

# Klinik & Forschung vereinen - Erfolgreich als Clinician Scientist Forschung - Basic/translational

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Inspired by  
Eugene Braunwald & Arnold Schwarzenegger

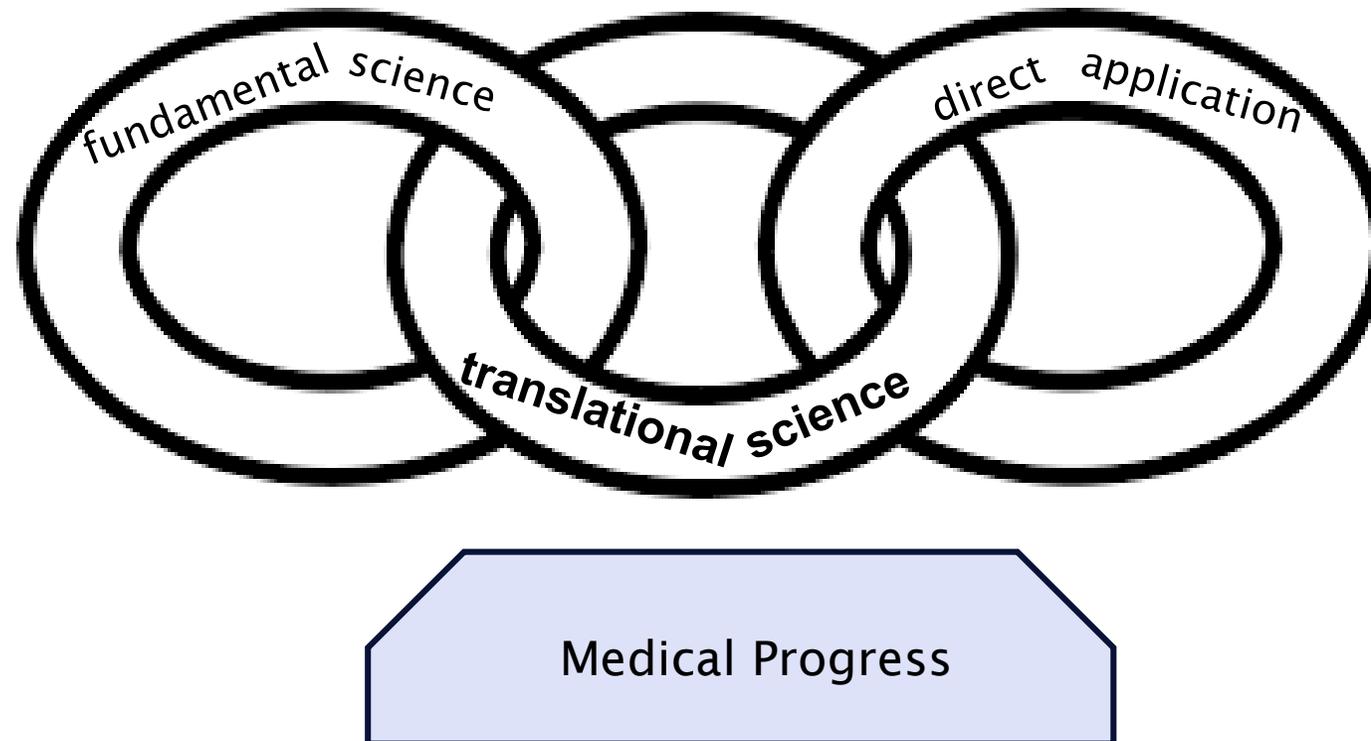


# Disclosures – Philipp Staber, MD PhD



Research Support	Takeda-Millenium, Genactis, Roche Diagnostics
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# Modern medicine: From craftsmanship to medical science



# Modern medicine: From craftsmanship to medical science

MEDICAL EDUCATION  
IN THE  
UNITED STATES AND CANADA

A REPORT TO  
THE CARNEGIE FOUNDATION  
FOR THE ADVANCEMENT OF TEACHING

BY  
ABRAHAM FLEXNER

WITH AN INTRODUCTION BY  
HENRY S. PRITCHETT  
PRESIDENT OF THE FOUNDATION

**1910**

BULLETIN NUMBER FOUR (1910)  
(Reproduced in 1960)  
(Reproduced in 1978)

- identified the need for medical education to incorporate scientific advances with clinical instruction

## SCIENCE - THE ENDLESS FRONTIER

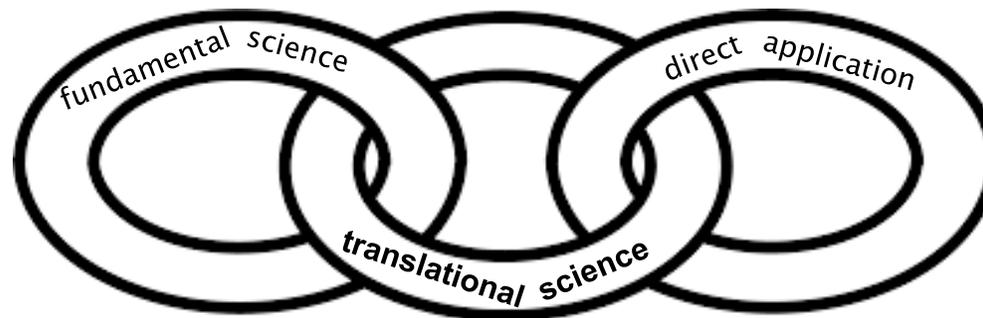
"New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."--

FRANKLIN D. ROOSEVELT November 17, 1944.

## Science The Endless Frontier

A Report to the President by **Vannevar Bush**, Director of the Office of Scientific Research and Development, July 1945  
(United States Government Printing Office, Washington: **1945**)

“scientific progress is essential for public welfare, the war against disease, and national security”



Medical Progress

# Modern medicine: From craftsmanship to medical science

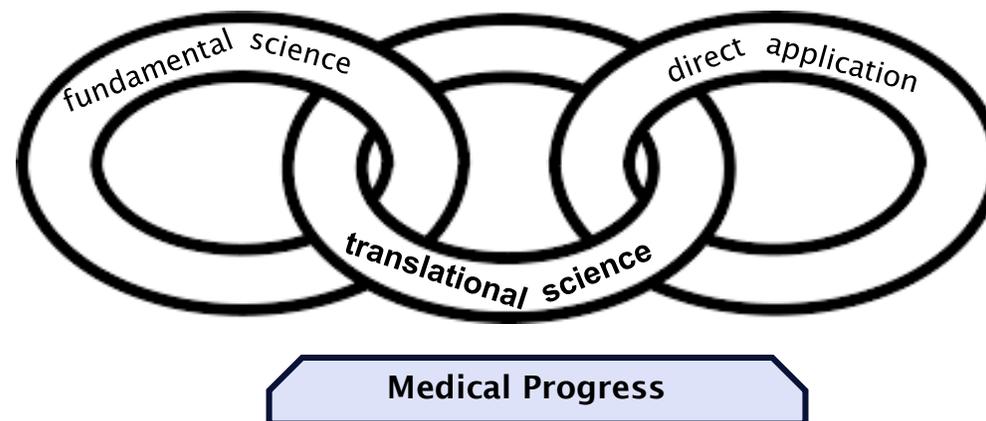
## Physician-scientist



clinical understanding coupled with scientific skills

needed for both:

- **disease mechanism research** and
- **bench-to-bedside translation.**



physician-scientist's skillset is invaluable to investigation, innovation and medical breakthroughs



Robert Lefkowitz

“There are a lot of really bright physicians who just don’t understand what kind of contributions they could make if they tried laboratory research”

Harding CV et al. Acad Med. 2017

# Unique situation of medical universities



- Generation of new knowledge: research
- Transition of knowledge: training of medical students and residents
- Application of knowledge: practice of clinical medicine
  - patients seek most educated and most capable physicians

# Modern medicine: From craftsmanship to medical science

## Physician-scientist



- Medical schools increased numbers of both MD and PhD research faculty
- Since 1964, MD-PhD training by Medical Scientist Training Program (MSTP) of NIH
  - As of 2016: 45 NIH-funded MSTPs; 455 medical schools without MSTP funding

# Modern medicine: From craftsmanship to medical science

## Physician-scientists

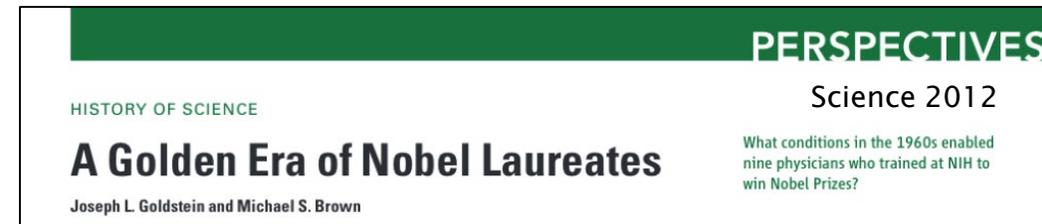


Robert Lefkowitz

“There are a lot of really bright physicians who just don’t understand what kind of contributions they could make if they tried laboratory research”

- a minority of both, practicing physicians and active research scientists
- BUT: playing a critical role medical progress

35% Nobel Laureates (physiology ... many in chemistry)



# Physician-scientist: An endangered species

1212 THE NEW ENGLAND JOURNAL OF MEDICINE May 27, 1976

**SPECIAL ARTICLE**

**RESEARCH, THE LIFELINE OF MEDICINE**

ARTHUR KORNBERG, M.D.

**Abstract** Advances in medicine spring from discoveries in physics, chemistry and biology. Among key contributions to the diagnosis, treatment and prevention of cardiovascular and pulmonary diseases, a recent Comroe-Dripps analysis shows two thirds to have been basic rather than applied research. Without a firm foundation in basic knowledge innovations perceived as advances prove hollow and collapse. Strong social, economic and political pressures now threaten acquisition of basic knowledge. Scientists feel driven to undertake excessively complex problems and gamble against the historical record that science generally progresses by tackling discrete and well defined questions. Regardless of circumstances, professional standards require the physician and scientist to be creative and enlarge the fund of knowledge. (N Engl J Med 294:1212-1216, 1976)

1266 THE NEW ENGLAND JOURNAL OF MEDICINE May 21, 1981

**THE ROLE OF M.D.-PH.D. TRAINING IN INCREASING THE SUPPLY OF PHYSICIAN-SCIENTISTS**

JANET W. BICKEL, M.A., CHARLES R. SHERMAN, PH.D., JAMES FERGUSON, M.D., LIESEL BAKER, B.S., AND THOMAS E. MORGAN, M.D.

Accountability in Research, 19:89-113, 2012  
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DOI: 10.1080/08989621.2012.660076

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**The Vanishing Physician Scientist: A Critical Review and Analysis**

Richard Gordon

PERSONAL PERSPECTIVE The Journal of Clinical Investigation

**Rescuing the physician-scientist workforce: the time for action is now**

Dianna M. Milewicz,<sup>1</sup> Robin G. Lorenz,<sup>2</sup> Terence S. Dermody,<sup>3</sup> Lawrence F. Brass,<sup>4</sup> and the National Association of MD-PhD Programs Executive Committee<sup>5</sup>

Published in final edited form as:  
*Acad Med.* 2017 October ; 92(10): 1390-1398. doi:10.1097/ACM.0000000000001779.

**History and Outcomes of Fifty Years of Physician-Scientist Training in Medical Scientist Training Programs**

Clifford V. Harding, MD, PhD [Joseph R. Kahn Professor, chair of pathology, and director], Medical Scientist Training Program, Case Western Reserve University and University Hospitals Cleveland Medical Center, Cleveland, Ohio

Myles H. Akabas, MD, PhD [Professor of physiology and biophysics, and director], and Medical Scientist Training Program, Albert Einstein College of Medicine, Bronx, New York

Olaf S. Andersen, MD [Professor of physiology and biophysics] Weill Cornell Medical College, and director, Weill Cornell/Rockefeller/Sloan Kettering Tri-institutional MD-PhD Program, New York, New York

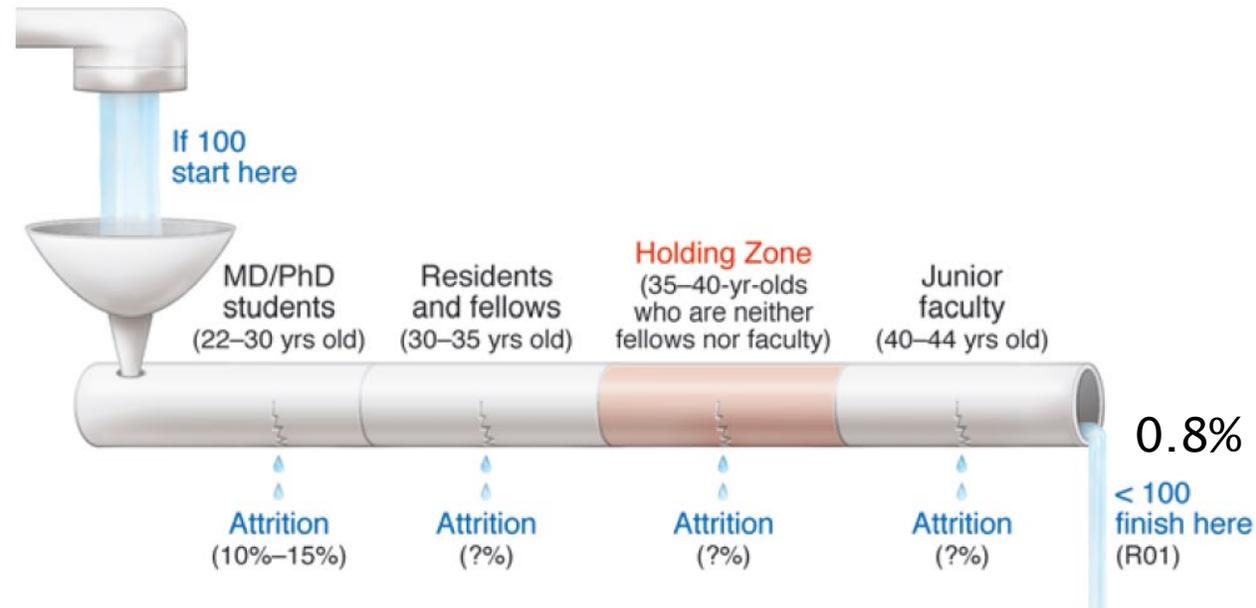
N ENGL J MED 381;5 NEJM.ORG AUGUST 1, 2019 399

The New England Journal of Medicine

**Saving the Endangered Physician-Scientist — A Plan for Accelerating Medical Breakthroughs**

Mukesh K. Jain, M.D., Vivian G. Cheung, M.D., Paul J. Utz, M.D., Brian K. Kobilka, M.D., Tadataka Yamada, M.D., and Robert Lefkowitz, M.D.

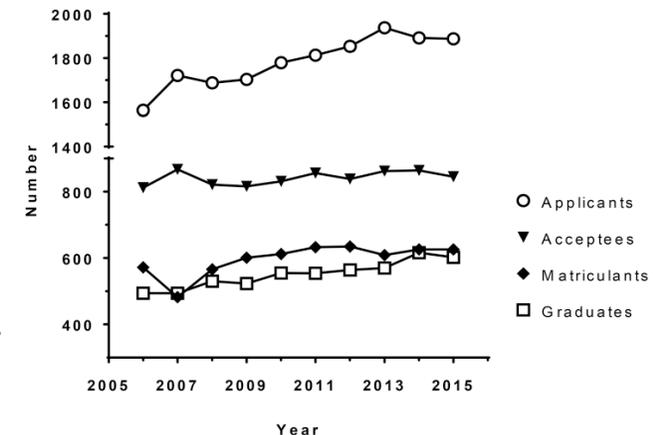
# Physician-scientist: An endangered species



- 1 mio MD - 14,000 researchers (1.4%)
- 8,200 (0.8%) have NIH grants
- Avg. age of first NIH R01 grant: 44a (MD-PhD), 45a (MD) ... 0 < 38a

# Physician-scientist: An endangered species

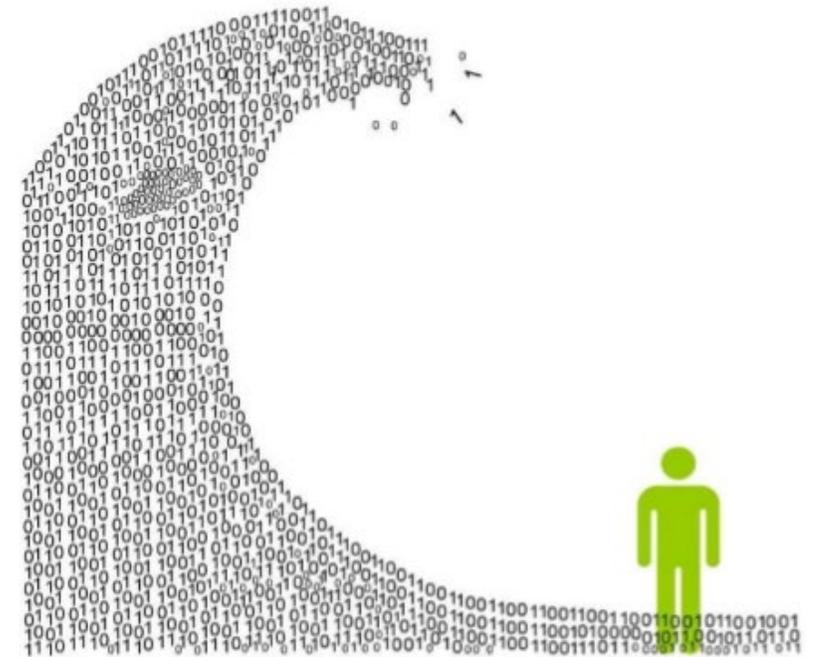
- **increasing time to degree (TTD)** from the 1970s to the 1990s (In 2010 mean TTD 8.0 a).
- **Clinical** fields have undergone **increasing specialization** with longer training requirements (residency, fellowships, subspecialty fellowships, board requirements, CME, maintenance of certification).
- **Increasing specialization in science**, accompanied by increasing needs for funding for complex technical infrastructures and staffing to perform research, as well as increasing regulatory burden
- resulted in **increased duration of postgraduate training** for both clinical and scientific fields.
  - Long periods of clinical residency/fellowship training can break research momentum
  - Long periods of scientific training can interrupt the development and maintenance of clinical skills
- lower salaries in academia relative to private practice.
- increased pressure for clinical productivity, which decreases time available for research.
- decreased grant application success rates
  - total number of physician-scientists has remained stable over the past few decades, while declining as percentage of the total biomedical research workforce.



# Physician-scientist: An endangered species

- Club of old white men

- Staying up to date



# Rescuing physician scientist

- Shorten time to an independent research position by at least 5 a
  - Better integrate research and not start >3a full-time clinical training
    - Protected time for research
    - Adequate monitoring
    - Focus career guidance and individual career development
- Achieve greater diversity and numbers in training programs
- ...Move medical meetings from weekends



**Table 2. Recommended Solutions to the Declining Numbers of Physician-Scientists.**

Category	Solutions
Augment entry (trainee level)	<ul style="list-style-type: none"> <li>Increase basic science foundational coursework in medical curriculum</li> <li>Fund year-out research opportunities during medical school (e.g., Sarnoff fellowship, National Institutes of Health Medical Research Scholars program, and Stanford's "Discovery Curriculum" and Berg Scholars program)</li> <li>Fund research opportunities during residency and fellowship, with guaranteed protected time, debt relief, and experienced mentors</li> </ul>
Reduce attrition (junior-faculty level)	<ul style="list-style-type: none"> <li>Provide robust and sustained support for junior faculty</li> <li>Protect time for research</li> <li>Develop mentorship and sponsorship network within or between institutions</li> </ul>
Increase institutional support	<ul style="list-style-type: none"> <li>Create a national network of academic institutions committed to physician-scientists</li> <li>Establish physician-scientist offices</li> <li>Establish guidelines for salary, optimal balance of clinical and research efforts, and sustained research support</li> </ul>
Other	<ul style="list-style-type: none"> <li>Expand loan-repayment programs</li> <li>Improve family-leave policies and maximize child and parental care resources</li> <li>Revise requirements for board certification, maintenance of certification, and institutional credentialing</li> </ul>

# 5 Rules to become a physician scientist



- 1) have a vision

What problem do you want to solve?

- change status quo
- role model

# 5 Rules to become a physician scientist



- 2) think big

e.g. make discoveries that change patient care

# 5 Rules to become a physician scientist



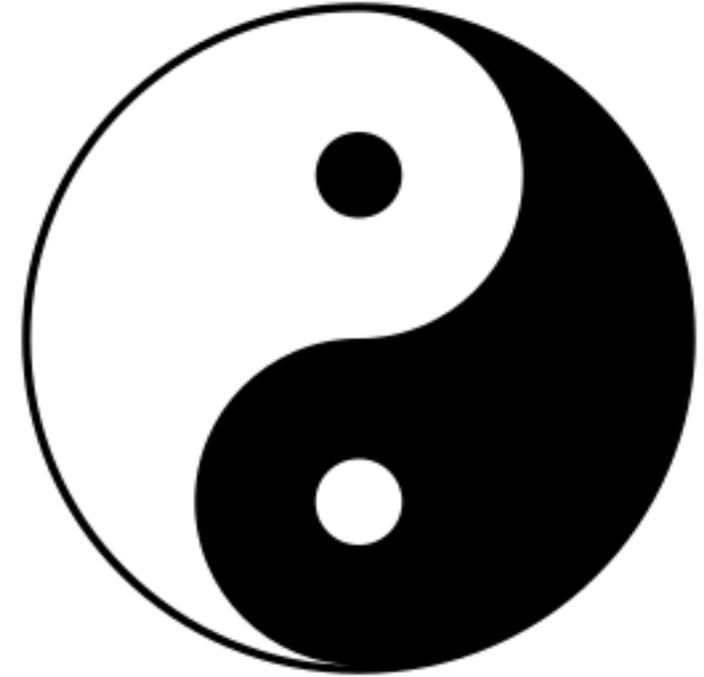
- 1) have a vision
- 2) think big
- 3) ignore the naysayers:

“if you’re an apple, you will always be a second rate banana.”

“going abroad is a waste of time and money. There is enough good science here.”

# Bi-directional flow

- The two things you do need to be mutually reinforcing:
- Bench to Bedside versus Bedside to Bench to Bedside
- examples:
  - 1 Physician: general internal medicine ... Research: functional geneticist in yeast
  - 2 Physician: cardiac rhythmology ... Research: cloning, transmembrane channels
  - 3 Physician: hematologist/ AML ... Research: mechanistic targeting fusion oncoproteins
  - ...



# 5 Rules to become a physician scientist



Focus on your vision/ goal

- 1) have a vision
- 2) think big
- 3) ignore the naysayers:

“if you’re an apple, you will always be a second rate banana.”

“going abroad is a waste of time and money. There is enough good science here.”

# Going abroad

- Why?
- When?
- How long?
- Where?
- How?

# Going abroad

“going abroad is a waste of time and money. There is enough good science here.”

- Why? ... yourself:
  - Pro:
    - You learn from the best in the world
    - Building the basis for your own research topic
    - Out of the box view
    - Foundation / skills for collaborations
    - You experience amazing stuff
  - Con:
    - Finance (even best grants cannot make up the relative loss)
    - Time
    - Pressure: You need to succeed (very few alternatives)
    - Neither here nor there (reintegration?)



# Going abroad

“going abroad is a waste of time and money. There is enough good science here.”

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    - Neither here nor there (reintegration?)

## 19th century scientist

I must find the explanation for this phenomenon in order to truly understand Nature...



## 21st century scientist

I must get the result that fits my narrative so I can get my paper into Nature..

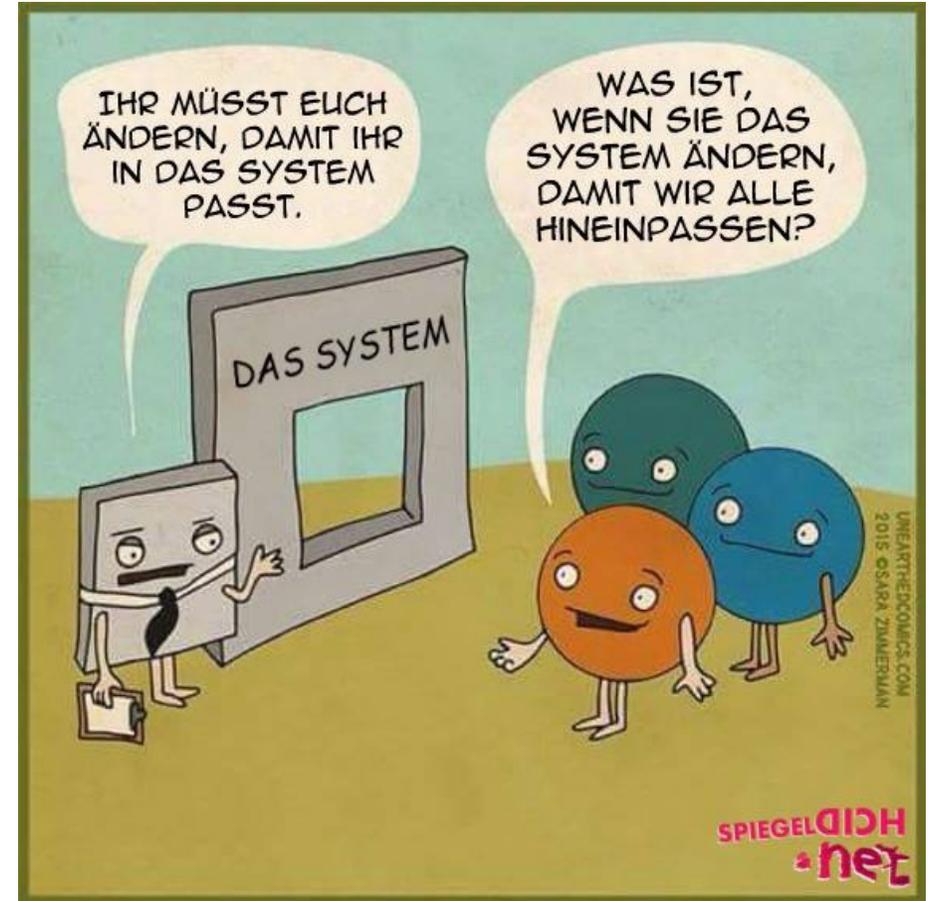


facebook.com/pedromics

# Going abroad

“going abroad is a waste of time and money. There is enough good science here.”

- Why? ... institution:
  - Pro:
    - New: topics, methods,
    - Mindset
    - Foster exchange and collaboration
  - Con:
    - Challenges for reintegration?
    - Challenged by comparison



# Going abroad

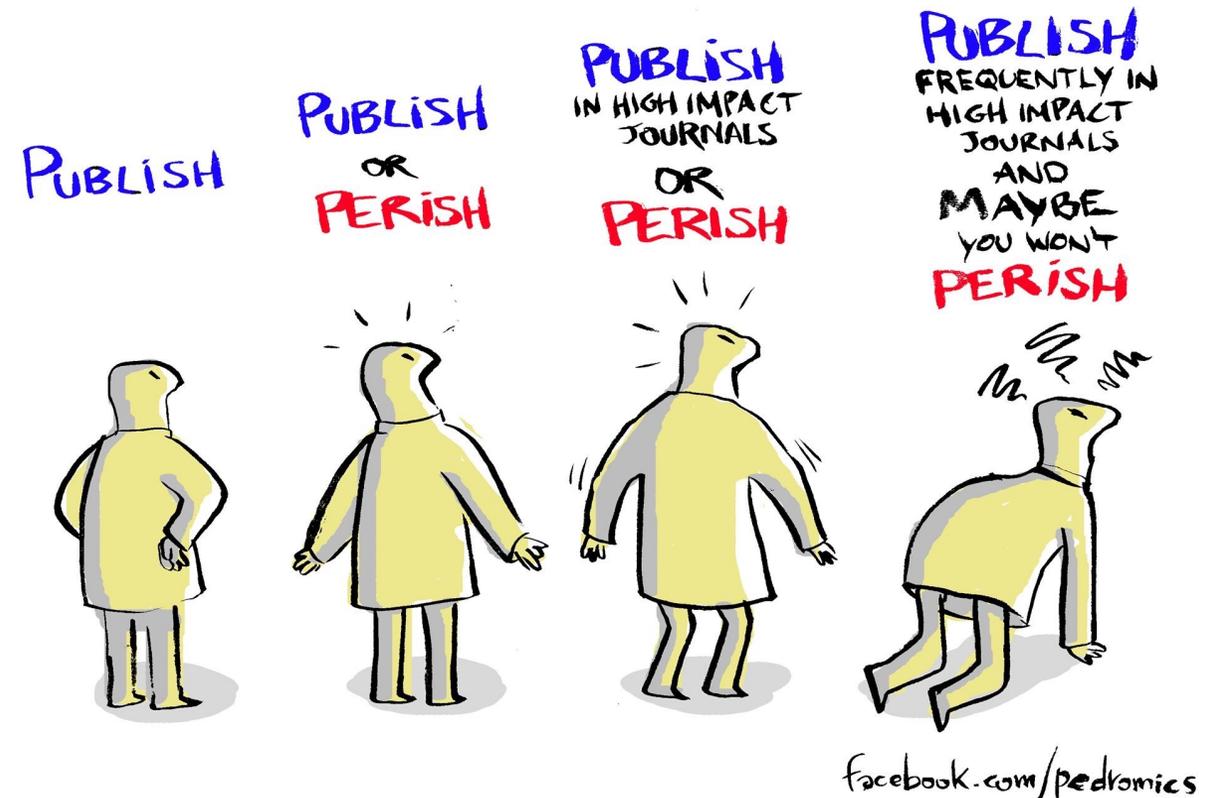
- Why?
- When?
  - Early: less commitments; more energy
  - Late: more security, more focus, easier funding
- How long?
  - Fundamental research training: 3-4 a
  - Applied research: 6 months
- Where?
  - Where the party is (mostly US)
- How?
  - Apply for your own funding: horizon 2020 MC-IOF, national (A: FWF Schrödinger, Austrian Academia of Science APART)
  - From research group (RO1 grant,...)

# 5 Rules to become a physician scientist



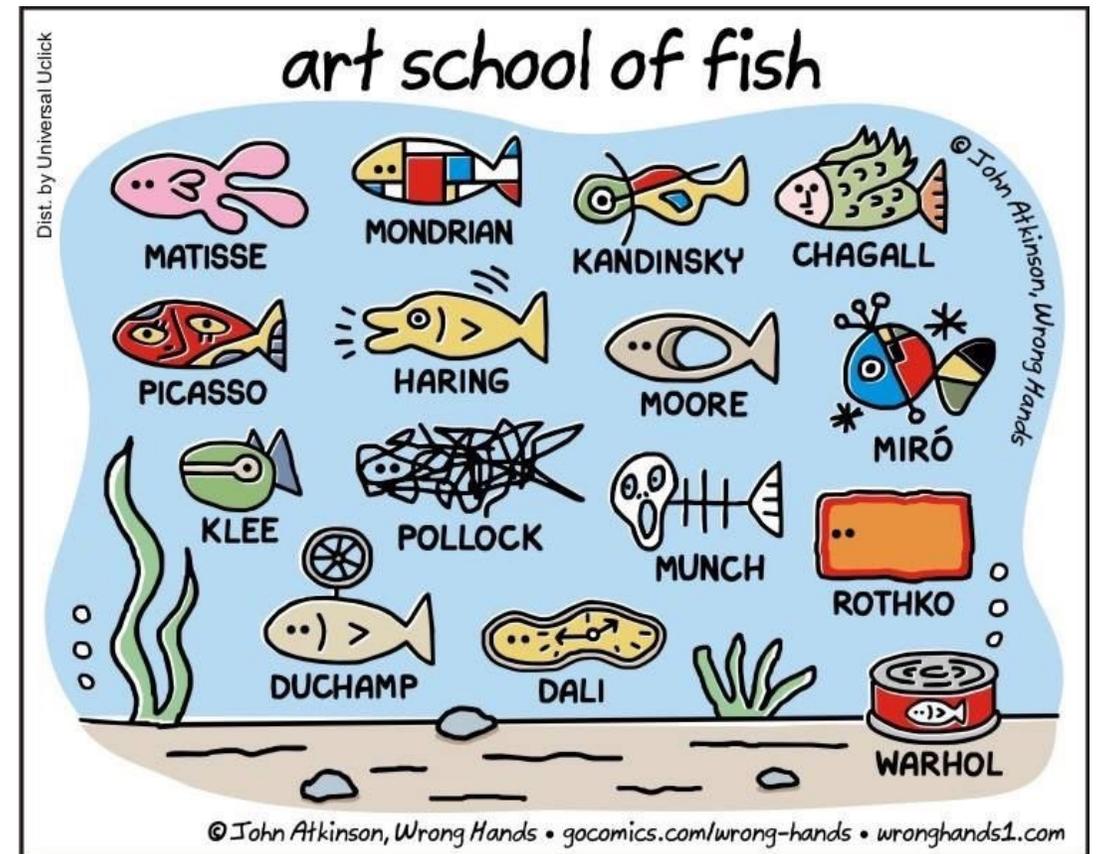
## THE EVOLU

- 4) work your ass off



# you need

- Mentor
  - Career guidance and individual career development
- Find mates
  - Meetings (small is beautiful)
  - Collaborations



# Relationship to industry: proper balance

- Recognize: Universities cannot produce drugs. (But: Ideas, target identification, ...)
- Mutual respect: honest and dedicated in moving patients care forward
- Both: Change and improve the care of patients
- Difference: Improve the value of the company vs search for the best treatment
- Tipp: not with just one company (border might get blurry)

# 5 Rules to become a physician scientist



- 4) work your ass off
- 5) give back

# 5 Rules to become a physician scientist



- 
- 1) have a vision
  - 2) think big
  - 3) ignore the naysayers
  - 4) work your ass off
  - 5) give back

# Thank you!



Patients and their families



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Staber lab