and kidney transplant recipients, and that the endothelial injury markers are downregulated in the former

CLINICAL IMPLICATIONS

Better understanding of the immunoregulatory role of the liver allograft will help individualize the immunosuppressant treatment in transplant patients, and help transplant highly sensitized patients.

FUTURE PLANS

In the upcoming year, we will continue our efforts to identify the basic immunologic phenomena underlying the unique alloimmune responses seen in liver transplant patients. We will also partake in two NIH-funded clinical trials (along with UCSF) using infusion of alloantigen-pulsed regulatory T cells to minimize pharmacologic immunosuppression.

REFERENCES/PUBLICATIONS

Gynecologic Surgery
Department of Surgery Research Profile

Jamie N. Bakkum-Gamez, MD
Gynecologic Surgery

BACKGROUND
I am a gynecologic oncologist and my practice is solely surgical. From a quality improvement (QI) standpoint, I am leading projects to improve the quality of surgical care, outcomes, and value in gynecologic surgery. From a research standpoint, my two areas of research focus are 1) the development of a non-invasive screening test for endometrial cancer and precursor lesions and 2) the investigation of novel oncolytic therapeutics for metastatic and/or recurrent endometrial cancer. I have been the Mayo site PI for the Gynecologic Oncology Group (GOG)/NRG Oncology from 2012 to present.

AIMS/GOALS
- Improve the value of gynecologic surgical care at Mayo Clinic through QI efforts to decrease surgical site infections, transfusion rates, venous thromboembolism rates, length of hospital stay, etc.
- Develop the first ever screening test for endometrial cancer by combining self-sampling with a tampon and sensitive molecular assays.
- Introduce a novel systemic oncolytic virus therapy for metastatic, incurable endometrial cancer.

FINDINGS TO DATE
- Surgical site infection reduction: Utilizing the DMAIC quality improvement approach, we implemented a 15-item evidence-based and best-practice bundle of interventions that reduced surgical site infection rates by 76% in our high risk laparotomies for uterine and ovarian cancer.
- Screening test development in endometrial cancer: Methylated tumor DNA can be detected in tampon samples from women with endometrial cancer.
- Oncolytic virus therapy: Preclinical data on measles virus, vaccinia, and vesicular stomatitis virus (VSV) in endometrial cancer has identified VSV to have highly potent oncolytic activity against endometrial cancer. VSV is currently in a phase I trial as an intratumoral injection in patients with hepatocellular carcinoma (clinicaltrials.gov identifier NCT01628640) at Mayo Clinic Arizona.

CLINICAL IMPLICATIONS
- QI projects in the Division of Gynecologic surgery have led to lasting improvements in the value of care.
- There is currently not a screening test for endometrial cancer, despite the fact that it is the most common gynecologic malignancy in developed nations. Endometrial cancer incidence and mortality is increasing. Earlier diagnosis of endometrial cancer or identification of precursor lesions may improve survival from the disease.
- Recurrent endometrial cancer is most often lethal. Novel agents to treat widespread primary disease and recurrence are needed. VSV is highly oncolytic in preclinical models and a phase I trial in humans is warranted.

FUTURE PLANS
- Ongoing QI efforts are underway to reduce transfusion rates, better understand VTE risks and modalities to reduce the rate, and improve referral to genetic counseling in our ovarian cancer population.
Currently a large-scale clinical trial with a goal accrual of 1000 women 45 years of age and older presenting with signs/symptoms that may represent endometrial cancer is accruing. This cohort will be utilized to test and validate our endometrial cancer screening test molecular signature. Larger population-based studies will follow. We were recently selected as a Mayo Clinic Transform the Practice team to support this work.

We have developed a phase I clinical trial of intravenous VSV in metastatic endometrial cancer. The IND for VSV is currently under review at the FDA, an R01 grant will be reviewed in February 2016, and the clinical trial should open in mid-2016.

REFERENCES/PUBLICATIONS


AIMS/GOALS

- To identify the most effective evaluation for women with abnormal uterine bleeding after endometrial ablation
- Optimize the use of sonohysterography in evaluation of abnormal uterine bleeding

FINDINGS TO DATE

- Endometrial thickness measurements during sonohysterography correlate well with normal endometrial pathologic findings
- Endometrial biopsy and office hysteroscopy are viable options for evaluation of patients with abnormal bleeding after endometrial ablation
- Hysterosalpingography is more likely to be unsatisfactory after endometrial ablation in women who have had concomitant hysteroscopic sterilization

CLINICAL IMPLICATIONS

- A significant proportion of women develop abnormal bleeding after endometrial ablation for menorrhagia. The development
of accurate and effective means for evaluation of bleeding after endometrial ablation is important to exclude uterine malignancy and determine future therapy. Sonohysterography has the potential to replace or reduce the need for endometrial biopsy, lessening the pain and cost of evaluation of abnormal bleeding.

FUTURE PLANS

- Complete a retrospective cohort study of women with abnormal bleeding post endometrial ablation including 15 years of data from Mayo Clinic
- Design a prospective study of evaluation of bleeding after endometrial ablation using the data from the cohort analysis
- Develop new technologies to prevent post endometrial ablation adhesions
- References/Publications

William A. Cliby, M.D.
Gynecologic Surgery

BACKGROUND

My research has primarily and consistently focused on ovarian cancer. This includes both clinical outcomes research with a focus on quality improvement and a translational research effort focused on novel therapies. I have been an active member of the Mayo Clinic Cancer Center SPORE in Ovarian cancer research since first awarded.

AIMS/GOALS

Determine the relevant predictors of morbidity and mortality from Ovarian Cancer debulking surgery. Develop models for appropriate selection of surgical candidates for primary and recurrent ovarian cancer. Refine and perfect surgical techniques for complicated resections of ovarian cancer. Investigate novel therapeutic approaches to ovarian cancer including viral therapy and targeted approaches.

FINDINGS TO DATE

- Described national patterns of care in ovarian cancer: quality, compliance with national guideline care and predictors of survival.
- Developed a validated model with weighted-risk scoring to identify those patients best treated with primary surgery or neo-adjvant chemotherapy followed by surgery.
- Developed and validated scoring models to identify patient most likely to benefit from secondary debulking surgery with recurrent ovarian cancer.
• Improved rates of complete resection in ovarian cancer, now exceeding 60% of new primary cases and 85% of cases having residual disease less than 1 centimeter. These improved rates have resulted in improved disease free and overall survival.

• Demonstrated safety of a viral approach to Ovarian cancer (measle virus) collaboratively.

• Described the relevance of a novel surface receptor (MISIIR) as a target for anticancer therapy.

• Identified a role for fibrosis and TGF-β signaling pathway in metastatic ovarian cancer.

CLINICAL IMPLICATIONS

• The role of primary surgery in the management of ovarian cancer has long been recognized with residual disease after debulking surgery one of the most important factors impacting survival. Nationally there is wide variation in rates of complete or near complete resection despite this recognition. Much of these differences stem from lack of expertise and concern over morbidity. Our work has contributed greatly to the national dialogue and continued eduction on advanced techniques of surgical resection, mitigation of surgical morbidity and proper patient selection. Surgical resection has limits on its contributions to overall survival obviously. Advanced in therapies that address recurrences and chemotherapy resistance are critically needed. As part of the larger community in ovarian cancer research at Mayo Clinic, we collaboratively work with clinical and basic researchers to address these areas. The original work using viral therapy to treat ovarian cancer has led to a new clinical trial for patients with recurrent disease that holds promise for improved strategies. Our current lab work is focused on 1) determining the feasibility of a monoclonal antibody to target a unique surface receptor in ovarian cancer, and 2) on targeting the TGF-β pathway to control metastases. The latter approach seeks to repurpose currently available drugs in use for other systemic diseases for improved disease control in ovarian cancer.

FUTURE PLANS

• Refine the contributions of fibrosis and TGF-β signaling in the metastatic and fibrotic signature that characterizes ovarian cancer.

• Further testing of currently available TGF-β inhibitors in ovarian cancer models.

• Continued clinical trials using viral therapy.

REFERENCES/PUBLICATIONS


The long-term area of focus in my research has been endometrial cancer. During the last 15 years, I have done extensive clinical and translational research on the diagnosis, prevention and treatment of uterine malignancy. This effort has contributed to lead our Institution at becoming one of the world-recognized leaders in endometrial cancer treatment. This continues to be my main area of interest, including the role of robotic surgery and sentinel lymph nodes in the surgical management of uterine cancer.

More recently, I have started a very fruitful collaboration with our microbiome team (H. Nelson, M. Walther Antonio, N. Chia). We have generated very interesting data on the potential role of the microbiome in endometrial cancer development. We are in the process of publishing our data and grant writing.

AIMS/GOALS

- To advance the care of patients with endometrial cancer
- To evaluate the role of minimally invasive and robotic surgery in endometrial cancer
- To study the role of sentinel lymph nodes in the treatment of endometrial cancer
- To ascertain the uterine microbiome role in the etiology of endometrial cancer
- To develop an accurate biomarker for the identification of patients with endometrial cancer or at risk for developing a uterine malignancy

FINDINGS TO DATE

- During the last 15 years, we have already extensively studied the surgical and postoperative management of endometrial cancer, including the role of lymphadenectomy and patterns of metastatic dissemination.
- More recently we have studied risk factors for the development of endometrial cancer and possible areas of prevention.
- We have recently identified a microbiome signature which is strongly associated with endometrial cancer.

CLINICAL IMPLICATIONS

- Our studies on the management of endometrial cancer have led to multiple changes in the treatment of uterine malignancy at Mayo Clinic and in many other institutions throughout the world. Now, the surgical treatment of endometrial cancer is shifting from full surgical staging to utilizing sentinel lymph nodes. This will allow a broader utilization of minimally invasive surgery for the treatment of this disease.
- Our findings on the strong association between the microbiome and endometrial cancer may have important implications for understanding the etiology of uterine cancer, and for potential early diagnosis and prevention.
- Our work can lead to findings comparable in significance to the association of Helicobacter pylori with stomach cancer, and to equally efficient prevention strategies.

FUTURE PLANS

- Further characterize the role of minimally invasive and robotic surgery in the treatment of endometrial cancer
• Study the role of sentinel lymph nodes in endometrial cancer, and its implications in postoperative treatment (ongoing prospective study)

• To ascertain the role of the uterine microbiome in the etiology of endometrial cancer and to develop an accurate biomarker for the identification of patients with a diagnosis of endometrial cancer or at risk for developing a uterine malignancy

REFERENCES/PUBLICATIONS


Elizabeth (Ebbie) A. Stewart, M.D.
Gynecologic Surgery

BACKGROUND

Uterine fibroids are noncancerous tumors of the uterus that commonly cause heavy menstrual bleeding, pelvic pain and pressure, bowel and bladder problems, and sometimes infertility and miscarriage. Clinically significant fibroids are found in about 1 in 4 women and account for up to half of all hysterectomies. They are also a disease of significant health disparities; for women of African descent, fibroids develop at an earlier age and more frequent and severe.

AIMS/GOALS

• The long-term goal of Dr. Stewart’s research is to develop prevention strategies for fibroids.

REFERENCES/PUBLICATIONS

Manuscripts:


## Discipline Matrix

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