The Surgeon Scientist

University of California, San Diego
Surgery Research Day
May 3, 2017

Allan D. Kirk, MD, PhD, FACS

David C. Sabiston, Jr. Professor and Chairman

Department of Surgery, Duke University School of Medicine

Surgeon-in-Chief, Duke University Health System

Durham, North Carolina

Duke Surgery

United for *all* patients

THE

GENUINE WORKS

OF

HIPPOCRATES

TRANSLATED FROM THE GREEK

WITH

A PRELIMINARY DISCOURSE AND ANNOTATIONS

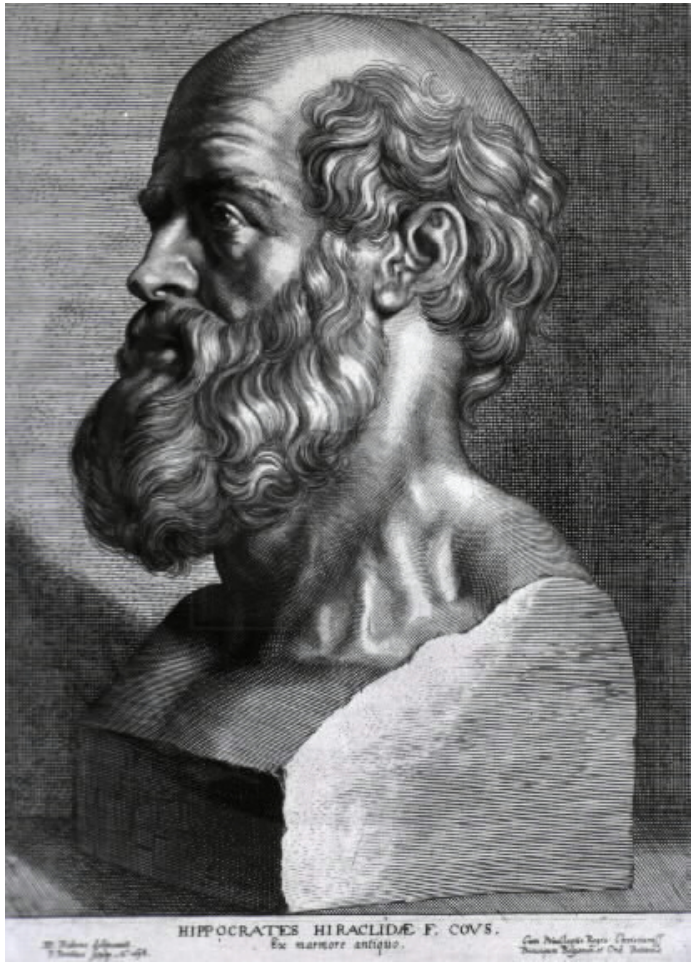
BY

FRANCIS ADAMS, LL.D.
SURGEON.

IN TWO VOLUMES

VOL. I.

LONDON
PRINTED FOR THE SYDENHAM SOCIETY
MDCCCXLIX.

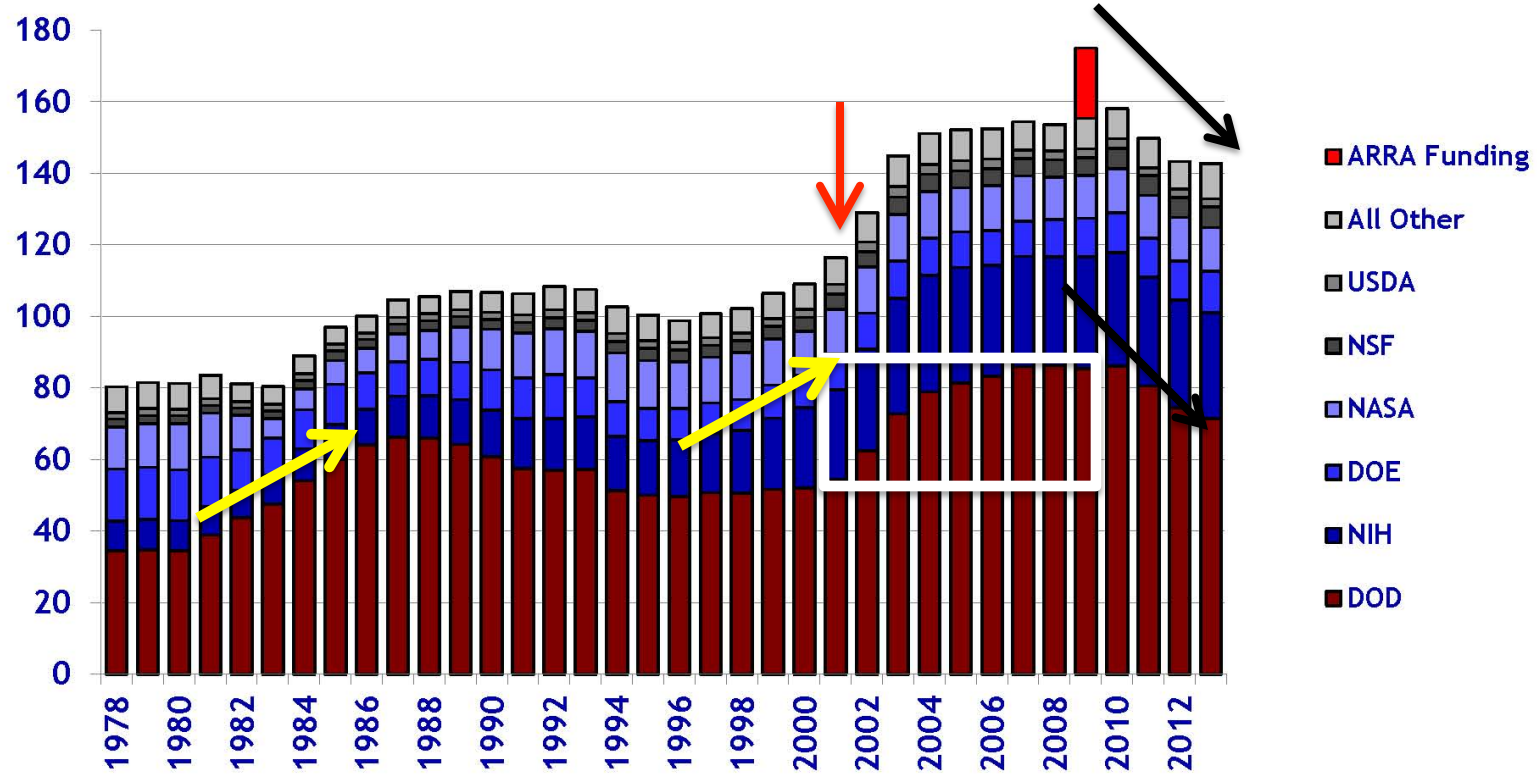


Throughout history, the common defining trait of a great surgeon has been a *personal* understanding of health, disease and healing achieved through direct, tactile experience.

What is the current research landscape?

Trends in R&D by Agency

in billions of constant FY 2012 dollars

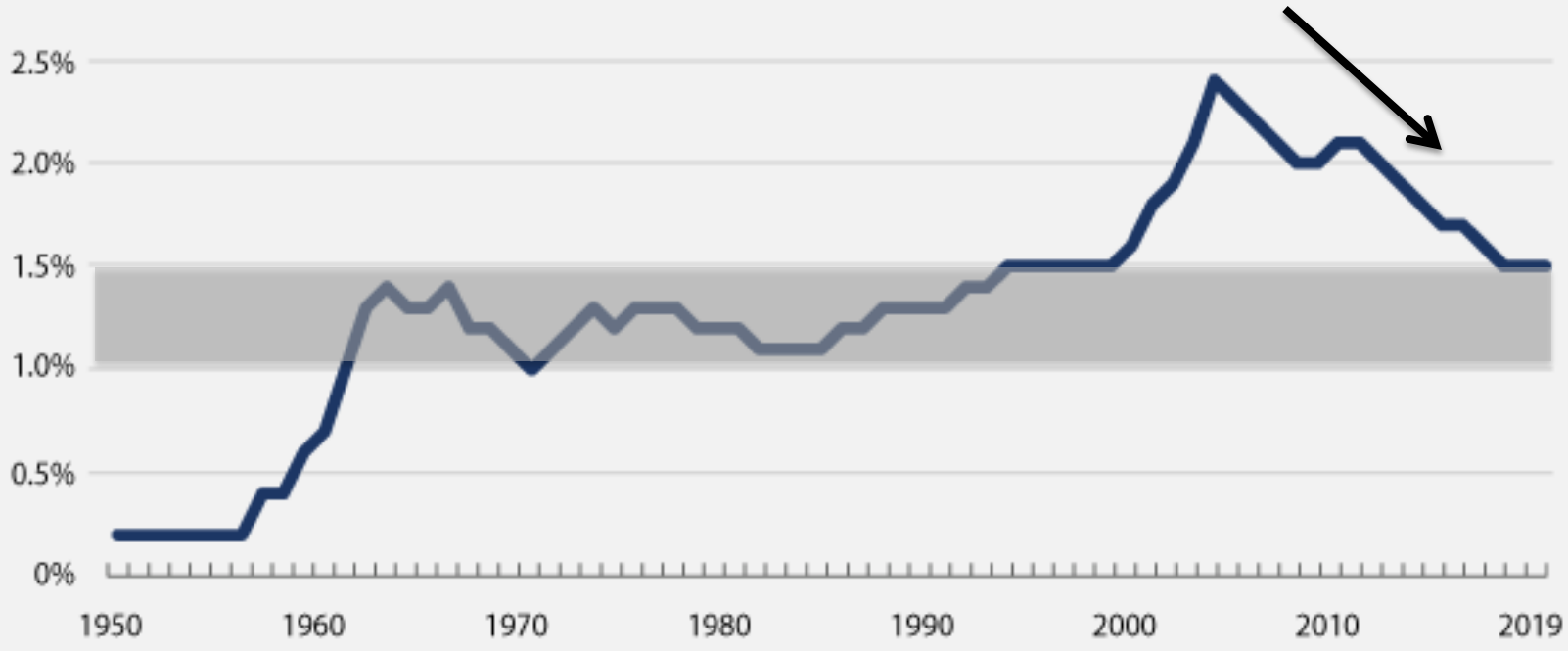


Source: *AAAS Report: Research & Development* series.
FY 2012 and FY 2013 figures are latest estimates.
1976-1994 figures are NSF data on obligations in the Federal Funds survey.

AAAS

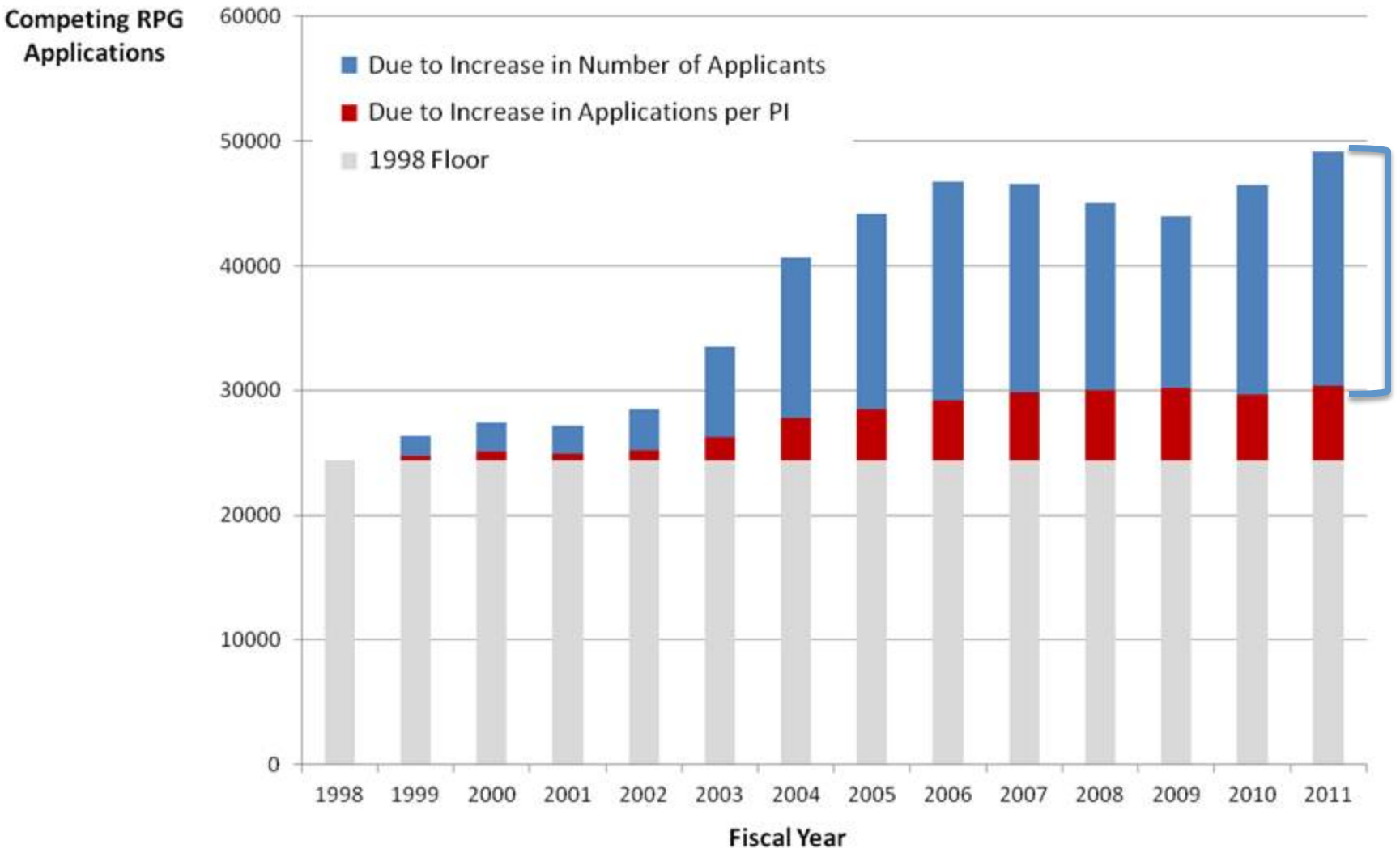
FIGURE 1

NIH funding as a share of GDP, FY 1950–2019



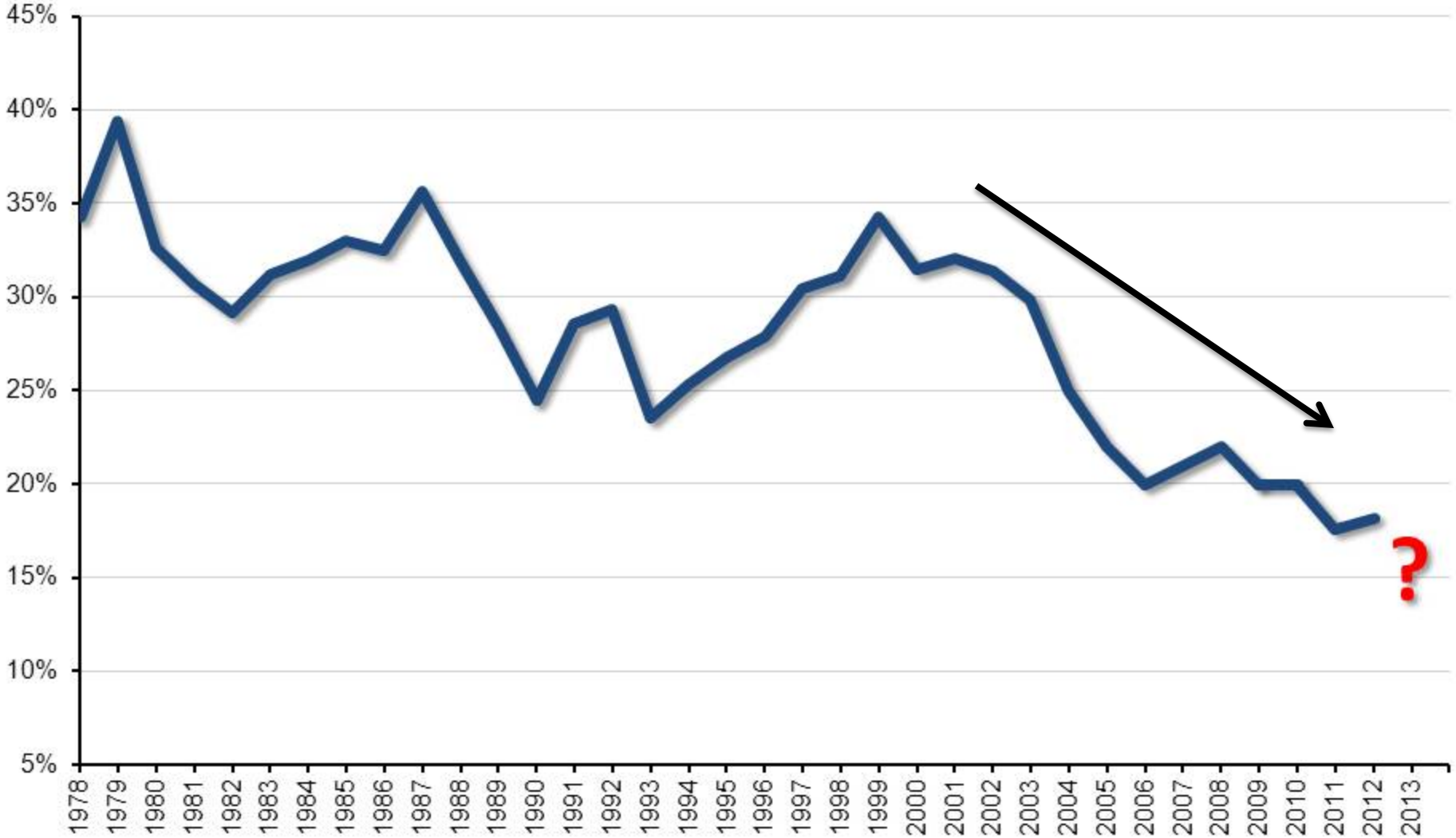
Source: NIH funding figures through FY 2014 are based on total budget authority. Projected NIH funding figures for FY 2015 through FY 2019 are based on data from the Congressional Budget Office. GDP figures are based on data from the Office of Management and Budget Historical Tables, Table 1.2

Figure 3: Sources of Increase in Competing Applications



NIH Grant Application Success Rates

FY 1978-2013



Source: NIH http://report.nih.gov/success_rates/

NIAID Paylines

As of December 5, 2011, we have all FY 2012 interim paylines except T32. You can find FY 2011 paylines at Archive of Final NIAID Paylines by Fiscal Year. For more financial information, go to Paylines and Funding.

Subscribe to Email Alerts for notification of final paylines.

NIAID Interim Paylines for FY 2012

These paylines apply to applications reviewed for September 2011, February 2012, and May 2012 Council meetings.

Grant Types	Interim Payline	Description
R01 (non-new PIs)	9 percentile	Research Projects for established investigators
R01 (new PIs)	12 percentile	Research Projects for new and early-stage investigators
F31	24 overall impact score	NRSA Individual Predoctoral Fellowships to Promote Diversity in Health-Related Research
F32	22 overall impact score	NRSA Postdoctoral Fellowships
K (except K99)	20 overall impact score	Career Development Awards
R03	20 overall impact score	Small Grants
R15	20 overall impact score	Academic Research Enhancement Awards (AREA)
R21	20 overall impact score	Exploratory/Developmental Grants
R41, R42	25 overall impact score	STTR Phase I and II—Small Business Technology Transfer
R43, R44	25 overall impact score	SBIR Phase I and II—Small Business Innovation Research
T32	TBA	Institutional NRSA Training Awards

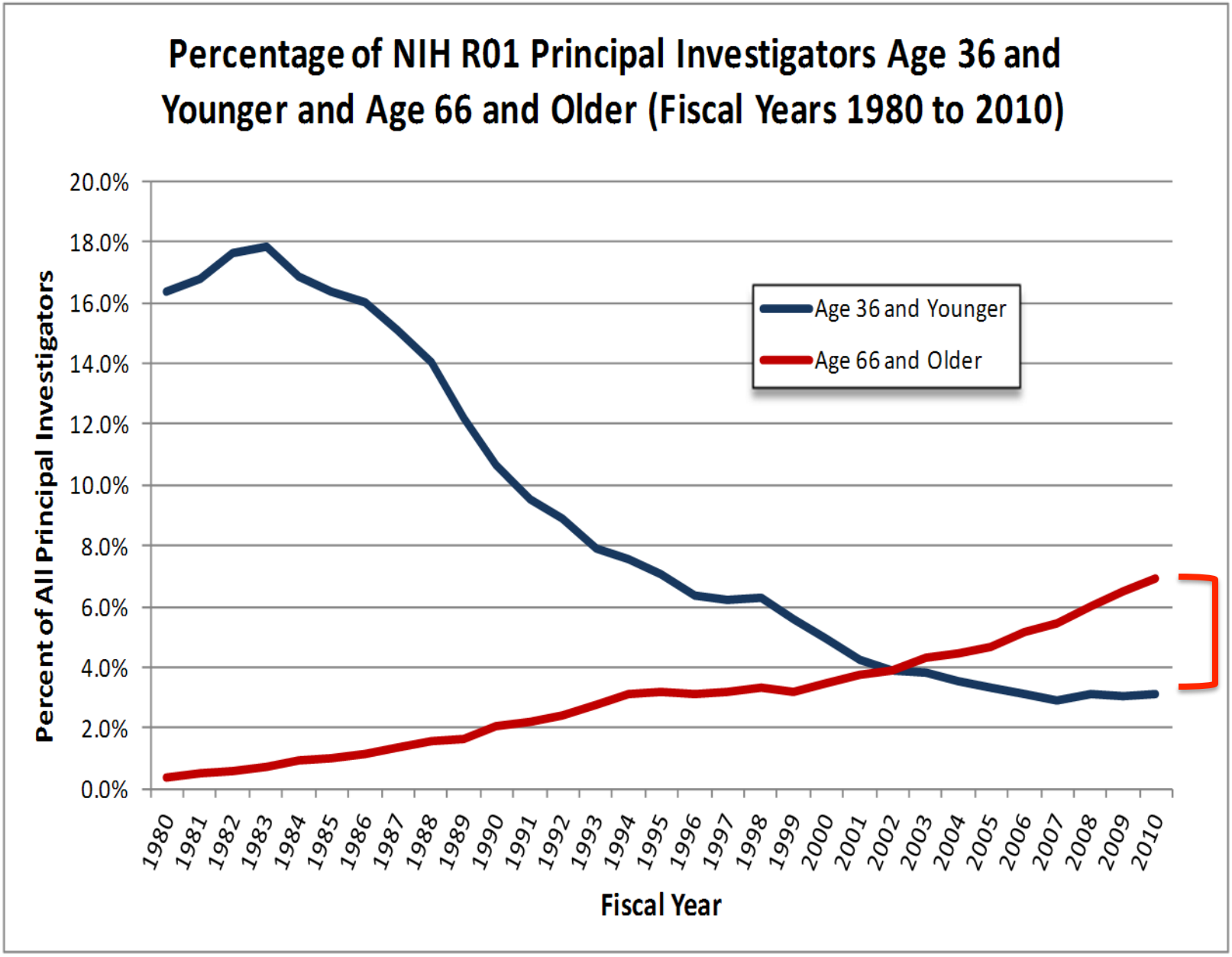
Highlights

- *NIAID Funding Newsletter*, December 7, 2011
- All About Grants
- Strategy for NIH Funding
- Samples and Examples
- Sample Applications
- Top Policy Changes
- Resources for Researchers

Look It Up

- Academic Research Enhancement Award (AREA)
- advisory Council
- career development award (K)
- early-stage investigator
- exploratory/developmental research grant (R21)
- fellowship (F)
- fiscal year (FY)
- interim payline
- overall impact score
- payline
- percentile
- R01
- R56-Bridge award
- small business award
- training grant (T)

See the Glossary for more terms.


Percentage of NIH R01 Principal Investigators Age 36 and Younger and Age 66 and Older (Fiscal Years 1980 to 2010)
Percent of All Principal Investigators
20.0%
18.0%
16.0%
14.0%
12.0%
10.0%
8.0%
6.0%
4.0%
2.0%
0.0%
Age 36 and Younger
Age 66 and Older
1980
1981
1982
1983
1984
1985
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1987
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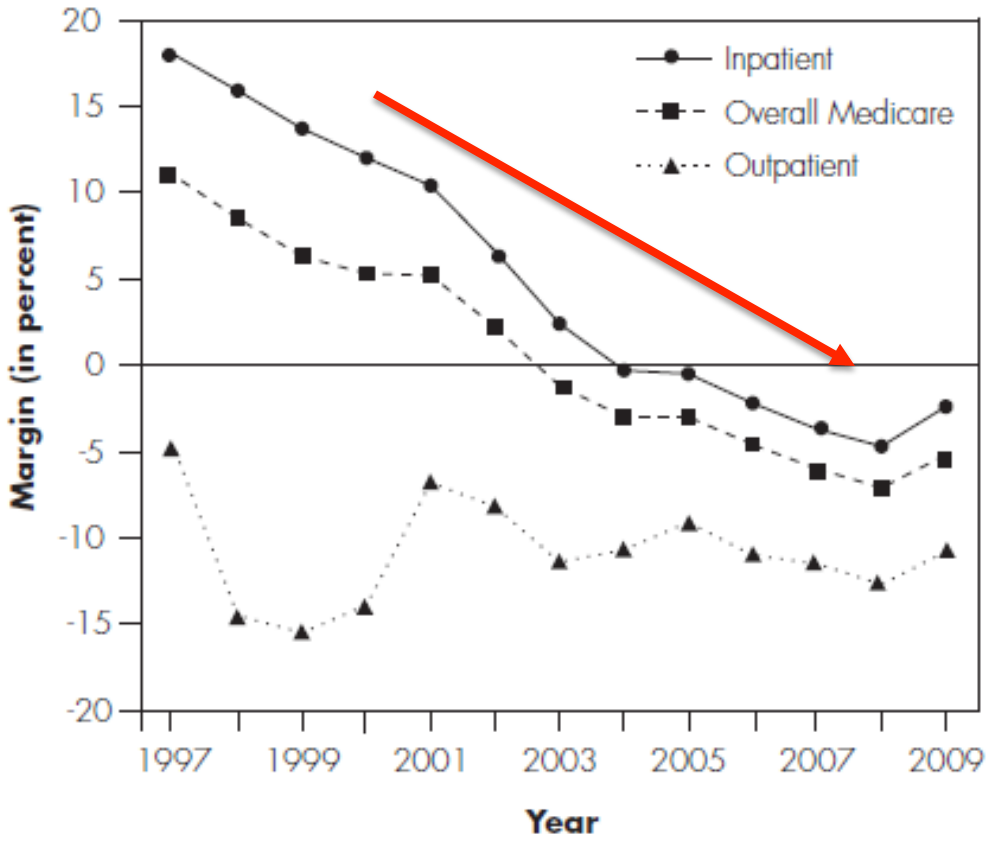
2008
2009
2010
Fiscal Year

Hospital Medicare margins: inpatient, outpatient, and overall

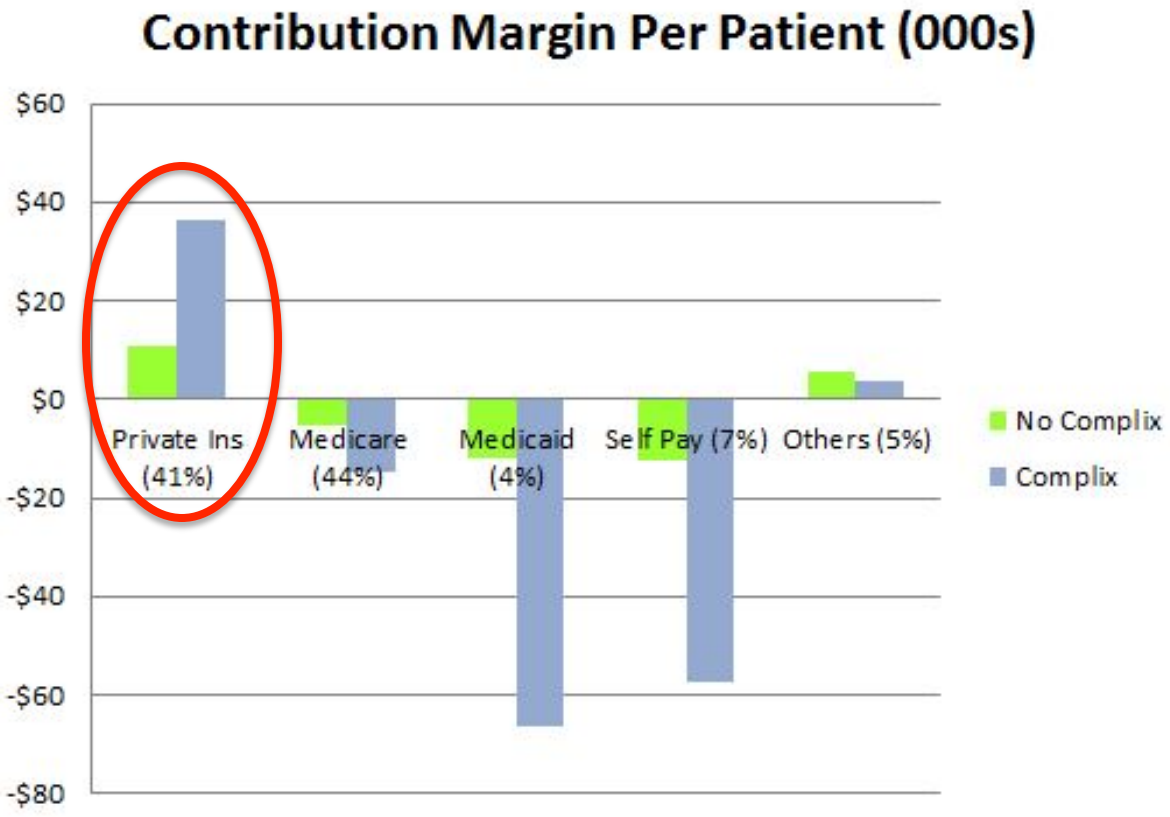


Note: A margin is calculated as payments minus costs, divided by payments; margins are based on Medicare-allowable costs. Analysis excludes critical access and Maryland hospitals. Medicare inpatient margins include services covered by the acute inpatient prospective payment system. Overall Medicare margin includes acute inpatient, outpatient, hospital-based home health and skilled nursing facility (including swing bed), and inpatient psychiatric and rehabilitation services, plus graduate medical education.

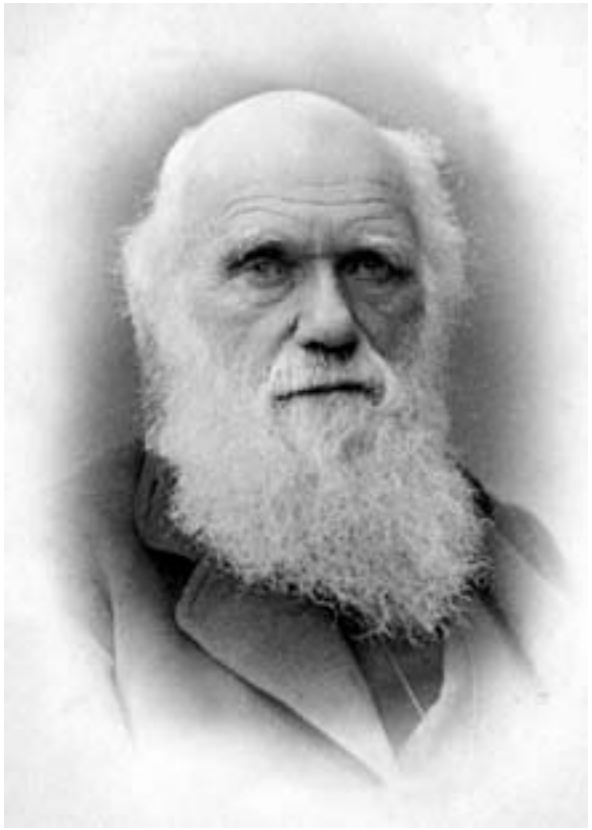
Source: MedPAC analysis of Medicare Cost Report file from CMS.

Relationship Between Occurrence of Surgical Complications and Hospital Finances

Sunil Eappen, MD
Bennett H. Lane, MS
Barry Rosenberg, MD, MBA
Stuart A. Lipsitz, ScD
David Sadoff, MBA
Dave Matheson, JD, MBA
William R. Berry, MD, MPP, MPH
Mark Lester, MD, MBA
Atul A. Gawande, MD, MPH



JAMA 2013; 309 1599-1606



There is less money.
There are more investigators.

How are surgeons competing?

NIH Funding By Department

Rank	Department Name	Award
1	INTERNAL MEDICINE/MEDICINE	$2,964,274,308
2	PSYCHIATRY	$720,025,463
3	PEDIATRICS	$641,351,772
4	MICROBIOLOGY/IMMUN/VIROLOGY	$590,964,253
5	PATHOLOGY	$553,368,578
6	BIOCHEMISTRY	$528,527,165
7	NEUROLOGY	$455,886,715
8	PHARMACOLOGY	$455,841,831
9	NONE	$441,593,672
10	GENETICS	$400,257,249
11	PHYSIOLOGY	$397,438,025
12	ANATOMY/CELL BIOLOGY	$395,298,073
13	RADIATION-DIAGNOSTIC/ONCOLOGY	$318,860,295
14	SURGERY	$277,078,059
15	PUBLIC HEALTH & PREV MEDICINE	$275,762,981
16	NEUROSCIENCES	$262,501,878
17	OPHTHALMOLOGY	$202,915,539
18	OTHER BASIC SCIENCES	$175,314,912
19	OBSTETRICS & GYNECOLOGY	$127,519,666
20	BIOLOGY	$126,704,146
21	ANESTHESIOLOGY	$102,727,334
22	OTOLARYNGOLOGY	$82,419,481
23	NEUROSURGERY	$68,969,668
24	FAMILY MEDICINE	$62,972,501
25	DERMATOLOGY	$61,402,753
26	UROLOGY	$59,293,257
27	ORTHOPEDICS	$54,925,833
28	BIOSTATISTICS & OTHER MATH SCI	$49,696,886
29	BIOMEDICAL ENGINEERING	$42,564,812
30	EMERGENCY MEDICINE	$36,229,529
31	VETERINARY SCIENCES	$35,811,713
32	OTHER HEALTH PROFESSIONS	$34,031,041
33	MISCELLANEOUS	$30,458,088
34	PHYSICAL MEDICINE & REHAB	$24,725,251
35	OTHER CLINICAL SCIENCES	$21,293,585
36	BIOPHYSICS	$10,085,092
37	PSYCHOLOGY	$9,400,240
38	ADMINISTRATION	$8,273,083
39	ENGINEERING (ALL TYPES)	$7,904,757
40	SOCIAL SCIENCES	$4,594,112
41	PHYSICS	$4,562,638
42	NUTRITION	$3,506,892
43	CHEMISTRY	$2,020,651
44	DENTISTRY	$325,628
	GRAND TOTAL	$11,129,679,405
	MEAN	$252,947,259

542,686,298

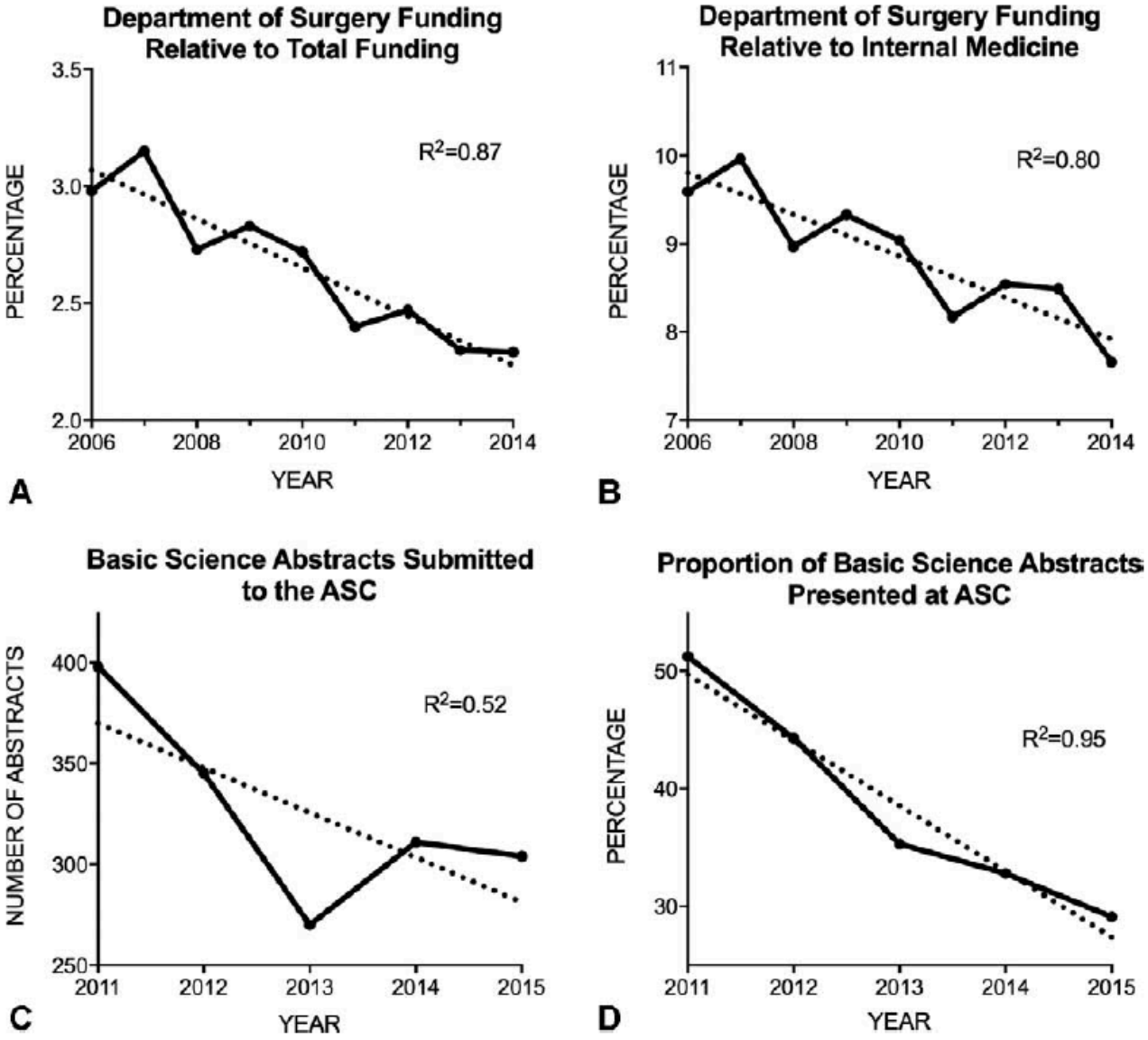
BRIMR.org 2014

ORIGINAL ARTICLE

The Future of Basic Science in Academic Surgery

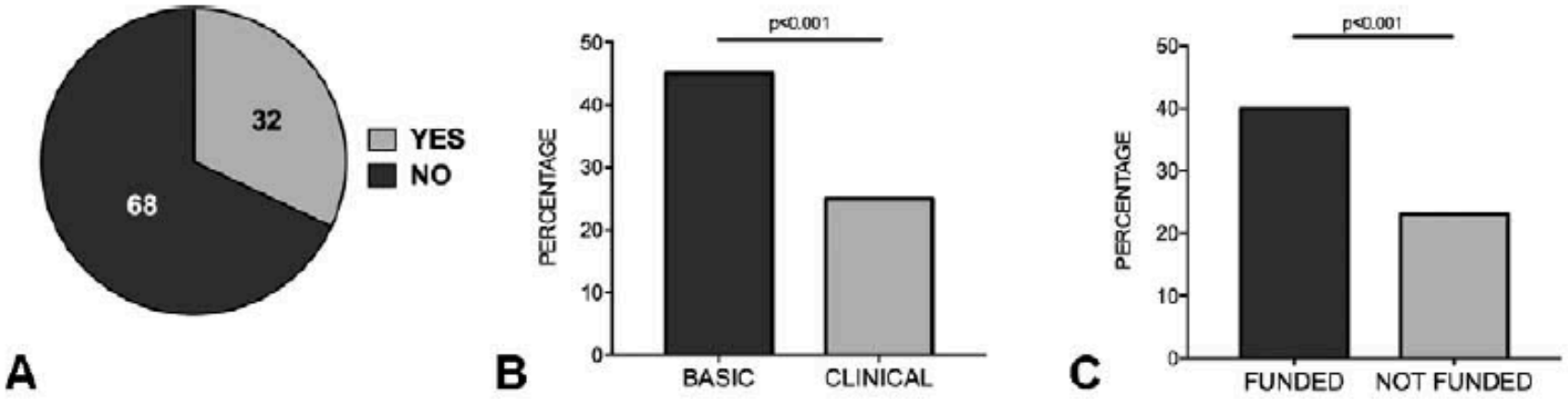
Identifying Barriers to Success for Surgeon-scientists

Sundeep G. Keswani, MD, Chad M. Moles, BSPH,* Michael Morowitz, MD,† Herbert Zeh, MD,‡*
*John S. Kuo, MD, PhD,§ Matthew H. Levine, MD, PhD,¶ Lily S. Cheng, MD,||***
*David J. Hackam, MD, PhD,†† Nita Ahuja, MD,†† and Allan M. Goldstein, MD,***
Basic Science Committee of the Society of University Surgeons



Keswani, et al. Ann Surg 2016

”Do you believe it is realistic to expect surgeons to be successful basic scientists in today’s hospital environment?”



Keswani, et al. Ann Surg 2016

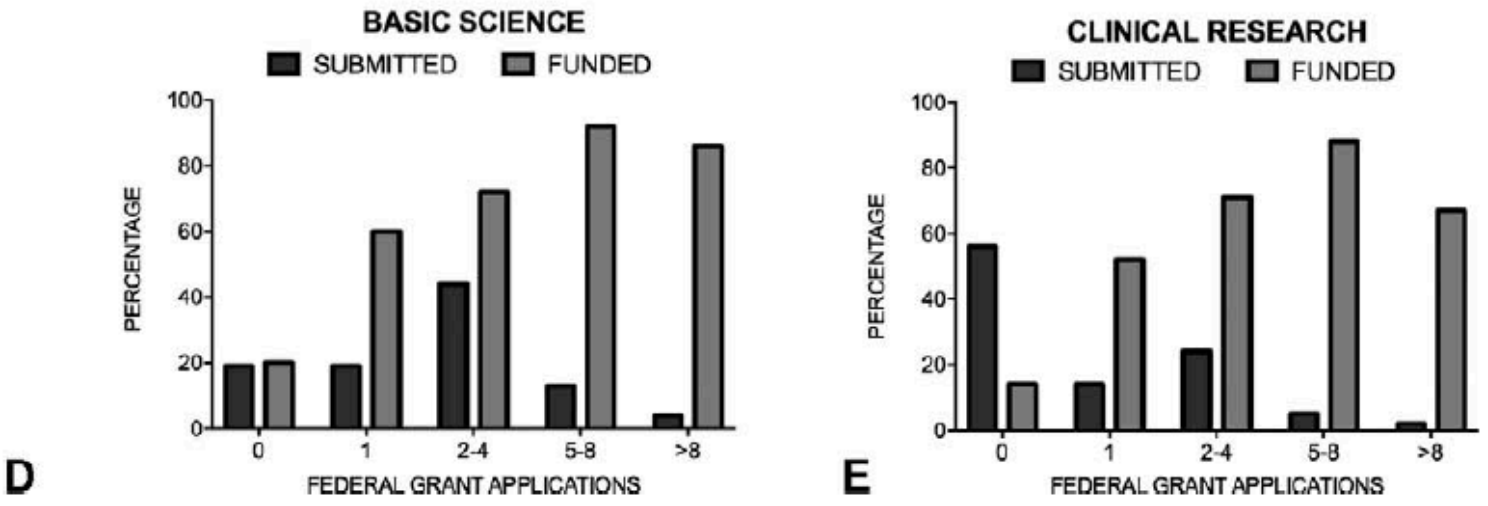
Recent trends in the funding and utilization of NIH career development awards by surgical faculty

Shawn J. Rangel, MD, *and* **R. Lawrence Moss, MD,** *Stanford, Calif, and New Haven, Conn*

"Surgeons are less likely to apply for career development awards, and those who do are less likely to be successful compared to their non-surgical peers."

Surgery 2004; 136:232-9.

Funding and Persistence



Keswani, et al. Ann Surg 2016

Why are surgeons performing poorly?

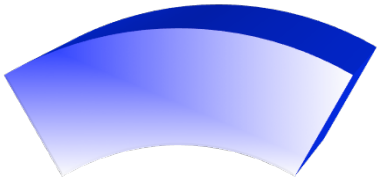
- They are stupid.
- They are lazy.
- They are not creative.
- They are disinterested.
- There are not any interesting or important questions.

No profession has a more intimate link between the basic laboratory and the clinic than surgery.

The Spectrum of Surgical Research

Policy

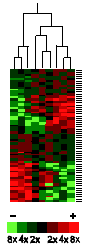
Bring new treatment approaches to patients



Clinical Application

Discovery

Study disease mechanisms pursue new therapeutic targets



Translation

Rigorously test and refine new approaches in pre-clinical models

Develop and screen new candidate therapeutics

Why are surgeons performing poorly?

- They are stupid.
- They are lazy.
- They are not creative.
- They are disinterested.
- There are not any interesting or important questions.
- Research is too hard.

Is research easy? No.

Was research ever easy?

No!

Banting and Best

-from “Glory enough for all”

Why are surgeons performing poorly?

- They are stupid.
- They are lazy.
- They are not creative.
- They are disinterested.
- There are not any interesting or important questions.
- Research is too hard
- They are distracted.

Improving the Surgeon's Participation in Research: Is It a Problem of Training or Priority?

Clifford Y. Ko, M.D., Edward E. Whang, M.D., William P. Longmire Jr., M.D., David W. McFadden, M.D.

Presented at the Annual Meeting of the Association for Academic Surgery, Philadelphia, Pennsylvania, November 18–20, 1999

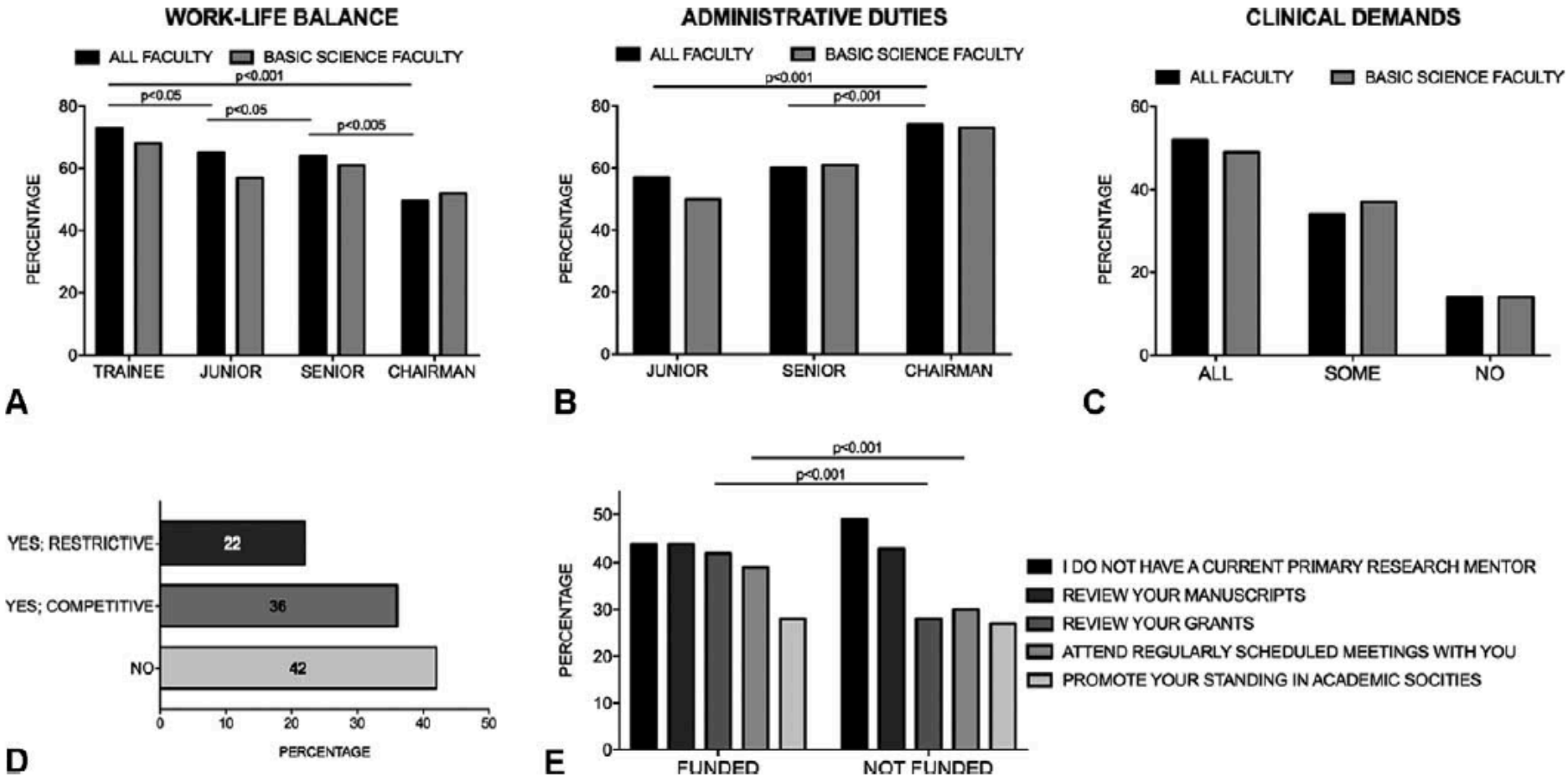
A 25-item survey was sent to 850 senior-level members of academic societies, including the Association of Academic Surgeons, Society of University Surgeons, and American Surgical Association. 44% response rate. 99% performed research at the beginning of their faculty appointment.

- 38% stopped performing basic research by age 39
- 17%stopped performing basic research between ages 40 and 49
- 23% stopped performing basic research between ages 50 and 59
- The primary reason given was clinical load

Conclusions:

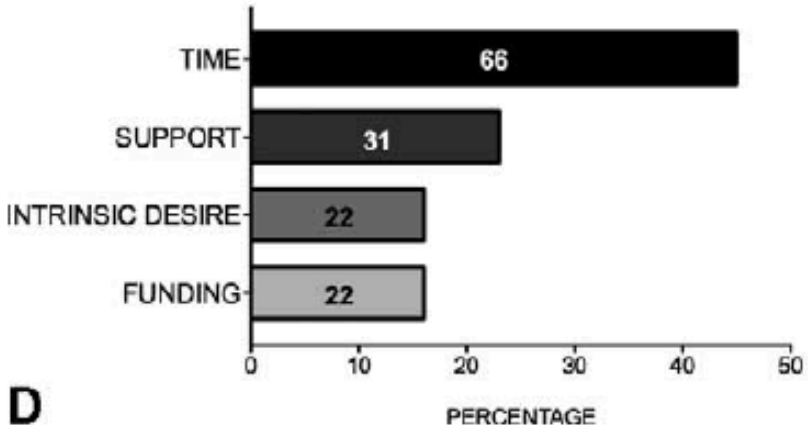
(1) the majority consensus is that research training is integral to the development of academic surgeons;
(2) such research training opportunities appear adequate; however,
(3) faculty performing research, particularly at the junior level, need to be better protected from other academic duties, such as clinical practice and administration.

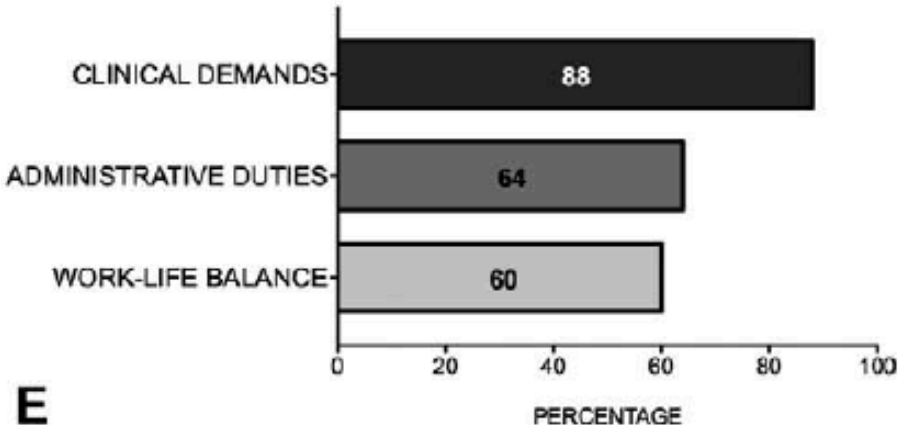
Stressors for surgeons doing research



Keswani, et al. Ann Surg 2016

Major stressors for academic surgeons





Keswani, et al. Ann Surg 2016

American Journal of Transplantation 2011; 11: 245–252
Wiley Periodicals Inc.

doi: 10.1111/j.1600-6143.2010.03314.x

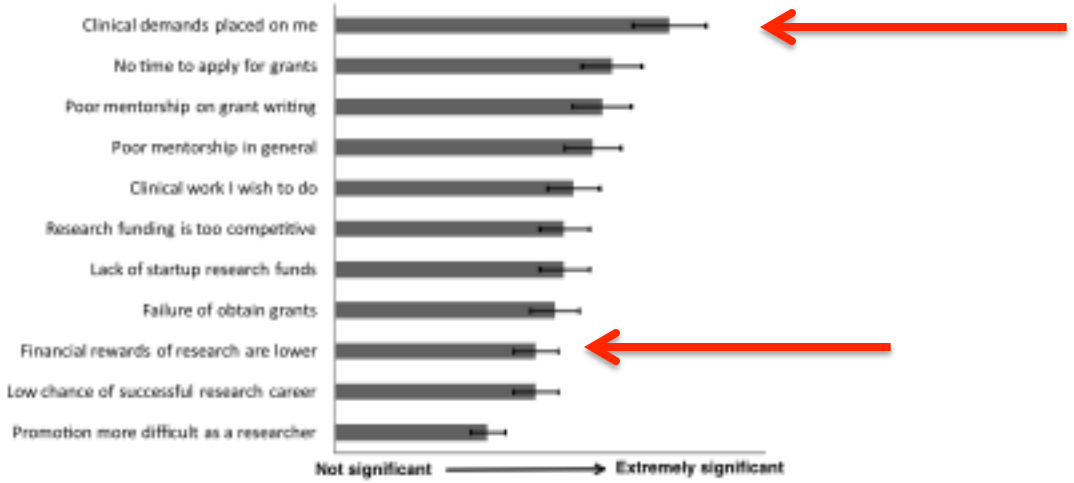
Young Transplant Surgeons and NIH Funding

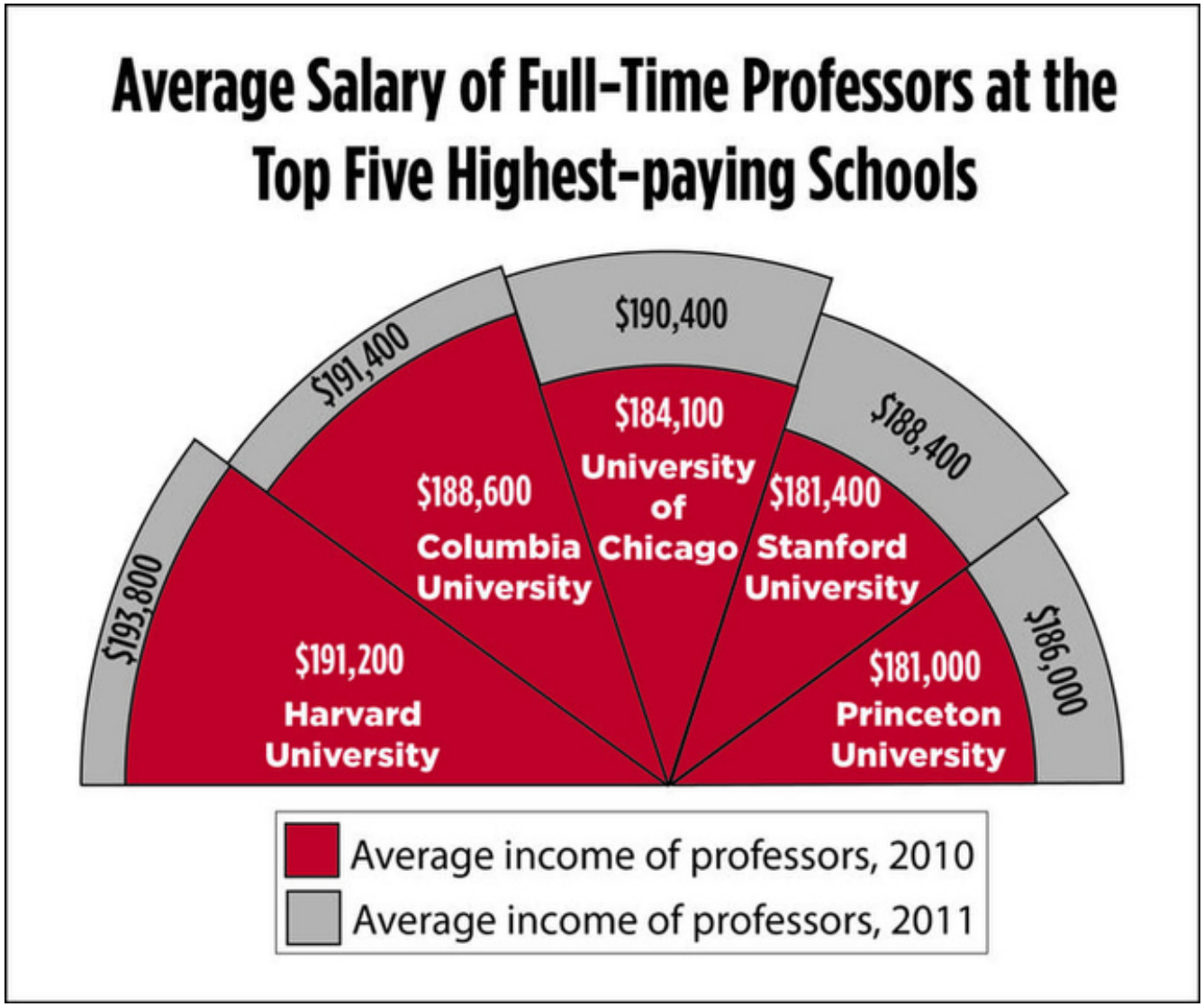
M. J. Englesbe[a,*], R. S. Sung[a] and D. L. Segev[b]

[a]*Department of Surgery, University of Michigan, Ann Arbor, MI*
[b]*Department of Surgery and Epidemiology, Johns Hopkins University, Baltimore, MD*
**Corresponding author: Michael J. Englesbe, englesbe@umich.edu*

Of 373 surgeons graduating from ASTS approved fellowships from 1998-2008, only 6 (1.8%) received career development (K-series) awards, and 5 received R awards.

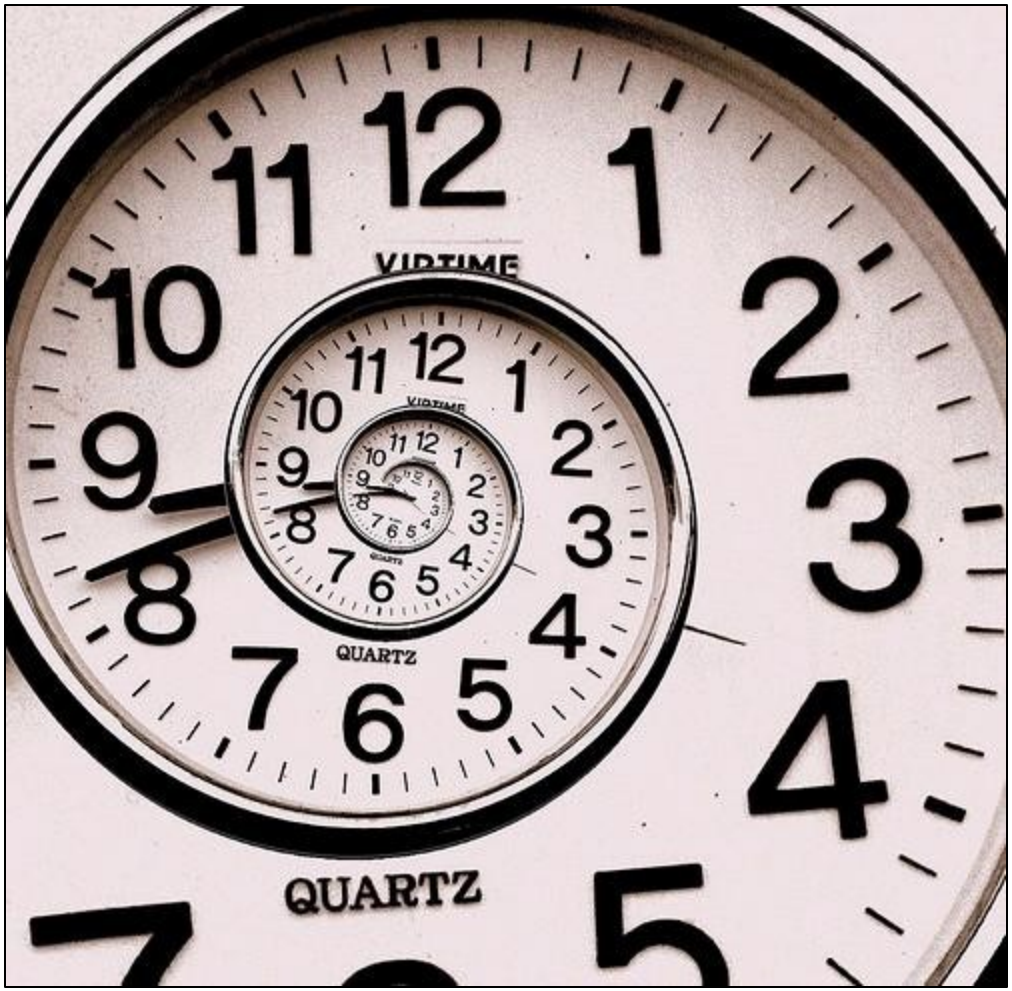
Perceived barriers to developing a research career among young transplant surgeons





American Association of University Professors

Research Takes Time




Time is money.

The reward for doing research is that you get to do research.

In surgery, the gap between the fiscal rewards of research and clinical practice is the widest. As such, surgeon-scientists must, more than any other professionals, understand the inherent rewards of being able to do research, and perform research that has real value.

How do we create those surgeons?

Needs for a Research Career

- Talent
- Time
- Teachers
- Training
- Teams

Kirk AD, Feng S. Surgeons and Research: Talent, Training, Time, Teachers and Teams. *Am J Transplant*. 2011; 11:191-3.

Tips for Success in Research

- Become a voracious reader.
- Learn to write well.
- Master the English language.
- Associate yourself with a dedicated and well-funded mentor.
- Abandon all sense of entitlement.
- Really…abandon all sense of entitlement.
- Go “all in”, and most importantly, be honest with yourself as to whether you enjoy research.

More Tips for Success in Research

- If you enjoy reductionist biology, find a way to associate it with clinical reality.
- If you like clinical applicability, understand the reductionist biology.
- Find a niche where being a surgeon is an advantage, not a hindrance.
- Expect failure, and embrace it as a way to improve… again, abandon any sense of entitlement.

Mentorship

- Faculty members wishing to do research should develop a mentoring team
- Environment where research is a team sport
- Grantsmanship support
- Time management
- In the end there is a 12% payline, and faculty members have to write competitive grants.

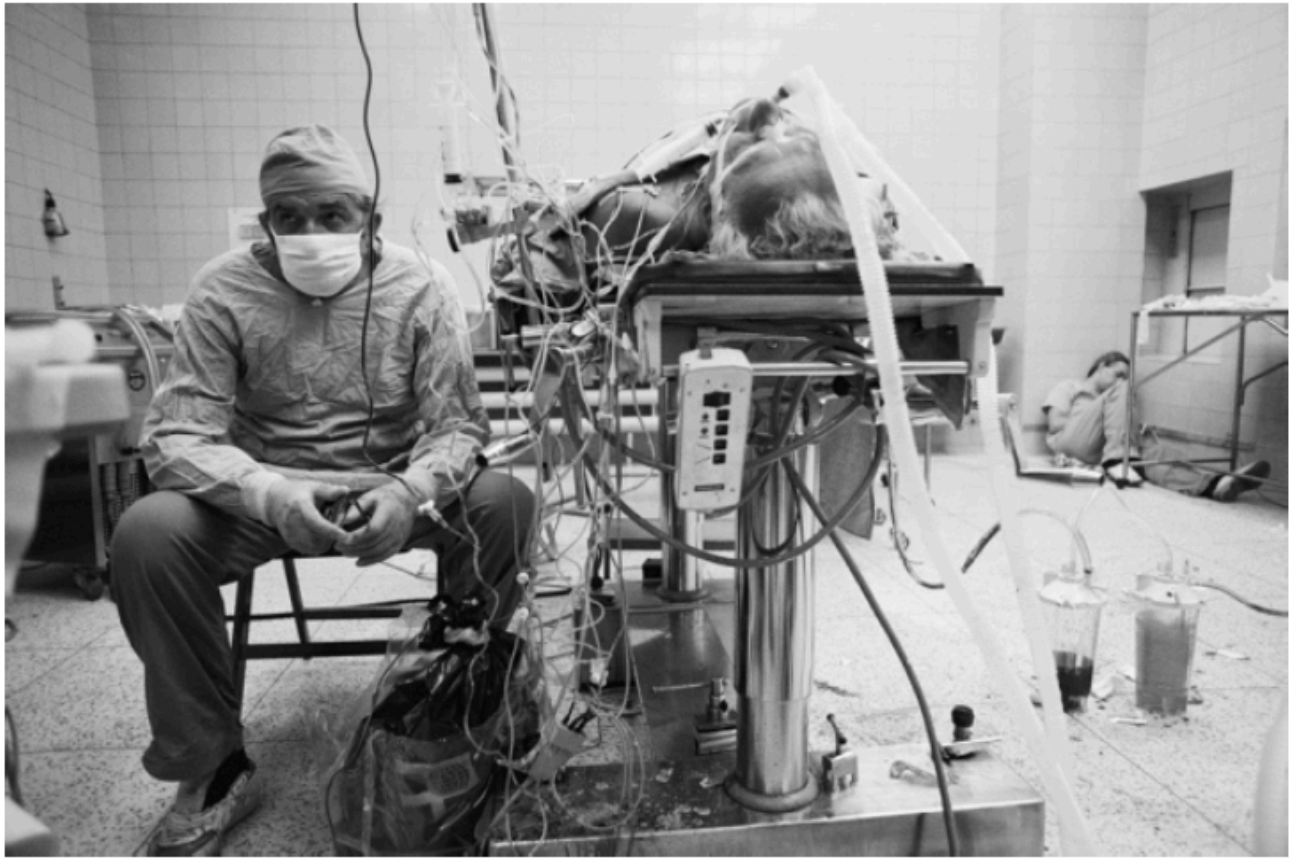
Research is hard,
and there is no “affirmative action”
for surgeons.

NATURE | EDITORIAL

More surgeons must start doing basic science

They say they don't have the time or incentives to do research — and that's dangerous for translational medicine.

21 April 2017



James L. Stanfield/NGC

Surgeon Zbigniew Religa next to his patient after a 23-hour heart transplant in Poland in 1987.

Races are won in the Mountains

Races are won in the Mountains

Good Luck!