

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

Philipp Staber

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Inspired by
Eugene Braunwald & Arnold Schwarzenegger

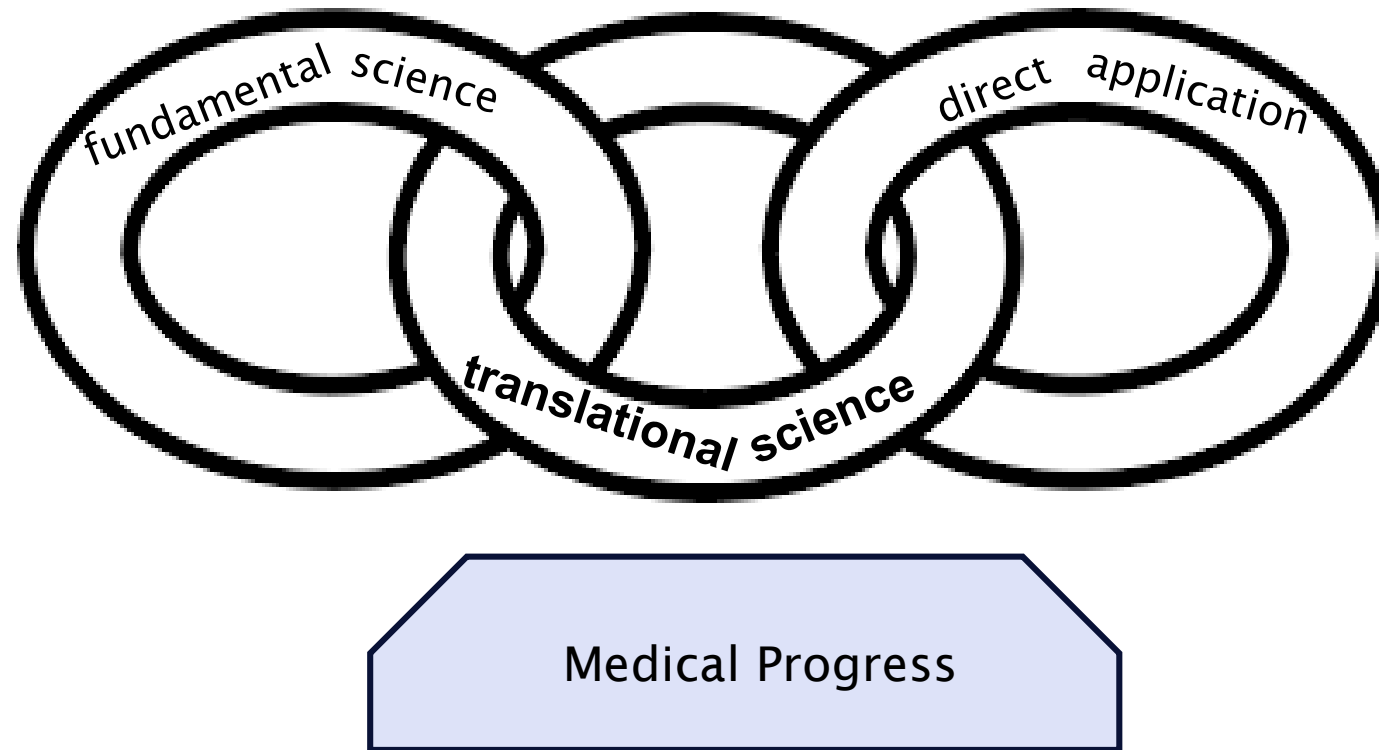


Disclosures – Philipp Staber, MD PhD



Research Support	Takeda-Millennium, Genactis, Roche Diagnostics
Honoraria	Amgen, Roche, Janssen, Gilead, Karyopharm, Morphosys, CTI, Cellegene, Abbvie, Takeda
Scientific Advisory Board	Amgen, Roche, Janssen, Gilead, Karyopharm, Morphosys, Abbvie, CTI, Takeda

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

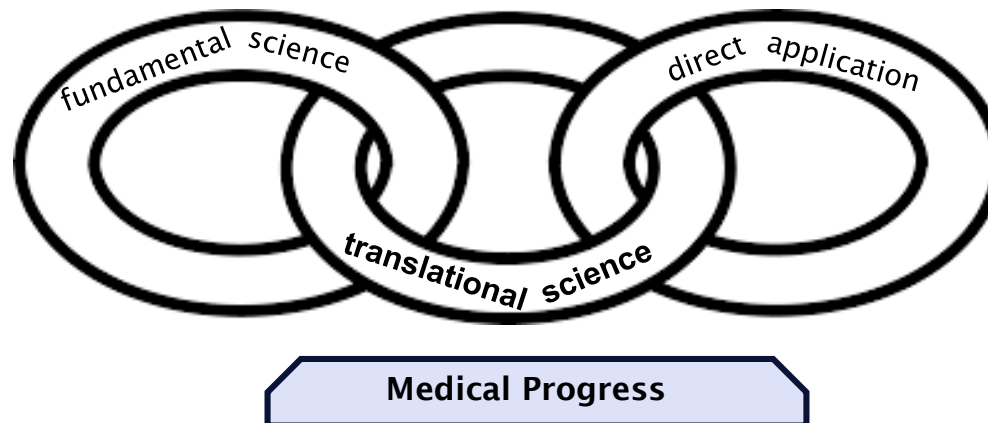
"New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."--

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”



Modern medicine: From craftsmanship to medical science

Physician-scientist



clinical understanding coupled with scientific skills

needed for both:

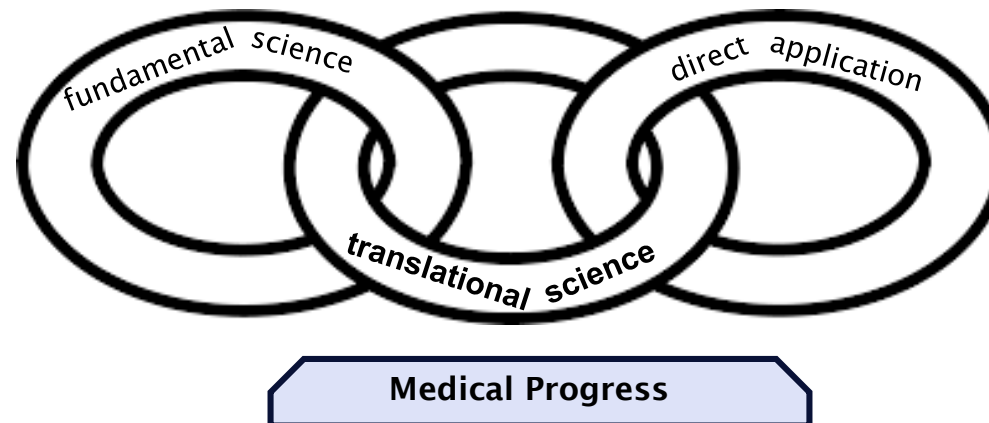
- **disease mechanism research** and
- **bench-to-bedside translation.**



Robert Lefkowitz

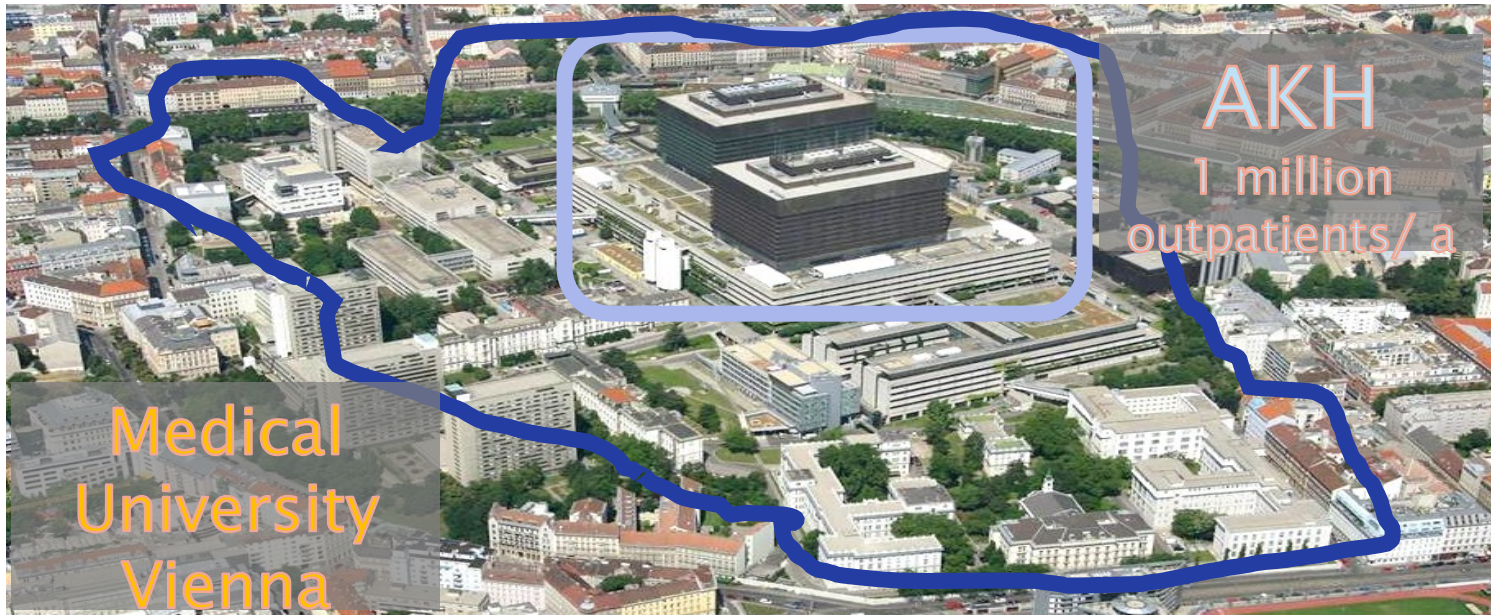
“There are a lot of really bright physicians who just don’t understand what kind of contributions they could make if they tried laboratory research”

Harding CV et al. Acad Med. 2017



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

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

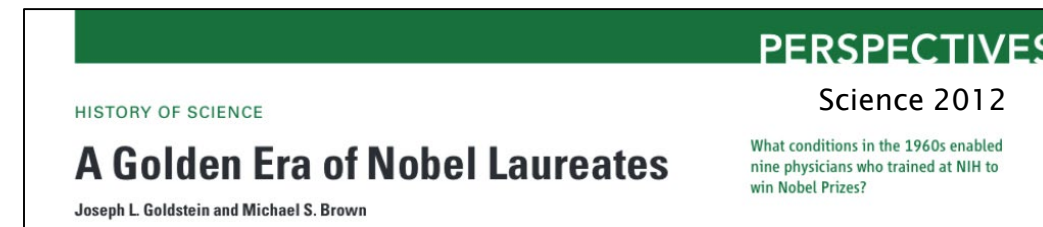


Robert Lefkowitz

“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)

Accountability in Research, 19:89-113, 2012
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ISSN: 0898-9621 print / 1545-5813 online
DOI: 10.1080/08989621.2012.660076



The Vanishing Physician Scientist: A Critical Review and Analysis

Richard Gordon

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
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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

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.

PERSONAL PERSPECTIVE

The Journal of Clinical Investigation

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

Dianna M. Milewicz,¹ Robin G. Lorenz,² Terence S. Dermody,³ Lawrence F. Brass,⁴
and the National Association of MD-PhD Programs Executive Committee⁵

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

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The New England Journal of Medicine

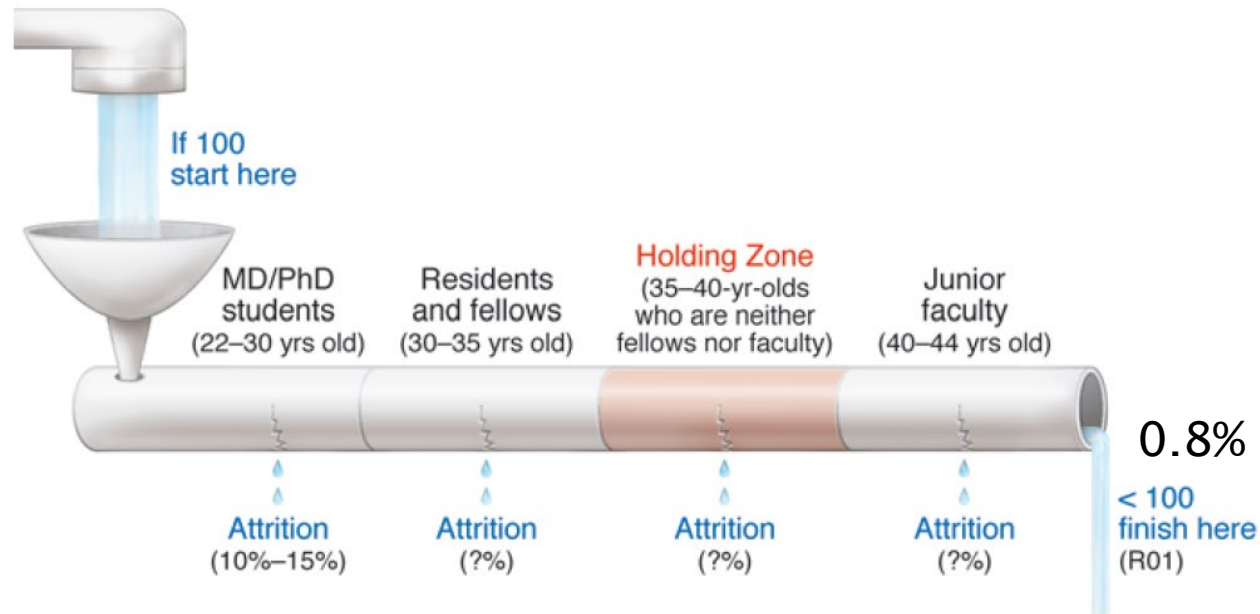
Saving the Endangered Physician-Scientist — A Plan for Accelerating Medical Breakthroughs

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.



MEDICAL UNIVERSITY
OF VIENNA

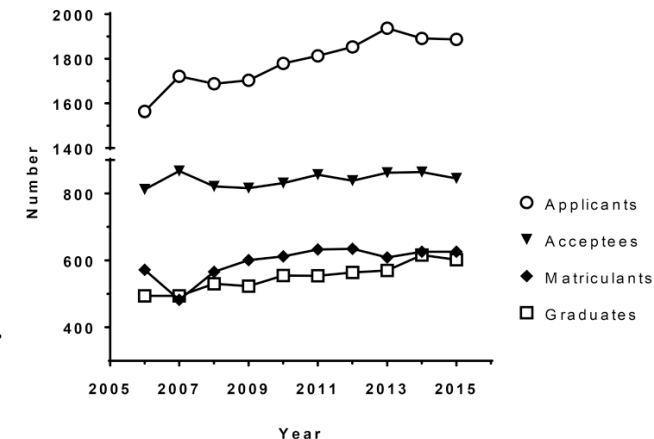
Physician-scientist: An endangered species



- 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.

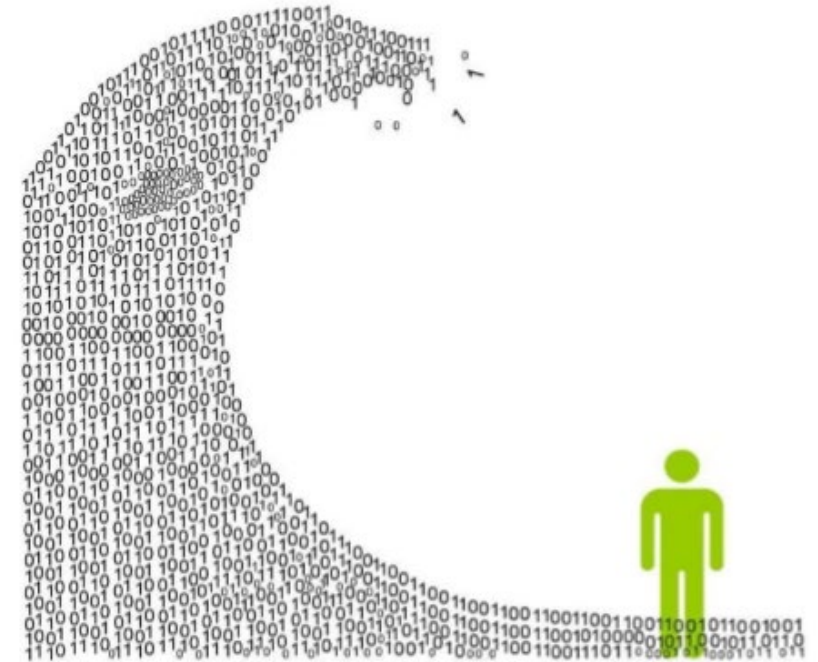


Physician-scientist: An endangered species

- 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)	Increase basic science foundational coursework in medical curriculum 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) Fund research opportunities during residency and fellowship, with guaranteed protected time, debt relief, and experienced mentors
Reduce attrition (junior-faculty level)	Provide robust and sustained support for junior faculty Protect time for research Develop mentorship and sponsorship network within or between institutions
Increase institutional support	Create a national network of academic institutions committed to physician-scientists Establish physician-scientist offices Establish guidelines for salary, optimal balance of clinical and research efforts, and sustained research support
Other	Expand loan-repayment programs Improve family-leave policies and maximize child and parental care resources Revise requirements for board certification, maintenance of certification, and institutional credentialing

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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 - Finance (even best grants cannot make up the relative loss)
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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

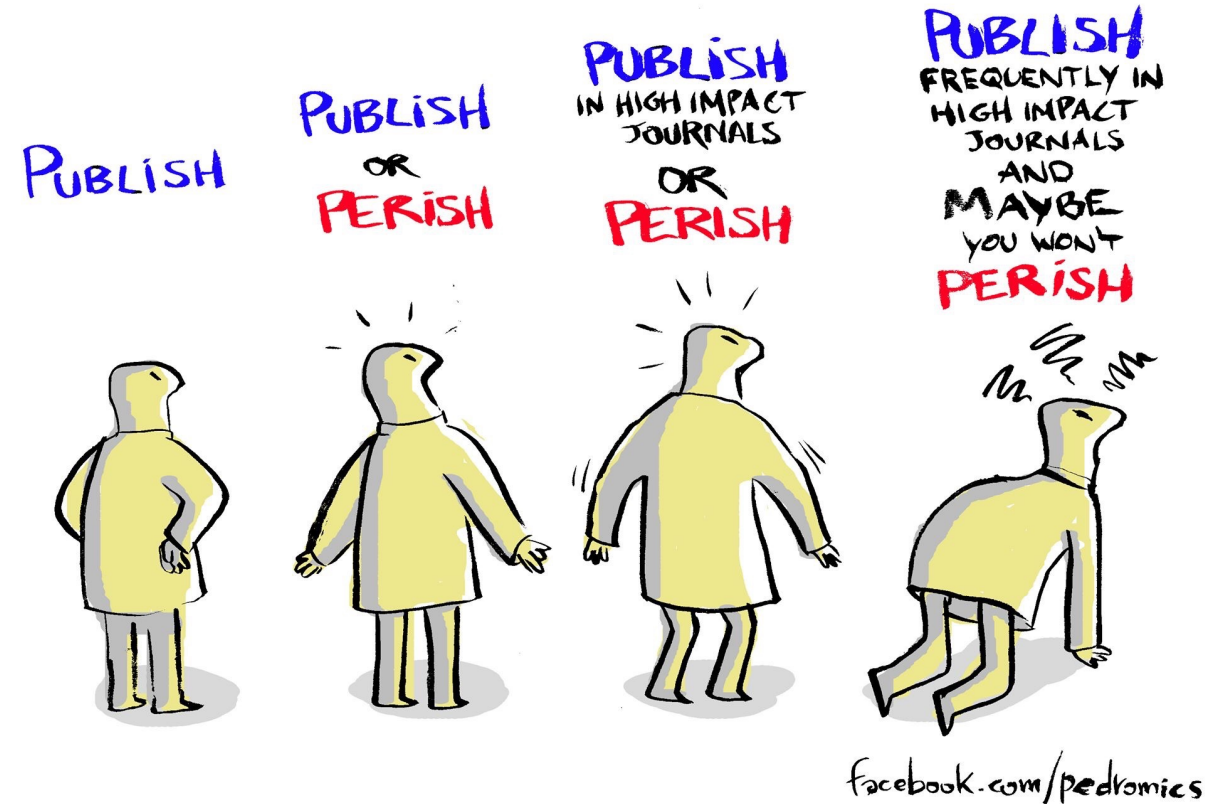
- Why?
- When?
 - Early: less commitments; more energy
 - Late: more security, more focus, easier funding
- How long?
 - Fundamental research training: 3-4 a
 - Applied research: 6 months
- Where?
 - Where the party is (mostly US)
- How?
 - Apply for your own funding: horizon 2020 MC-IOF, national (A: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

5 Rules to become a physician scientist

THE EVOLU

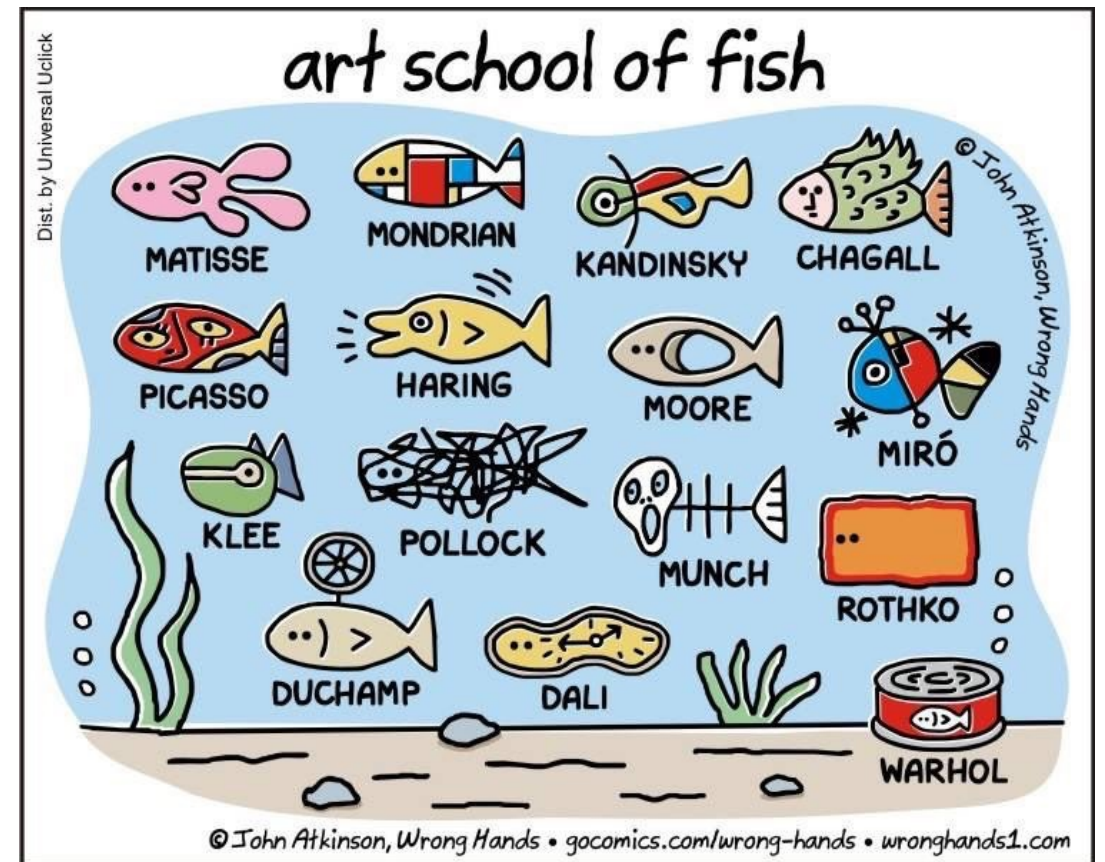


- 4) work your ass off



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

Department of Medicine I:

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Staber-Laboratory:

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Giulio Superti-Furga



Staber lab