Improving People's Lives Through Innovations in Personalized Health Care

Critical Bridge to Surgical Innovation: Professional Development, Mentorship & Research Training for Surgical Trainees

Ginny L. Bumgardner MD PhD
Professor of Surgery
December 18, 2015

THE OHIO STATE UNIVERSITY
WEXNER MEDICAL CENTER

DEPARTMENT OF SURGERY
THE OHIO STATE UNIVERSITY

Objectives

- Review the 2004 Surgery Blue Ribbon Committee Report & Directives
- Discuss the Evolution of the Professional Development Program in the OSU Department of Surgery
- Outcomes & Metrics of Success
- Initial Investment & Financial Sustainment
- Challenges
- New Directions

2004 Surgery Blue Ribbon Committee Report

American Surgical Association Blue Ribbon Committee

Report on Surgical Education: 2004

***Haile T. Debas, MD**, Barbara L. Bass, MD, FACS, Murray F. Brennan, MD, FACS, Timothy C. Flynn, MD, FACS, J. Roland Folse, MD, FACS, Julie A. Freischlag, MD, FACS, Paul Friedmann, MD, FACS, Lazar J. Greenfield, MD, FACS, R. Scott Jones, MD, FACS, Frank R. Lewis, Jr., MD, FACS, Mark A. Malangoni, MD, FACS, Carlos A. Pellegrini, MD, FACS, Eric A. Rose, MD, FACS, Ajit K. Sachdeva, MD, FRCSC, FACS, George F. Sheldon, MD, FACS, Patricia L. Turner, MD, Andrew L. Warshaw, MD, FACS, Richard E. Welling, MD, FACS, and Michael J. Zinner, MD, FACS*

Call to Action: Recommendations …..impetus for a concerted effort by the ACS, ABS, and the RRC to further refine and implement them.

Annals of Surgery • Volume 241, Number 1, January 2005

2004 Surgery Blue Ribbon Committee Report (Impetus & Charge)

- The Committee was charged with examining the multitude of forces impacting health care and making recommendations regarding the changes needed in surgical education to enhance the training of surgeons to serve all the surgical needs of the nation, and to keep training and research in surgery at the cutting edge in the 21st Century.

Annals of Surgery • Volume 241, Number 1, January 2005

Blue Ribbon Committee Report Headings:

- ✓ Surgical/Medical Workforce
  - Medical student education in surgery
  - Resident workhours and lifestyle in surgery
- ✓ Residency education in surgery
- ✓ The structure of surgical training
- ✓ Education support and faculty development
- ✓ Training in surgical research
- ✓ Continuous professional development

Surgeons as Innovators and Leaders of Patient Care

- "The research and innovation of American surgeons throughout the centuries has contributed significantly to scientific knowledge and has helped develop the best patient care in the world":
  - ORGAN TRANSPLANTATION
  - OPEN HEART SURGERY
  - CLINICAL NUTRITION
  - JOINT REPLACEMENT
  - BIOMATERIALS
  - ARTIFICIAL ORGANS

Annals of Surgery • Volume 241, Number 1, January 2005

Surgeons Unique Advantages as Innovators

- "Surgeons must exploit their unique advantages; the most clear of which is direct proximity to disease that yields a vivid understanding of both patient needs and care delivery logistics.
- Many great ideas emerge from navigating a difficult situation; and this is something that nonclinicians simply do not experience.
- Surgeons also have unprecedented access to properly phenotyped biological samples"

- Kirk AD, Feng S (2011) *Surgeons and research: talent, training, time, teachers and teams*. Am J Transplant 11: 191-193.

The Gap in Surgical Education

- Research training in surgery lacks structure, organization, and oversight.
- Lack of adequate protected time for research
- Lack of a national agenda for research training
- Research experience should benefit the individual

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Evolution of the OSU DOS Professional Development Program

- Initiated in 2002 by
  - DOS Chair: Chris Ellison MD
  - Residency Program Director: Mark Arnold MD
- Early Actions
  - Dedicated Time for PD: 1 year
  - Research Training Program Director
  - Dedication of Financial Resources to Resident PD
- Overall Goal
  - Support the development of future leaders in surgery

Program Metrics: Departmental
Core Goals of a Surgical Training Program

1. Clinical Mastery of Surgery:
   - Medical Knowledge, Surgical Technique & Judgment and Patient Care.
2. Academic Mastery of Surgery:
   - ✓ Mature critical thinking skills
   - ✓ Transform clinical observations into research questions & well-designed projects
   - ✓ Acquire investigative skills that ultimately improve surgical care & outcomes
   - ✓ Learn how to advocate and lead

Evolution of the OSU DOS Professional Development Program

- Challenges
  - Cultural barriers among the residents
  - Cultural barriers among the faculty
  - Minimal interaction with research faculty outside DOS
- Strengths
  - Key DOS faculty support
    - Center for Minimally Invasive Surgery (CMIS)
    - Comprehensive Cancer Center (CCC)
    - Hepatobiliary and Pancreatic Cancer
    - NCH Pediatric Surgery Group
    - Comprehensive Transplant Center

Evolution of the OSU DOS Professional Development Program

- Cultural Change
  - ➢Leaders in Surgery develop expertise
    - Clinical/Surgical Care
    - Motivation to improve patient care
    - Attuned to the identification of important clinical questions
  - ➢Essential tools in this path
    - Research education & training
    - Mentors
    - Collaborators
    - Track record: Presentations, Publications, Awards

Evolution of the OSU DOS Professional Development Program

Structure: 3 Phases

I. Preparation
   a) Recruitment
   b) DOS Residency Program Director
   c) Research Training Program Director

II. Training
   a) Masters Degree: MMS, MPH, MBA, MA
   b) Research mentorship

III. Post Degree Career Mentorship

Phase I: Preparation

- Fall Meeting with PGY1s & PGY2s
- Individual Meetings with PD, RPD and PIs
  - Career aspirations
  - Review CV & Research experience
  - Funding opportunities
  - Potential research projects
- Resident Peer to Peer
- Mentor Selection
- Project Development
- Tailored Curriculum
- Research Fellowship Application (local, national)
- NIH Loan Repayment Program Application
- Application to Graduate School (MMS)

Phases II: Training

- Mentored Research
  - Scientific Presentations
  - Publications
- MMS Didactics
- MMSP Quarterly Meetings
- MMS Exam
  - DOS Grand Rounds Presentations
- Minimum Graduation Requirements
  - 30 credits
  - 3.0 GPA
  - MMS Exam

DOS RTP Quarterly Agenda

- Academic Progress (credits, core requirements, gpa)
- Trainee Research Progress Report
- Curriculum Updates (new courses)
- Calendar
  - Upcoming OSU Research/Research Training Events
  - Upcoming meetings
  - Schedule of MMS Exam presentations
- Grant Opportunities
- Recognition of Scholarly Achievements

Recognition Section of Autumn 2015 DOS RTP Quarterly Meeting

- **Shayna Brathwaite MD:** NIH/NMA Travel Award. National Medical Association Convention & Scientific Symposium in Detroit, Michigan August 2015.
- **Daniel Lodwick MD:** the **SUS Karl Storz Resident Research Scholarship Award** for his project entitled, *"Radiation Dose Tracking in Computed Tomography".*
- **Michelle Nguyen MD** on receiving the **AAMC Learning Health System Pioneer Award** ($10,000) for her project entitled, *"The cost of quality: how do we calculate Value-based care?"* Michelle is also the recipient of the **Center for Integrative Health & Wellness (CIHW) Buckeye Pilot Research Grant** ($7,500) for her project entitled, *"Improving patient safety and satisfaction by decreasing physician burnout."*
- **Terry Rager MD MS** on his upcoming presentation of his paper, *"Exosomes Secreted from Bone Marrow-Derived Mesenchymal Stem Cells Protect the Intestines from Experimental NEC"*, at the **2015 AAP National Conference** & Exhibition being held in Washington, D.C.
- **Taehwan Yoo MD** on receiving the **2016 James King Award**

Masters of Medical Science Degree
(College of Medicine Program open to all OSUWMC residents and fellows)

- Core Requirements

I. Research Design & Methodology
II. Biostatistical Analysis
III. Research Ethics
IV. Science Communication

Masters of Medical Science Degree
(College of Medicine Program open to all OSUWMC residents and fellows)

- Development of new courses
  - Career Development for Surgeons
  - Business Management for Surgeons
- Electives
  - Health Policy
  - Topic Specific Journal Clubs
  - Pharmacogenomics
  - Biomedical Informatics
  - Clinical Informatics
  - Survey Design…

Translational Science Curriculum

- Topics of broad relevance
  - Immunology & Inflammation
  - Host Pathogen Science
  - Cancer Biology & Therapeutics
  - Wound Healing & Regeneration
  - Pharmacogenomics
- Minimize in-class time to facilitated discussion
- Exposure to faculty from many disciplines
- Pair research and clinical faculty

Multidisciplinary Class: SP TS Curriculum

Multidisciplinary Class: SP TS Curriculum

New! Career Development for Surgeons Course

SPRING 2014	SURG 8503.03		
30-Apr	Evaluation of Research I	Critical review of the literature and interpretation of clinical trials	Schmidt
30-Apr	Evaluation of Research II	Reviewing a manuscript (in-class activity)	Schmidt
5-May	Prep for a Career in Academic Surgery I	Planning your career and preparing your CV and effective e-mail and other correspondence	Arnold
7-May	Prep for a Career in Academic Surgery II	Networking, surgical societies, looking for your first job	Ellison
12-May	Prep for a Career in Academic Surgery III	Negotiating your first job, mentorship, setting up your lab or research program	Black & Whitson
19-May	Prep for a Career in Academic Surgery IV	Establishing successful research collaborations; financial management of grant funds	Carson
21-May	Prep for a Career in Academic Surgery V	Leadership skills and other opportunities in academic medicine	Higgins
28-May	Prep for a Career in Academic Surgery VI	Time management and work-life balance	Higgins

DOS NEWSLETTER


Drosdeck


Martin del Campo


Matthews

MASTER OF MEDICAL SCIENCE PROGRAM

MMSP Corner

Master of Medical Science candidates have been active in the following investigations:

Joe Drosdeck, MD
Mentors: W. Scott Melvin, MD & Dean Mikami, MD

Abstracts accepted for presentation:
"Multivariate Analysis Of Risk Factors For Wound Infection After Laparoscopic Colorectal Surgery." Society of American Gastrointestinal and Endoscopic Surgeons (SAGES), Baltimore, MD, April 17-20.

"Porcine Wet Lab Improves Surgical Skills in Third Year Medical Students." Academic Surgical Congress, New Orleans, LA, February 5-7, 2013.

Abstract accepted for poster:
"Reinforcement Of Midline Laparotomies With Bioabsorbable Mesh: Implications On Wound Infection." SAGES, April 17-20.

Sara Martin del Campo, MD
Mentor: William Carson, MD

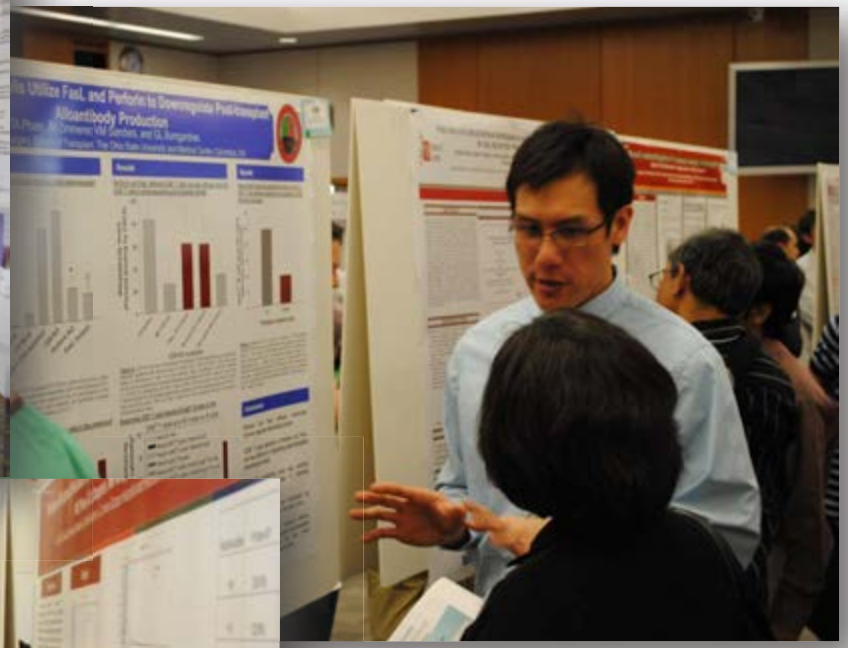
Abstract accepted for presentation:
Martin del Campo SE, Grignol VP, Peters SB, Clark JR, Carson WE III. "MicroRNA Profiling Classifies Problematic Melanocytic Lesions." 2013 Annual Cancer Symposium of the Society of Surgical Oncology. National Harbor, MD, March 6-9, 2013.

Mika Matthews, MD
Mentor: Gail Besner, MD

Publications – manuscripts:
Matthews MAB, Satiani B, Lohr JM. Trends in a changing vascular practice environment for members of the Society for Vascular Surgery. *Journal of Vascular Surgery* [accepted]

Satiani B, Matthews MAB, Gable D. Work effort, productivity, and compensation trends in members of the Society for Vascular Surgery. *Vascular and Endovascular Surgery* 2012; 46(7), 508-513.

Science Communication in Action



Dr. Carlos Pellegrini

"…the best surgery resident research conference I have attended….

The Ohio State University
Wexner Medical Center

Masters Exam:
Individual Research Accomplishment

Education

12 Presentations

8 Publications

7 Awards

SURGERY GRAND ROUNDS

Research Presentation in partial fulfillment for the Master of Medical Science degree:

"miRNA Are Differentially Expressed in HCC: So What?"

Jon C. Henry, MD

Undergraduate Education: BS, Biology, The Ohio State University, Columbus, OH

Medical School: MD, The Ohio State University, Columbus, OH

General Surgery Residency: The Ohio State University, Columbus, OH

Research Advisors: Carl R. Schmidt, MD, assistant professor of clinical surgery, Division of Surgical Oncology
Thomas D. Schmittgen, PhD, associate professor and chair, Pharmaceutics

Research Presentations:

Edward F. Hayes Graduate Forum Ohio State University – Oral Presentation – "miR-199a-3p targets CD44 and reduces proliferation and invasion of CD44 positive hepatocellular cell lines." March, 2011.

Columbus Surgical Society – Columbus, OH – Oral Presentation - "miR-199a-3p targets CD44 and reduces proliferation and invasion of CD44 positive hepatocellular cell lines." March, 2011.

American Association of Cancer Researchers Annual Meeting - Poster Presentation "miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines" April 2011.

Ohio State College of Medicine – Research Day – Poster Presentation - "miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines" April, 2011.

American College of Surgeons – Ohio Chapter Annual Meeting – Oral presentation. "Albumin is the key factor in outcome from malignant bowel obstruction." May, 2011.

Ohio State College of Pharmacy Research Day – Poster Presentation - "miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines" May, 2011

Ohio State Department of Surgery Research Day – Oral Presentation "miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines" June, 2011

Central Surgical Society Annual Meeting – Oral Presentationg – "Predictive Scoring System for Outcomes from Malignant Bowel Obstruction." Madison, WI. March 1-3, 2012.

American HepatoPancreaticoBillary Assoication (AHPBA) Annual Meeting – Oral Presentation – "Does Complete Radiographic Response Following TACE Improve Outcomes?" Miami, FL. March 7-11, 2012.

College of Pharmacy Research Day – Poster- "It Takes More Than One miRNA to Treat HCC" May 17th, 2012.

Department of Surgery Research Day Poseter – It Takes More Thank One miRNA to Treat HCC" May 25th, 2012.

Department of Surgery Research Day – Oral Presentation - – "Predictive Scoring System for Outcomes from Malignant Bowel Obstruction." – May 25th, 2012.

Research Publications:

Henry JC, Park JK, Jiang J, Kim JH, Roberts LR, Banerjee S, Schmittgen TD.miR-199a-3p targets CD44 and reduces proliferation of CD44 positive hepatocellular carcinoma cell lines. *Biochem Biophys Res Commun*. 2010 Dec 3. 403(1):120-5.

Park JK, **Henry JC**, Jiang J, Esau C, Gusev Y, Lerner MR, Postier RG, Brackett DJ, Schmittgen TD. miR-132 and miR-212 are increased in pancreatic cancer and target the retinoblastoma tumor suppressor.*Biochem Biophys Res Commun*. 2011 Mar 25;406(4):518-23.

Henry JC, Azevedo-Pouly AC, Schmittgen TD. microRNA Replacment Therapy for Cancer. *Pharm Res*. 2011, August 31.

Braconi C, **Henry JC**, Kogure T, Schmittgen T, Patel T. The Role of MicroRNAs in Human Liver Cancers. *Seminars in Oncology*. Dec 2011. 38(6):752-63.

Henry RK, Molnar A, **Henry JC**. A survey of U.S. Dental Practices' Use of Social Media. *Journal of Contemporary Dental Practice*. March-April 2012. 13(2):137-141.

Henry JC, Pouly S, Sullivan R, Sharif S, Klemanski D, Abdel-Misih S, Arradaza M, Jarjoura D, Schmidt CR, Bloomston M. A Scoring System for Prognosis and Treatment of Malignant Bowel Obstruction.

Henry JC, Malhotra L, Khabiri H, Guy G, Michaels A, Hanje J, Azevedo M, Bloomston M, Schmidt CR. Best Radiologic Response After Initial TACE for HCC Does Not Imply Better Outcomes. [Revised submission to the Journal *HPB* .]

McNally ME, Collins A, Wojcik S, Liu J, **Henry JC**, Jiang J, Thomas Schmittgen T, Bloomston M. Concomitant dysregulation of miR-151-3p and miR-126 correlates with improved survival in resected cholangiocarcinoma. [Accepted to the Journal *HPB* with revisions]

Research Awards:

Platinum (1st-place) Award at the Columbus Surgical Society – President's Symposium, 2011

Travel Award Recipient from the Ohio State College of Medicine Research Day – Trainee Presentation Day – Resident Category, 2011

2nd Place – American College of Surgeons – Ohio Chapter – Holzer Medical Center Award, 2011

Best Abstract Clinical/Translational Science – Ohio State University College of Pharmacy Research Day, 2011

First Place – 16th Annual Ohio State University Department of Surgery Research Day, 2011

NIH Loan Repayment Recipient, 2010-2012

NIH T32 in Cancer Research Recipient, 2010-20

Phase 3: Post-Degree Career Development

- Career Advisory Committee
  - Presentations at National Meetings
  - Completion of manuscripts submitted for publication
  - Development of new ideas for research studies
  - Application for research project funding
  - Fellowship/Position opportunities
  - Preparation of CV/resume
  - Letters of Recommendation

Advanced Research Training for Surgical Trainees (3 Phases)

Phase I

- Program Information
- Mentor Selection
- Curriculum Development
- Fellowship Application
- NIH LRP Application
- Application to the Graduate School (MMS)

Phase II

- Orientation
- Self-Assessment
- James King Research Presentations
- Quarterly Meetings
- MMS Didactics
- Mentored Research
- Professional Development
- Trainee Evaluation
- MMS Exam
- Career Advisory Committee

Phase III

- Career Advice
- Research Presentations
- Scientific Travel
- Publications
- Leadership Activities
- Fellowship/Position Application
- Letters of Recommendation

Tailored to the Individual

Protected Time
Core Curriculum

Career Goal Oriented

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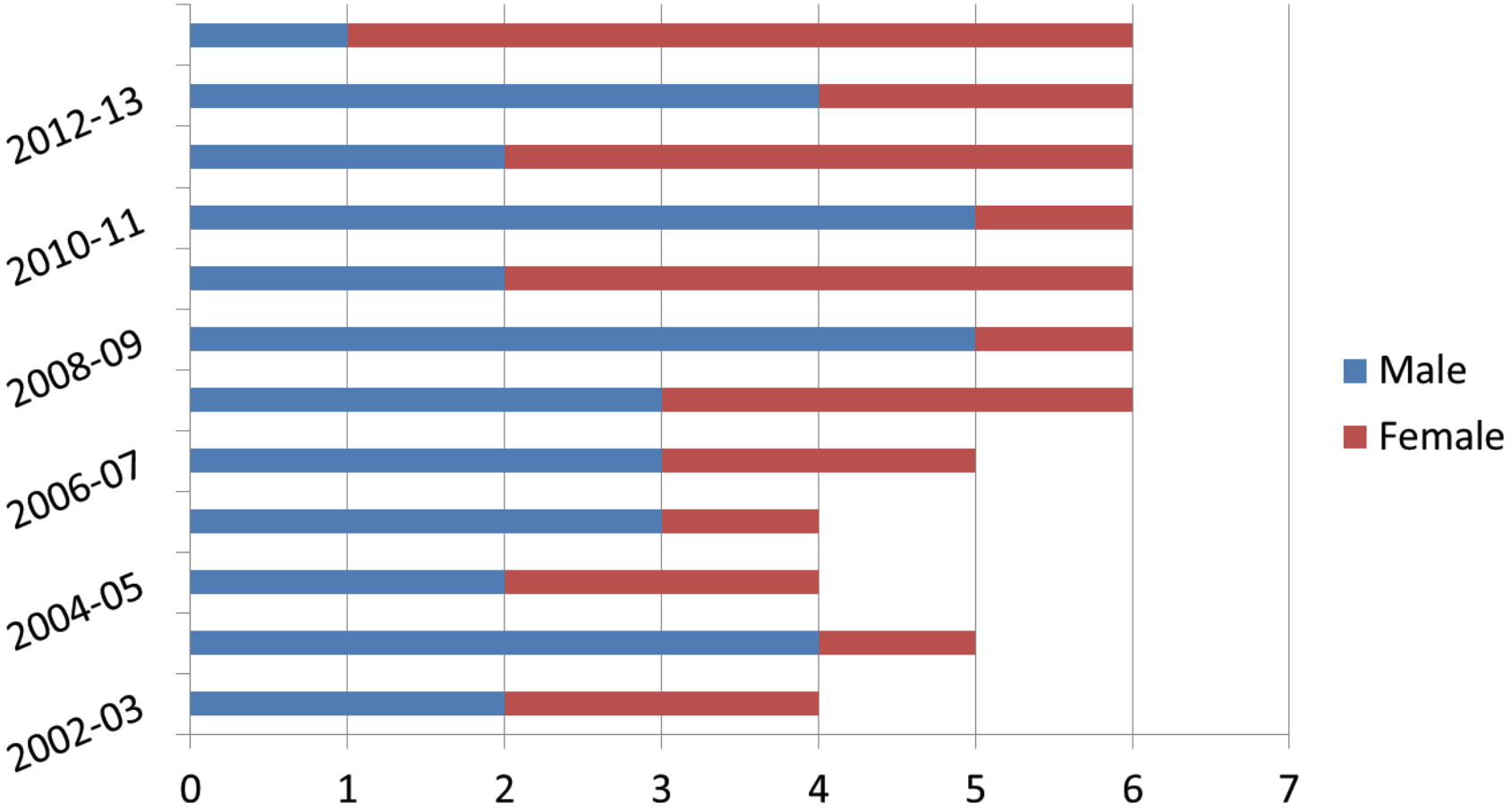
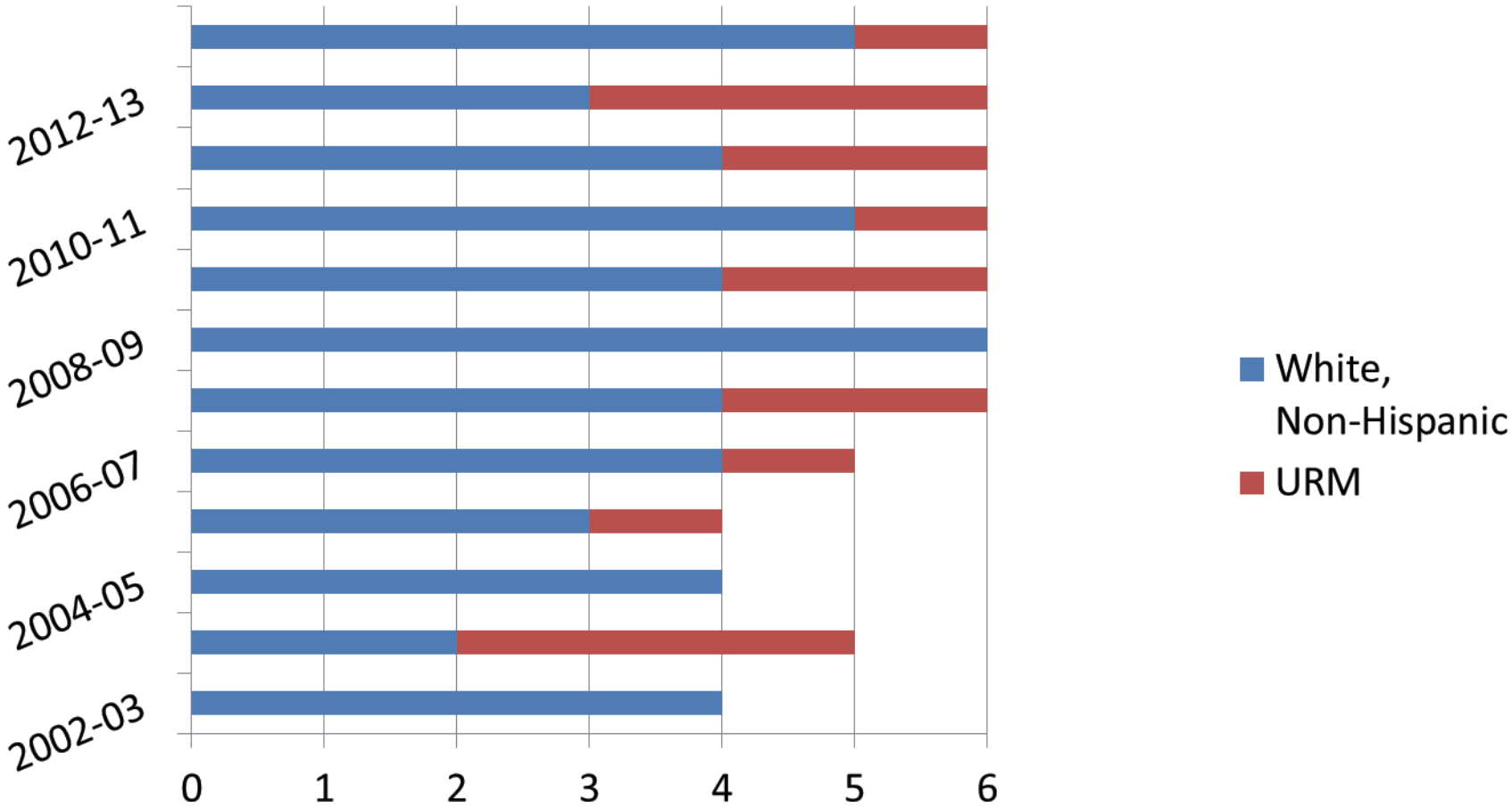
Metrics of Success: A Longterm Continuum

- ✓ Recruitment: Quality, Diversity
- ✓ Benefit to the Individual
- ✓ Individual Research Accomplishments
- ✓ Delivery of High Quality Evidenced-Based Surgical Care
- ✓ Placement into Prestigious Fellowships
- Transition into Academia
- Continued Publication & Presentation
- Engagement in Research as PI or Co-I
- Engagement in Research Team Leadership
- Transition into Surgical Leadership in Private Practice

Diversity of Incoming OSU Surgery Housestaff
(Gender Distribution 2002-2013)



Incoming Housestaff (URM distribution 2002-2013)



Diversity: Snapshot of OSU General Surgery Categorical Residents

2001-2002

- Total residents = 24
- 84% male
- 16% female
- 4% URM

2013-2014

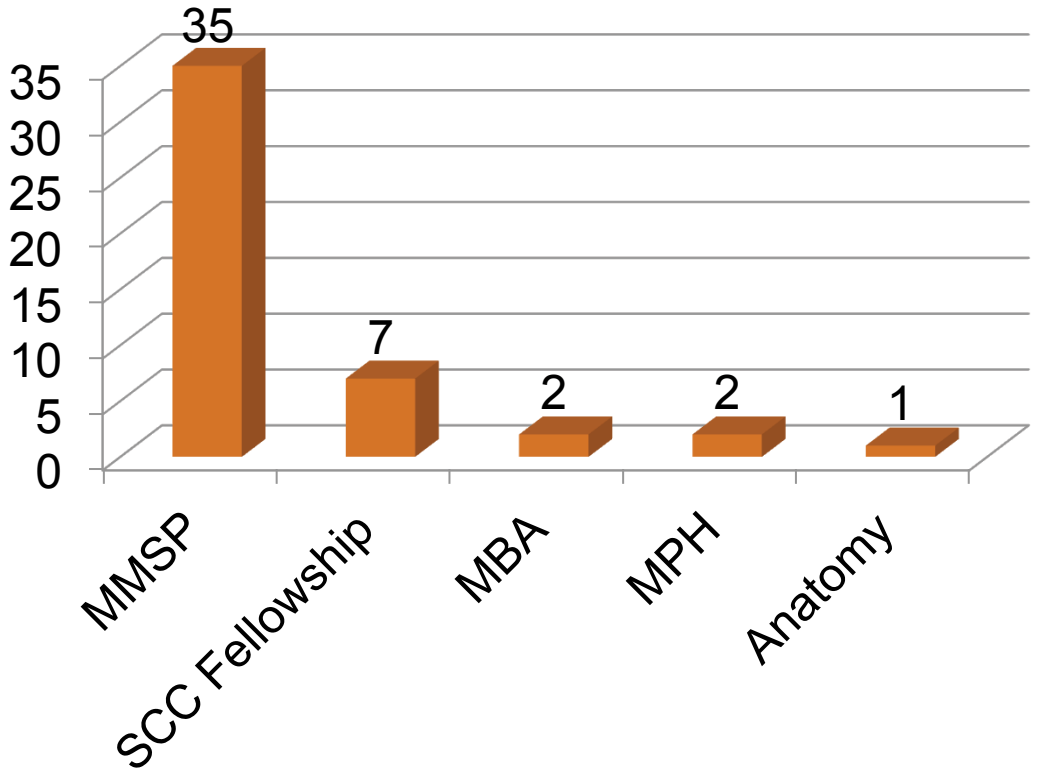
- Total residents = 38
- 50% male
- 50% female
- 29% URM

NIH Director: Francis Collins MD PhD:

"The biomedical research enterprise must engage all sectors of the population in order to solve the most complex biological problems and discover innovative new ways to improve human health."

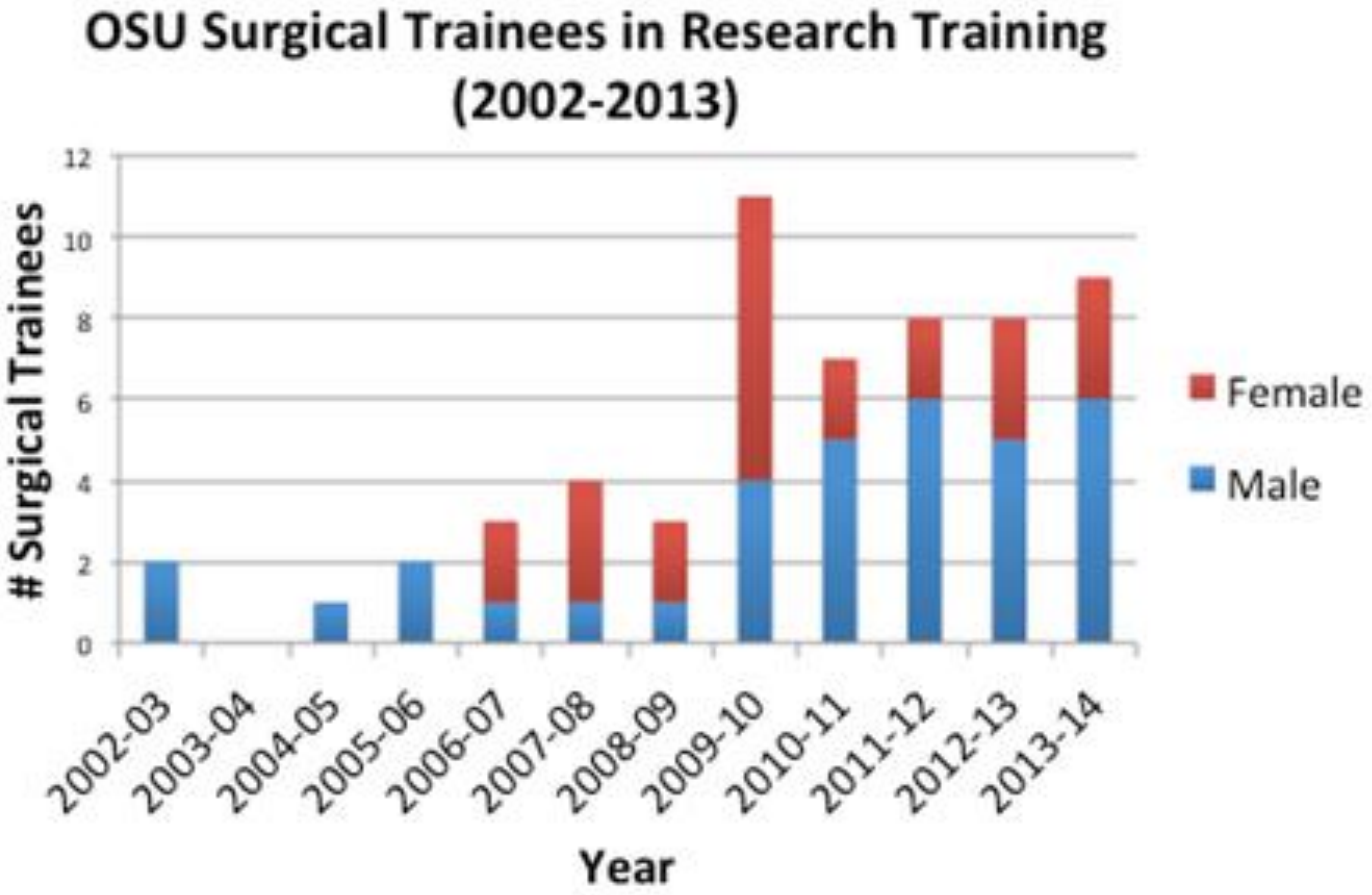
"Enhancing the Diversity of the NIH-funded Workforce"
https://commonfund.nih.gov/diversity/index.

Resident Professional Development Degrees Completed 2006 - 2015



40 Residents Completed Degrees, 7 Completed SCC Fellowship

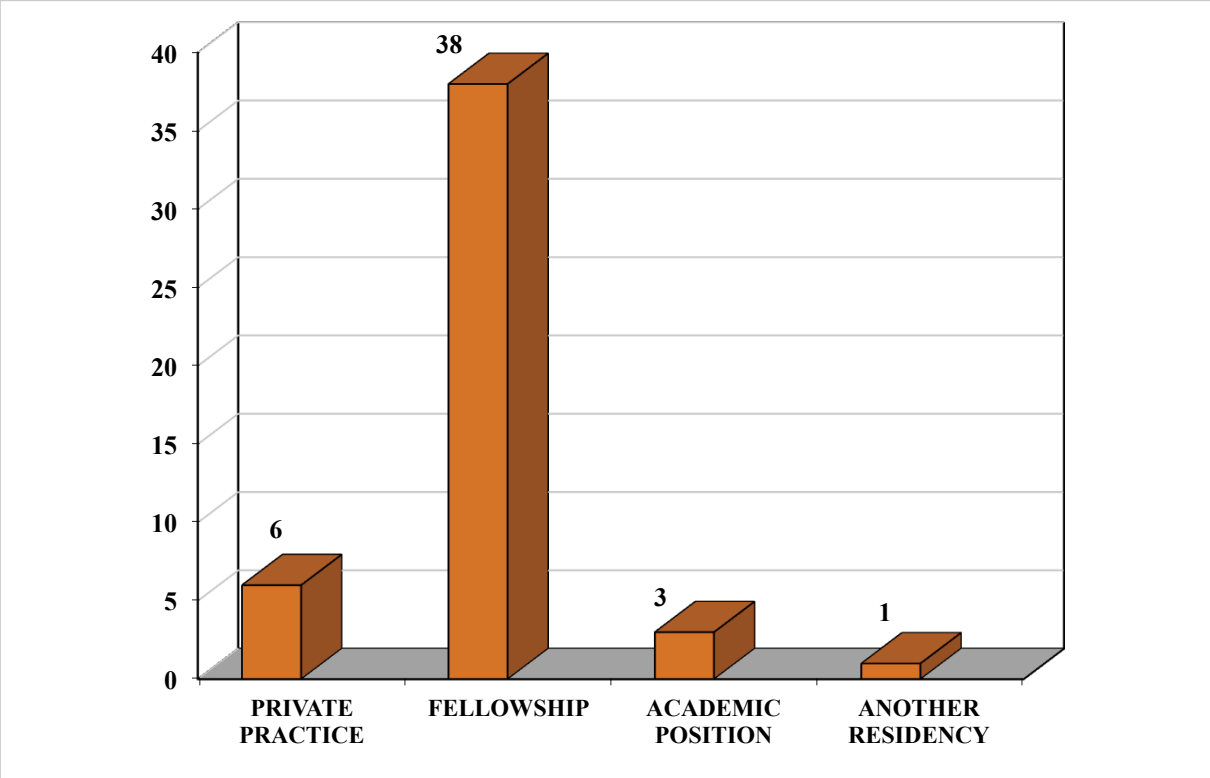
Benefit to the Individual



DOS Trainee Publications, Presentations, Awards & Placement (2002-2013)

	Alumni Group= DOS Residency/MMSP Alumni	Current Trainee Group= DOS Surgical Research Trainee	Total
# Trainees	15	21 (5/21 just started July 2013)	36
Total Publications	77	79	156
1st Authored Publications	29	32	61
Scientific Presentations:	58	69	127
Total Research Awards Received	10	24	34
Major National Research Award	3	11	14
NIH T32 support	3	11	14
NIH LRP	0	2	2
Trainee Placement into Fellowships	11	Not applicable	
Average number of total publications	5.1 per trainee	4.9 per trainee	
Average # of 1st authored publications	1.9 per trainee	2.0 per trainee	

Resident Destinations Upon Graduation
(2006 – 2015)



Pursuit of Diverse Fellowships

- Cardiovascular: 2
- Colorectal: 3
- Critical Care: 7
- Hepatobiliary: 1
- Minimally Invasive Surgery: 2
- Plastic Surgery: 2
- Surgical Oncology: 3
- Transplantation: 2
- Vascular: 4

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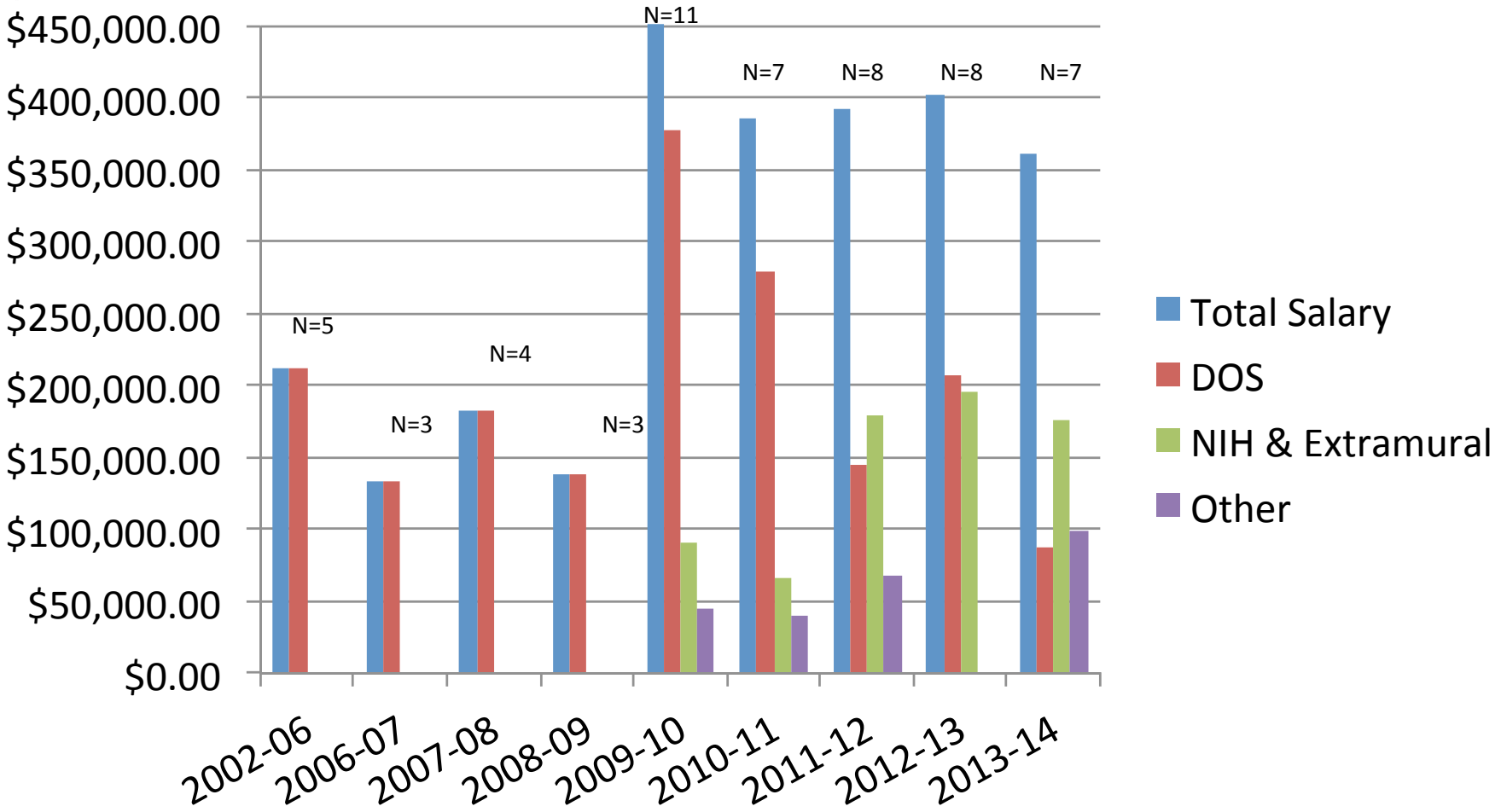
Initial Investment & Financial Sustainment

- Resident Stipend: GME PGY2/3 level
  - 50% supported by the DOS
  - 50% supported by the Research Mentor
- Resident Travel
- Resident Educational resources
- Program Staffing
- Degree Tuition

Initial Investment & Financial Sustainment

- Resources for Intramural & Extramural Grants
  - Graduate School University Fellowships
  - Institutional NIH T32s
    - T32 in Cancer
    - T32 in Tumor Immunology
  - Society Grants
  - NIH Minority Supplements
  - NIH F32
  - Pelotonia Fellowships (Cancer Research)
  - CTSA

Program Metrics: Financial Sustainability



Program Metrics: NIH

- NIH Training Grant Review Criteria

1. Training Program Director
2. Training Program, Environment & Institutional Support
3. Quality of the Trainees
4. Quality of the Mentors
5. Trainee Track Record

Project Number: 5T32AI106704-02 **Contact PI / Project Leader:** BUMGARDNER, GINNY

Title: ADVANCED RESEARCH TRAINING IN IMMUNOLOGY FOR SURGERY TRAINEES (ARTIST)

Awardee Organization: OHIO STATE UNIVERSITY

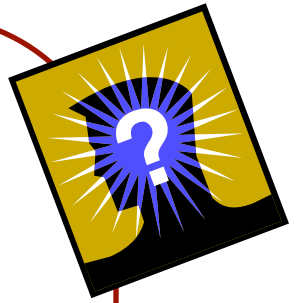
Abstract Text:

DESCRIPTION (provided by applicant): The goal of the OSU Advanced Research Training in Immunology for Surgery Trainees (ARTIST) program is to prepare surgical residents (postdoctoral trainees) for translational research careers involving study of how immune mechanisms affect tissue injury, repair, regeneration and replacement. This program is uniquely focused, serving a need that cannot currently be met at OSUWMC or perhaps anywhere else. As such, ARTIST will be a new paradigm for study and adoption by programs at other medical colleges. ARTIST integrates Immunology didactics, research-in-progress seminars and journal clubs from the College of Medicine Biomedical Sciences Graduate Program, as well as Translational Research courses from a novel "Signature Program Translational Science Curriculum," core courses in the Masters of Medical Science Program (Research Design, Grant Writing, Research Ethics, Biostatistics), and a new "Career Development for Surgeons" course. In addition, networking opportunities and an annual program retreat will offer unique opportunities for career development. National leaders and department chairs in surgery, especially those who have first-hand experience as visiting professors, recognize the strengths of the OSU Department of Surgery's Residency and Research Training Program. A small cadre of our surgical trainees, all training grant eligible and highly diverse (~30% URM, 50% female), will be selected for ARTIST. We will also invite trainees from other academic institutions by competitive application. Trainees will dedicate two full-time years, without clinical responsibilities, towards research education and training, earning a Master's of Science in Medical Science degree. They will be prepared to apply their training to deepen understanding of the immune system, as well as developing new, immune-based diagnostics, prognostics, therapeutics and clinical approaches that are relevant to surgical procedures and outcomes. While in the program they will also learn how to develop and draw upon clinical databases that integrate surgical outcomes with data from pathology and immunology. ARTIST Faculty Trainers who lead or participate in NIH-funded Program Projects (P01) and Specialized Programs of Research Excellence (SPORE) will provide context for use of such valuable databases in cores for collaborative team science. Infrastructure for ARTIST will include relevant OSU institutional research centers, research cores, outstanding training faculty and departmental administration. ARTIST's NIH-funded faculty, with distinguished track records in immunology and translational research, have been specially selected to inspire and guide trainees in immunology-focused mentored research. Clinical co-mentors and a post-training longitudinal, career advisory committee will provide guidance and facilitate placement into prestigious fellowships and academic faculty positions for ARTIST trainees. The national impact of the ARTIST program will be realized through scientific maturation of a trainee group with comprehensive clinical expertise, with the ability to apply the power of immunology-based research to benefit surgical patients.

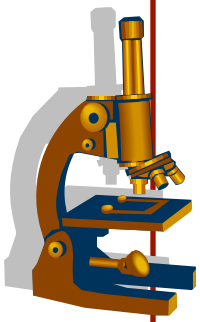
Advanced Research Training for Surgical Trainees

Conduct of Clinical Trials

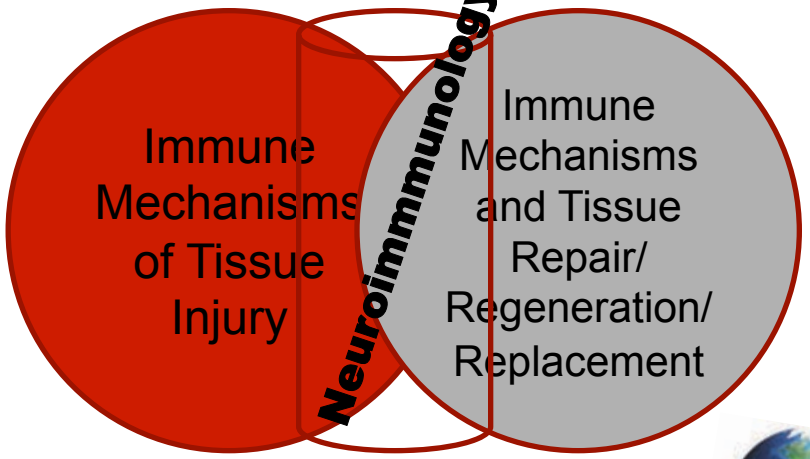
Immune Biomarkers & Therapeutics



Basics of Technology & Commercialization



Development of Tissues Repositories



Development of Integrated Clinical Databases

First ARTIST T32 Awardees

Teaching tomorrow's surgeon-scientists

For more than ten years the OSU Department of Surgery has supported the development of academic surgical careers by encouraging its residents to pursue research training through the OSU College of Medicine's Master of Science in Medical Science degree program (MMSP). This program offers a tailored research curriculum combined with a mentored research experience for residents and fellows in clinical training programs at Ohio State and Nationwide Children's Hospital. Our mission is aligned with national efforts to support the physician-scientist pipeline. The General Surgery training program aims not only to train superb surgeons but also has the goal to develop future leaders in surgery.

Our residency program is distinguished by its inclusion of a professional development year to complement the five clinical training years. Many residents pursue two full years of mentored research training along with didactics available through the MMSP. These efforts which resulted in outstanding research accomplishments by our high quality surgery trainees, provided a foundation for application to the National Institutes of Health for an institutional training grant (NIH T32 funding mechanism) to further develop and enhance the research education and training momentum achieved over the previous decade.

Ekene Onwuka, MD

Ginny L. Bumgardner, MD, PhD, COM associate dean for Research Education, professor of surgery and DOS Research Training Program director has been awarded a National Institutes of Health training grant (T32AI106704) entitled "Advanced Training in Immunology for Surgical Trainees" (ARTIST). This grant supports a new research training program in immunology for selected residents in the Department of Surgery. The T32 will support two trainees each year for five years of the grant period (2014–2019).

Ginny Bumgardner, MD, PhD

The goal of the ARTIST program is to train and inspire a unique cadre of surgeon-scientists to translate astute observations at the bedside, in the operating room, and in the clinic into novel hypotheses that can be interrogated through immunology-focused translational research. Ultimately these surgeon-scientist research programs will accelerate the movement of discoveries in immunology for development of immune-based diagnostics, prognostics and/or therapeutics.

"The areas of research supported by this T32 are relevant to surgeons who work with tissues daily in the operating room and who are uniquely qualified to identify the important surgical problems and potential solutions when tissues are insufficient or damaged through disease or surgery," explains Dr. Bumgardner. These research areas include: immune mechanisms of tissue injury, immune mechanisms of tissue repair & regeneration, and applied immunology: diagnostic/prognostic biomarkers or immunotherapeutics

Ekene Onwuka, MD, who investigates tissue-engineered vascular grafts in the lab of mentor Christopher Breuer, MD, was the first resident to be appointed to the new ARTIST T32. "The ARTIST grant has already impacted my career," states Onwuka. "This career development program encouraged me to apply for, and be elected to a leadership position as the candidate member on the Association for Academic Surgeons Global Affairs Committee."

Starting in July 2015 general surgery residents Eliza Beal, MD (mentors Sylvester Black, MD, PhD and Carl Schmidt, MD), Christopher McQuinn, MD (mentors Greg Lesinski, PhD and Mark Bloomston, MD) and Taehwan Yoo, MD (mentors Cameron Rink, PhD and Mounir Haurani, MD) will begin their ARTIST T32 programs.

Additional resources:
NIH study: http://acd.od.nih.gov/psw.htm.
J Clin Invest: http://www.jci.org/articles/view/80933

Above: MMSP candidate Sara Mansfield, MD investigates virology and immunology in the lab of Robert Baiocchi, MD

Left: ARTIST awardees. (L to R) Taehwan Yoo, MD, Ekene Onwuka, MD, Eliza Beal, MD and Christopher McQuinn, MD

Objectives

- Review the 2004 Surgery Blue Ribbon Committee Report & Directives
- Discuss the Evolution of the Professional Development Program in the OSU Department of Surgery
- Outcomes & Metrics of Success
- Initial Investment & Financial Sustainment
- Challenges
- New Directions

Metrics of Success: A Longterm Continuum

- Recruitment: Quality, Diversity
- Benefit to the Individual
- Individual Research Accomplishments
- Delivery of High Quality Evidenced-Based Surgical Care
- Placement into Prestigious Fellowships
- Transition into Academia
- Continued Publication & Presentation
- Engagement in Research as PI or Co-I
- Engagement in Research Team Leadership
- Transition into Surgical Leadership in Private Practice, Health Systems, Academia, Industry, Government…

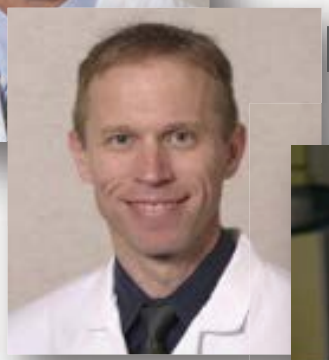
Program Metrics: National

- 2004 Blue Ribbon Committee
  - ✓ Structure, Organization, Integration
  - ✓ Benefits to the Individual
  - ✓ Protected Time
  - Surgeon-Scientist Preparedness
    - ✓ Identification of Important Research Questions
    - ✓ Negotiation for Resources and Protected Time
    - ✓ Identification of Collaborators
    - ✓ Prepare an IRB/IACUC approved protocol
    - Prepare competitive NIH (or other) grant proposals
    - Lead a Research Team
    - Lead a Clinical Trial
    - Serve on Grant Review/Study Sections

New Directions

- Enhance Career Development for Surgeons Course
- Creation of an MMS Clinical Investigation Curriculum
- Creation of an MMS Health Outcomes Research Curriculum
  - ACS National Surgical Quality Improvement Program for Multispecialty (NSQIP) including the American College of Surgery Bariatric Surgical Program
  - Scientific Registry of Transplant Recipients (SRTR)
  - Society of Vascular Surgeons Quality Improvement
  - Carotid Surgery CMS national registry
  - Society of Thoracic Surgery national database (STS) for Cardiac and Thoracic Surgery
  - Intermax for LVAD registry
  - ELSO (Extracorporeal Life Support Organization)
  - National Burn program registry
- Creation of an Education Research Track

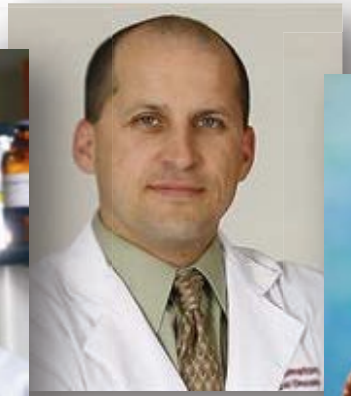
ACKNOWLEDGEMENTS: "The Village"



- Dr. Chris Ellison
- Dr. Mark Arnold
- Dr. Mark Bloomston
- Dr. Bill Carson
- Dr. Gail Besner
- Dr. Scott Melvin

The Residents!

- Heidi Pieper
- Lynnsay Sinclair
- Anna Patterson
- Beth Hanson
- Dennis Mathias



Sample "Immunology Focused" Curriculum

Course #	Title	Credit	MMS Core* & ARTIST Required**	Instructor
		SUMMER		
PubH-Bio 6280	Practical Biostatistics for Biomedical Laboratory Researchers	3	Biostatistics*	Draper
IBGP 8880.03	Signature Program Translational Science Curriculum: Wound Healing & Regenerative Medicine	2	Translational Research Design**	Roy
SURG 8501	Career Development for Surgeons I	2	Surgeon-Scientist Career Training**	Bumgardner/ Schmidt
SURG 7193 xxx	Independent Study/Research	3	Mentored Research*	Mentor
	Total	10		
		AUTUMN		
MVIMG 7010	Molecular and Cellular Immunology	3 3	IBGP PhD Immunology Core**	Lafuse
SURG 8845	History of Immunology	1	Elective**	Sanders//Moffat-Bruce
VIS SCI 7960	Ethics in Biomedical Research	2	Research Ethics*	Zadnik
SURG 8502	Career Development for Surgeons II	2	Surgeon-Scientist Career Training**	Bumgardner/ Schmidt
SURG 7193xxx	Independent Study/Research	2	Mentored Research*	Mentor
	Total	10		
		SPRING		
VIS SCI 7970	Grantsmanship	2	Science Communication*	Zadnik
MVIMG 8010	Selected Topics in Advanced Immunology	3	Journal Club**	Turner
SURG 8503	Career Development for Surgeons III	2	Surgeon-Scientist Career Training**	Bumgardner/ Schmidt
SURG 7193.xx	Independent Study/Research	3	Mentored Research*	Mentor
	Total	10		

New! Career Development for Surgeons Course

	SURG 8501.01		
SUMMER 2013	Title	Topic	Faculty
12-Jun	Intro Why Be an Academic Surgeon?	Career path options for surgeon-scientist; fundamental areas of research; mentorship best practices	Bumgardner
19-Jun	The Scientific Method	Developing a hypothesis; essentials of study design	Schmidt
26-Jun	Basic Science I	Selecting and developing relevant basic science models - cell culture and tissue	Phay
3-Jul	Basic Science II	Selecting and developing relevant basic science models - small animal models	Coppola
10-Jul	Clinical research I	Developing, maintaining and analyzing clinical databases	Bloomston
17-Jul	Clinical research II	Research with large clinical databases, health services and surgical education research	Sen
24-Jul	Research ethics	Confidentiality and HIPAA, Intellectual Property, Technology Transfer, Research Compliance	Roy

New! Career Development for Surgeons Course

FALL 2013	SURG 8501.02	Topic	Faculty
21-Aug	Analysis of Research I	Lab Notebooks, Organization and analysis of data	Rink
28-Aug	Analysis of Research II	Common statistics for surgeon-scientists	Go
4-Sep	Analysis of Research III	Translational research methods (genomics, proteomics, metabolomics)	Ma
11-Sep	Preparing and Presenting Research I	Effective oral presentations	Hazey
18-Sep	Preparing and Presenting Research II	Graphic Presentation of Data in Presentations and Publications (Sigma Plot, Excel)	Roy & Zimmerer
25-Sep	Preparing and Presenting Research III	Writing a manuscript for peer review; Writing review articles or book chapters; Use of reference management software	Carson
2-Oct	Funding for Research I	NIH institutes, administration and procedures; career development awards	Ma
9-Oct	Funding for Research II	Other sponsors of biomedical research (surgical societies, AHRQ, PCORI; industry; internal seed grants)	Bumgardner
16-Oct	Funding for Research III	NIH grant types, paperwork, agreements and grant specifications; Cayuse	Gengler-Nowak
23-Oct	Funding for Research IV	Tips for Writing a successful translational research grant	Sen
30-Oct	Funding for Research V	Writing a successful grant cont…	Besner

Benefit to the Individual
Track Record of Success

- Top Number of Publications
  - Peter Nau: 12
    - Minimally Invasive Surgery
  - Jon Henry: 10
    - Hepatocellular Carcinoma
    - Malignant Small Bowel Obstruction
  - Jon Wisler: 8
    - miRNAs circulating biomarkers in sepsis
    - Burn/frostbite injury, critical care & trauma
  - Amy Collins: 7
    - Pancreatic Cancer

Phase I: Preparation
A Case Study

- A PGY2 interested in obesity and inflammation research; career in pediatric surgery
- OSU Adult Bariatric Surgery, NCH Bariatric Surgery
- NIH Funded Endocrinologist studying obesity and inflammation
- Co-mentorship Team: MD PhD Endocrinologist, OSU Bariatric Surgeon, NCH Program Director Liaison
- Masters Degree: Immunology Focused Curriculum
- Extramural Fellowship Applications

James King Research Awardees 2005-2013

	Resident Name	Award Year	Research Topic	Mentor(s)
1	Lloyd Brown MD MS	2005	Tumor Immunology	William Carson MD
2	Vance Smith MD MBA	2006	Models for Faculty Reimbursement at AMCs	E. Christopher Ellison MD
3	Irina Shahknovich MD MS	2007	Development of a Mouse Model of Spinal Cord Ischemia	Philip Popovich PhD & Hamdy Elsayed-Awad
4	Alicia Thomas MD MS	2008	CMV Virology	Charles Cook MD
5	Lisa Haubert MD MA	2008	Teaching Surgical Anatomy	Susan Moffat-Bruce MD
6	Amy Collins MD MS	2009	microRNAs & Pancreatic Cancer	Mark Bloomston MD
7	Thomas Pham MD MS	2009	Humoral Immunity & Transplant	Ginny Bumgardner MD PhD
8	Jon Wisler MD MS	2010	Novel Immune Biomarkers in Sepsis	Clay Marsh MD
9	Laura Peterson MD MS	2010	Vascular Repair & Regeneration after Cerebral Ischemia	Cameron Rink PhD & Michael Go MD MS
10	Mika Matthews MD MS	2011	Intestinal Inflammation & Repair	Gail Besner MD
11	Rachel Sullivan MD MS	2012	Hepatocellular Carcinoma & Inflammation	Jacob Samson PhD Carl Schmidt MD
12	Kara Keplinger MD MS	2013	P21 Activated kinase as a therapeutic target in Papillary Thyroid Cancer	Matthew Ringel MD
13	Terrence Rager MD MS	2013	Production of Tissue Engineered Intestine	Gail Besner MD

Association for Academic Surgery

The pediatric surgeon's road to research independence: utility of mentor-based National Institutes of Health grants

Alice King, MD,[a] Ian Sharma-Crawford,[a] Aimen F. Shaaban, MD,[a] Thomas H. Inge, MD, PhD,[a] Timothy M. Crombleholme, MD,[b] Brad W. Warner, MD,[c] Harold N. Lovvorn III, MD,[d] and Sundeep G. Keswani, MD[a],*

a Division of Pediatric, General and Thoracic Surgery, Cincinnati Children's Hospital and the University of Cincinnati College of Medicine, Cincinnati, Ohio

b Division of Pediatric Surgery, The Children's Hospital Colorado, Aurora, Colorado

c Division of Pediatric Surgery, Washington University School of Medicine, St. Louis, Missouri

d Department of Pediatric Surgery, Vanderbilt University Medical Center, Nashville, Tennessee

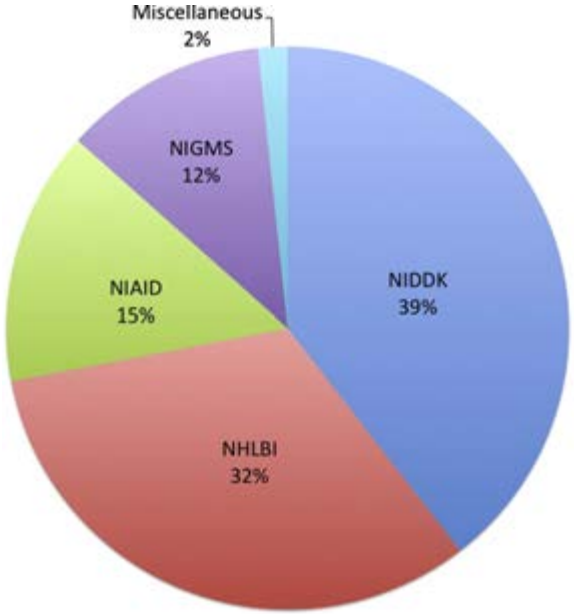


Fig. 2 – Percentage distribution of funds by NIH institutes

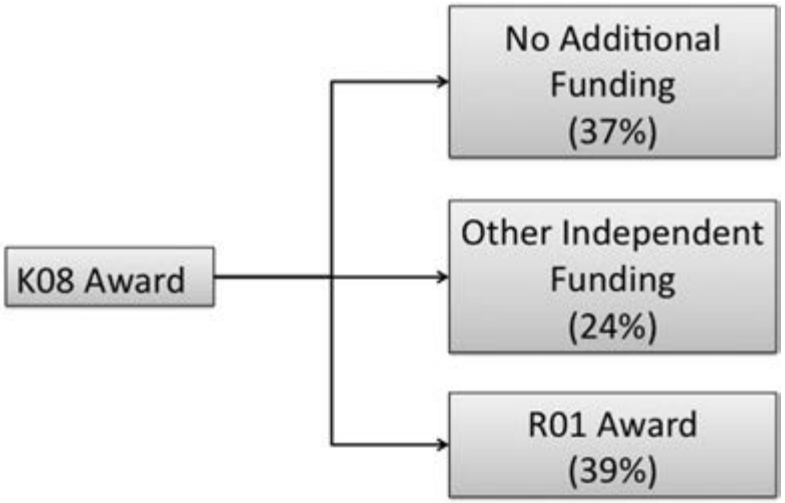
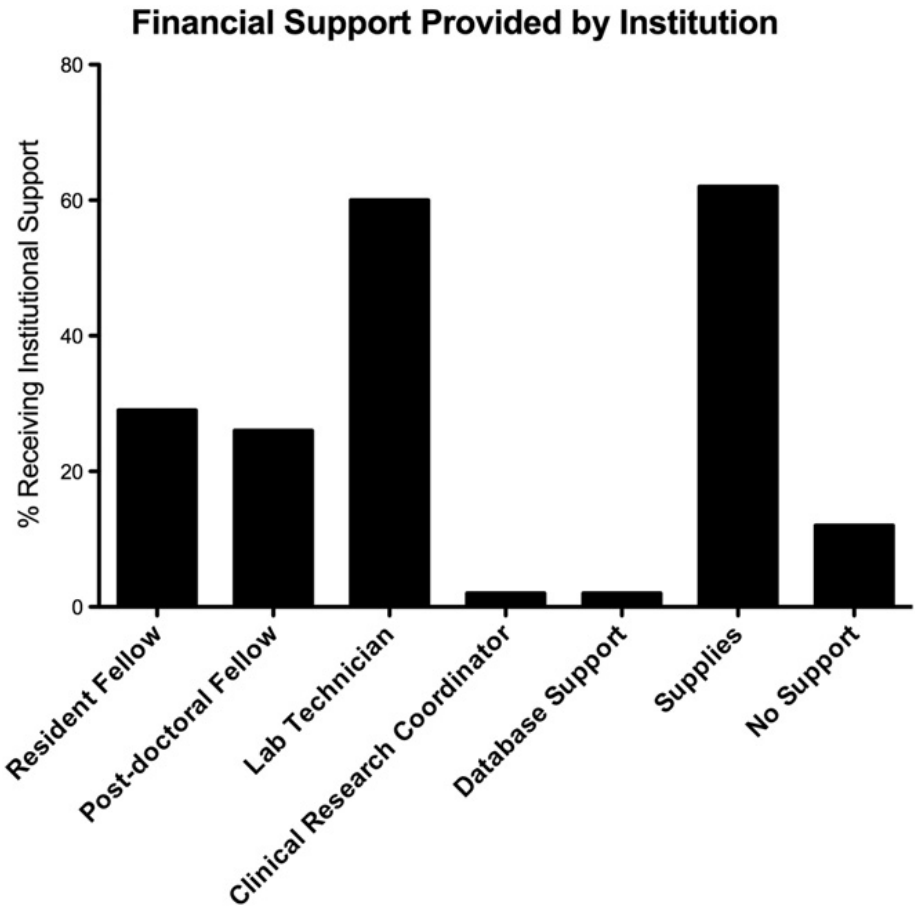


Fig. 3 – Distribution of funding obtained following the mentor-based K08 award among recipients of expired K08 awards.

What does it take to be a successful pediatric surgeon-scientist?

Carey Watson, Alice King, Shaheel Mitra, Aimen Shaaban, Allan Goldstein, Michael Morowitz, Brad Warner, Timothy Crombleholme, Sundeep G. Keswani

Journal of Pediatric Surgery 50 (2015): 1049-1052



- Mentorship 38%
- Protected Time (29%)
- Persistence 19%
- Hard Work 12%

Fig. 3. Financial support provided by institutions for laboratory support and supplies.

NIH Fellowships/Support

- 2000: Ergun Kocak
- 2003: Lloyd Brown
- 2005: Kristin Guenterberg
- 2006: Iyore James
- 2007: Amy Collins
  - CCTS TL1
- 2007: Eric Luedke
- 2008: Jon Henry
- 2009: Sara Martin del Campo
- 2009: Mika Matthews
- 2010: Justin Huntington
- 2010: Nicholas Latchana
- 2010: Robert Plews
- 2011: Sara Mansfield
- 2012: Shayna Brathwaite, Ekene Onwuka, Taewan Yoo, Shalynn Bennett
- 2013: Eliza Beal, Chris McQuinn

Prestigious Awards/Fellowships

- 2004: Meghan Forster

  Surgical Infection Society Fellowship

- 2006: Peter Nau

  AHPBA Fellowship

- 2007: Thomas Pham

  American Society of Transplant Surgeons/ NKF Fellowship

- 2007: Amy Collins

  AACR Pancreatic Cancer Research Award

- 2008: Jon Wisler

  University Fellowship

  Davis Bremer

2011: Sara Mansfield
Univ Fellowship (declined)
SUS Finalist

2011: Kara Keplinger
Pelotonia Fellowship

NIH LRP:
- Jon Henry
- Mika Matthews

Engagement in Research as PI/Co-I Grant/Project Submissions

- Ergun Kocak — NIH R21, Co-PI (funded)
- Amy Collins — AACR-FNAB Fellows Grant for Translational Pancreatic Cancer Research (funded)
- Jon Wisler — Davis-Bremer Award (funded)
- Jon Henry — NIH F32 (not funded)
  NIH R21 (funded)
- Laura Peterson — IRB protocol (approved)
- Thomas Pham — ASTS Transplant Fellow Research Grant (not funded)

Engagement in Research as PI/Co-I Grant/Project Submissions

- Ekene Onwuka — SUS (not funded); NIH F32 (in review)
- Terry Rager — SUS (finalist)
- Michelle Nguyen — SUS (finalist); Intramural award (funded)
- Daniel Lodwick — SUS (funded); NIH F32 (not funded)

Leadership

- Engagement in Research as PI or Co-I
  - Vascular Fellowship Research Project: Laura Peterson
- Engagement in Research Team Leadership
  - OSU Liver Cancer Research: Mary Dilhoff
- Transition into Surgical Leadership in Private Practice

Surgical Leadership in Private Practice

- Lisa Haubert MD MA
  - PP Colorectal Surgery, Houston, Texas
    - Co-chair of the General Surgery Forum at the American Society of Colon and Rectal Surgeons (ASCRS)
    - Medical Director of the Pelvic Health Center
- Natalie Jones MD MS
  - PP Surgical Oncology, Columbus, Ohio
  - Medical Director for the OhioHealth Skin Cancer Advisory Group
  - Cancer liaison physician to the ACS Commission on Cancer for Dublin Methodist Hospital (responsible for evaluating, interpreting, and reporting the facioities performance data through the National Cancer Data Base (NCDB) and facilitating quality improvement initiatives

Comments from the DOS Residents

I believe that surgeons are uniquely poised in translational research due to access to human tissue samples, a unique clinical thought process, and treatment focused applications.

Comments from the DOS Residents

My training in the MMSP program has allowed me to both enjoy research more as well as be more comfortable with conducting, discussing, and evaluating research. My work in this program has made me appreciate that research must be a part of a physician's practice in academics and private-practice. My participation in this program has influenced me to pursue a career in academic surgery. …My work over the two years in MMSP has prepared me for both clinical research and collaborations with basic science researchers to create truly translation research.

Finally, the program has improved the patient care and education aspects of my career. My practice will be more research based, but critical of the research as well and my teaching will be research based and on how to use research in patient care.

Comments from the DOS Residents

I believe that a research focused curriculum as a surgical trainee provides an invaluable protected time to develop the tools necessary for meaningful scientific contribution. It becomes difficult as a surgeon, without this time, to develop the necessary skill set to participate in basic science or translational research due to the demands required of an early clinical practice.

Program Funding Goals

- Institutional Training Grants
  - Compete for Current T32 positions
    - Cancer (Caligiuri, De LaChapelle, Carson)
    - Musculoskeletal (Guttridge)
    - Cardiovascular (Mohler)
    - Bioinformatics (Payne)
  - ✓ Advanced Research Training in Immunology for Surgical Trainees (Funded!)
- Individual Research Fellowships
  - ✓ SUS Research Grant
  - ACS Research Grant
  - NIH F32 postdoctoral award
    - Resident, PI of this career development award
    - Faculty, Mentor Role

Pursuit of Diverse Fellowships

- Cardiovascular: Quarrie*, Spata
- Colorectal: Haubert, Kuhrt, Thomas
- Critical Care: Beery, Fisher, Crockett, Evans, Vance Smith* (MBA), Kincaid, Jon Wisler
- Hepatobiliary: Collins
- Minimally Invasive Surgery: Luedke*, Nau*
- Plastic Surgery: Wallace, Kocak
- Surgical Oncology: Dillhoff*, Hatzaras* (MPH), Forster
- Transplantation: James, Pham*
- Vascular: Go*, Shaknokovich, Peterson, Henry*

Transition into Academia

- 2002: (William Wallace)
- 2003:
- 2004:
- 2005: **Go**, (Beery), (Kocak),
- 2006: **Brown**
- 2007: Jones, Fisher
- 2008: Forster, Shaknovich
- 2009: **Dilhoff**, Guenterberg
- 2010: James, **Nau**, Thomas
- 2011: Kincaid, Kuhrt, **Collins**, Pham, Quarrie
- 2012: Henry, Luedke, Peterson, Wisler
- 2013: Matthews, del Campo, Wendling, Spata