

PEDIATRIC ANESTHESIA RESEARCH: RAISING THE BAR

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DISCLOSURES

None



PROGRAM

- **Workshop Lectures – 30 minutes each**
 - Jerome Parness MD PhD: *Introduction; Getting Started as a Physician-Basic Scientist*
 - R. Blaine Easley MD: *Getting Started as a Physician-Clinical Scientist*
 - Olutoyin Olutoye MD: *Mentoring, the Ins and Outs*
 - Richard J. Levy MD: *Negotiating the Funding Agencies*
- 10 Minute break
- **Science Scholar Showcase – 30 minutes each**
 - Caleb Ing, MD MS: *Anesthetic Neurotoxicity and the Journey to Clinician-Scientist: Lessons Learned*
- **Panel Discussion – Open Question and Answer Period , ~50 minutes**

SCIENCE

A systematic, verifiable, experimental examination of the of the experiential universe

Requires repeated, iterative query

Based on expanding body of knowledge

Only as good as the techniques



WHY BASIC SCIENCE?

Passion: Need to know *WHY*?

The *thrill* of understanding Nature and her mechanisms

The potential for identifying new therapeutic targets and mechanisms

Amongst the most humanistic of endeavors

The most like anesthesia – no one knows what you do except for the *cogniscenti*

THE TOOLS

The tools of doing science, whether clinical or basic, are **NOT** what you learned in medical school.

Different language

Different way of thinking

Different standards of “truth”

Experimental design is **NOTHING** like clinical medicine

Performing experiments is a *tactile experience*

A lot to learn – ***INVESTMENT!***

Apprenticeship!!

WHERE?

Wherever there is a sustained departmental investment in research infrastructure

In newly investing department you have to get guarantees in writing from both Chair and DEAN

Need serious, successful *MENTOR* wherever you go – intra- or extra-departmental

Latter must be real idealist; Extra-departmental should receive financial remuneration for mentoring

Gender specific mentoring – juggling of

WHEN TO START?

The earlier the better

- Much to learn outside the disciplines of clinical medicine
 - Much of what you learned in basic science in medical school is no longer “truth”
 - Much to unlearn: Knowledge is not in boxes.
 - *The acquisition of scientific knowledge is not studying for the boards!!!!*
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COLLABORATION

Great science is multi-disciplinary!

Use Mentor's network

Develop your own network

Dare to ask the big questions!



HOW TO ASK A GOOD SCIENTIFIC QUESTION

Internal

I am intrigued

Self-motivation

*“Fresh Eyes” – unique
perspective*

External

*Mentor driven –
knowledge and
history of success*

Mentor Bias!

*Good Mentor will
value fresh eyes!*

FEASIBILITY VS. IMPORTANCE

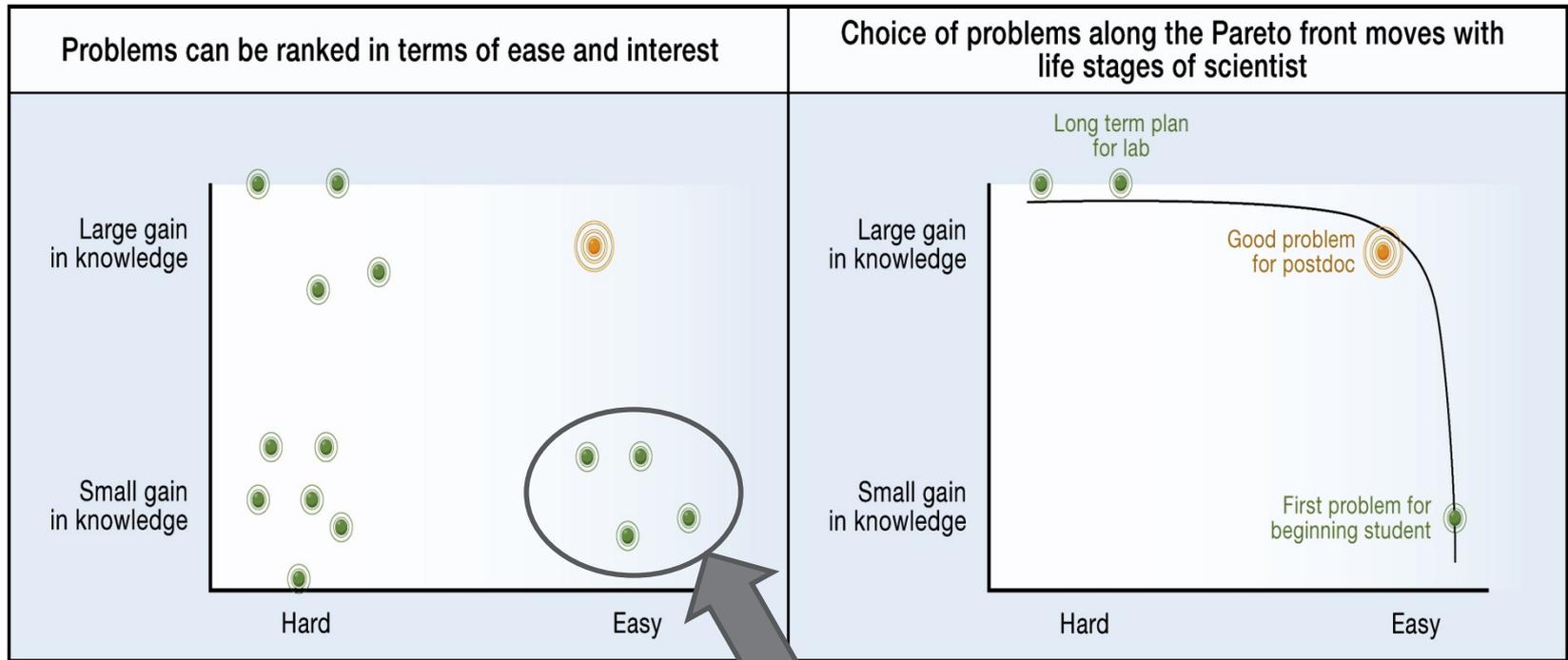
Do the techniques exist? Mentor's vs. Collaborator's lab?

Techniques easy or difficult to learn?

Is the question of great significance?

- Low-hanging fruit vs. difficult but important
- As a first project, best to take a small portion of an exciting project, use as springboard. Success breeds excitement, which breeds success, which breeds more excitement... !!!!

PROBLEM DIFFICULTY VS. IMPORTANCE



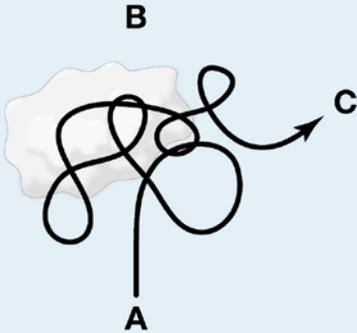
Low hanging fruit

DEVELOPING THE PLAN

TAKE THE TIME!!!! Read, discuss, examine techniques, understand what potential data might really mean – “surrogate” vs. true outcome data.

AVOID THE TEMPTATION TO GET STARTED QUICKLY. A well developed hypothesis and experimental plan will save time in the long run.

EXPERIMENTAL EXPECTATIONS

The objective schema can lead to frustration when the project goes off track	The nurturing schema gives support and opens new directions
 <p>A straight vertical arrow points from point A at the bottom to point B at the top.</p>	 <p>A path starts at point A at the bottom, loops around in a complex, tangled manner, and ends at point C on the right. Point B is located above the top of the loop.</p>

A → B, only with low hanging fruit or remarkable insight (rare)

A → C is most common result

Mother Nature *IS* complicated

Serendipity favors the prepared mind!

HOW LONG DOES THIS TAKE?

3-7 years – remember, you are in this for the long run

Long postdoctoral fellowship +/- junior faculty position

***Must* be in an institution that is willing to commit for the long haul**

Have Mentor, specific goals and reasonable time frame

MAINTAINING EXCITEMENT

Stay away from nay-sayers – sap psychic energy

You are motivated differently – accept this

- **Your significant other must be with you on this!**
- **Stay in a productive mode to maintain excitement.**
- **Clinically informed scientific research**
 - ***EVERY* clinical situation has the potential to inspire a meaningful scientific question, i.e., your clinical service should be viewed not as tedium or something that pulls you away from the lab, but as the canvas that inspires your scientific thinking!**

BARRIERS TO SUCCESSFUL SCIENTIFIC CAREER

Anesthesiologist and immediate gratification

Untutored in experimental thinking

Unfamiliarity with the association between the acquisition of knowledge and technical facility

\$\$\$ and debt: NIH loan repayment program

<http://www.lrp.nih.gov/> - up to \$35K per

yr



SCIENTIFIC CRITICISM

Ideal Scientific Criticism from someone who is rational, objective, open-minded, superior intelligence, integrity, communality – sets bar very high

Ambition, Jealousy breed the tendency to fraud and obstructionism in science, as in all fields

When you start out, it is best to **get criticism of your ideas from your mentors**, official and non-official, and **trusted colleagues** who may not be directly in your field of endeavor

Some **universities have consulting scientists** within their faculty who have been tapped to assist junior faculty with criticizing their ideas, grants, techniques, etc. **USE THEM!**

TYPES OF CRITICISM

Objective/Constructive: tell you why your data does not support your conclusions – rational

- Convince ourselves of the meaning of data by our hypothesis without considering other explanations
- Keeps one from examining the robustness of data
- Keeps one from doing the appropriate experiments to really answer the question

Objective/Non-constructive: tell you why your data does not support your conclusions - don't like your science or don't believe data, i.e., criticism not from rational base

- Objective reply may or may not change their opinion
- Sharpens your thought process

TYPES OF CRITICISM II

Subjective/Constructive: their interpretation of your data, recognizing the potential validity of your interpretation.

- Pressed for time? Based on data you do not know?
- Rationally explain your approach while considering the alternative – helps with refining your own thoughts

Subjective/Non-constructive: work not interesting or don't like your science – no objective approach

- Walk away, not worth your energies
 - Ambition? Jealousy? Competitor trying to get you down?
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ENTREPRENEURIAL SPIRIT ACADEMIC SCIENCE

An **entrepreneur** is a person who organizes, operates, and assumes the risk for a business venture. An entrepreneur is someone who believes they have a good business idea and try very hard to start the business.

Entrepreneurial Spirit describes the enthusiasm, excitement, initiative, commitment to the idea, the will to succeed and the dedication to the venture that is necessary to overcome the initial difficulties and demands faced by someone starting their own business.

<http://www.talki.com/question/63756>

Substitute “**scientific program**” for “**business venture**”.

Your motivation is to improve our scientific understanding of disease, health and therapy.

Your recompense will not be so much in money as advancing the frontier of the known world. By default, you will make a career. Learn to manage it.

PREPARE

How to Succeed as a Scientist: From Postdoc to Professor. Barbara J. Gabrys and Jane A. Langdale. Cambridge University Press, 2012, 211 pages.

Becoming a Successful Scientist: Strategic Thinking for Scientific Discovery. Craig Loehle, Cambridge University Press, 2010, 249 pages.

LABORATORY AND CAREER ADMINISTRATION

Howard Hughes Medical Institute website

- *Making the Right Moves*
- *Negotiating a faculty position*
- *Understanding University structure*
- *Leadership in Science*
- *How to hire*
- *How to be mentored and to mentor*
- *Planning for tenure*
- *Time and Project management*
- *Data management*
- *Securing funding*
- *Getting published, increasing your visibility*
- *Setting up collaborations*
- *Course design*

<https://www.hhmi.org/sites/default/files/Educational%20Materials/Lab%20Management/Making%20the%20Right%20Moves/moves2.pdf>

***THERE ARE NO
SHORTCUTS!!!!!!***



ENJOY!

*And you will
persevere...*



SEE YOU IN STOCKHOLM!



Harry How/Sally