

Identifying a Research Question and a Mentor

DOM Research Curriculum Series

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1. Choosing a Mentor

a. NIH Perspective (NIAID)

- i. Fellowship (F) grants and mentored career development (K) awards require mentorship from at least 1 mentor (=PI)
- ii. A mentor is someone who makes a long-term commitment to you for your research career
- iii. Serves as adviser, advocate, critic, instructor (and investor)
- iv. “A good mentor will help you define your research goals, and then support you in your quest to achieve them. He or she will share knowledge, provide encouragement, and hopefully inspire you. In addition ..., your mentor should help you develop your career goals and construct a scientific network. *Above all*, your mentor should be **someone you trust** to always keep *your best interest* in mind.” — from Thoughts on Choosing a Research Mentor, NIH Office of Intramural Training and Education
- v. Qualities of a Good Mentor
 1. Ideally, a mentor should be well-known (i.e., lots of publications) and well-respected (i.e., leadership role(s), awards, and/or Study Section service) in your selected field
 2. Essential qualities
 - a. Being knowledgeable, open-minded, supportive, motivating, and a good (active) listener.

3. He or she must be able to communicate clearly, give you appropriate projects to pursue, and teach you to analyze and interpret results
 4. Additionally, a good mentor should
 - a. Foster collaboration.
 - b. Ensure you're making progress towards goals.
 - c. Give you feedback on your scientific work in a constructive and timely manner.
 - d. Support your participation in career-building activities, e.g., retreats, grant writing.
 - e. Encourage you to be independent, for example, in designing and conducting experiments.
 - f. Introduce you to other researchers in your field.
 - g. Facilitate appropriate authorship on publications.
 - h. Help you with grant applications.
 5. A PI doesn't have to meet all the criteria above to be a good mentor.
 - a. You may need more than 1 mentor to fulfill complementary roles
 6. You must get along
 - a. Personal connection
 - b. Shared values around research, clinical work, personal life
 7. Mutual respect is critical
- vi. A mentor is not just...
1. A role model
 2. A patron
 3. A supervisor



Mrs. Mutner liked to go over a few of her rules on the first day of school.

vii. Before approaching a potential mentor

1. Talk to current mentees
 - a. Does the PI have the qualities listed above?
 - b. Is the PI accessible and available?
2. Do a lit search
 - a. Do the publications match your interests?
 - b. Are the journals high quality?
3. Look up PI on NIH Reporter
 - a. <https://projectreporter.nih.gov/reporter.cfm>
4. Self-reflect (Zerzan et al., Acad Med, 2009)
 - a. Clarify your values
 - b. Identify your work style and habits
 - c. Identify your knowledge and skill gaps
 - d. Specify short-term and long-term goals
 - i. Med student:
 1. Find a summer project
 2. Gain experience in field of interest
 3. Co-author an abstract and, ideally, a paper
 4. Support application for residency
 - ii. Resident:
 1. Find a project that can be done in 1 year with intermittent effort
 2. Gain experience in field of interest
 3. Co-author an abstract and a paper
 4. Support application for fellowship
 - iii. Fellow:
 1. Find a project that can be done in 1 year with intermittent effort
 2. First-author an abstract and a paper
 3. Get a training grant (F)

4. Support transition to faculty

iv. Junior faculty

1. Find 1-2 projects that can be done in 1-2 years with intermittent effort
2. First-author abstracts and papers
3. Get a career development award (K)
4. Move towards independence

viii. Get acquainted with the PI

1. Will you have your own project?
2. What are the mentor's expectations of trainees?
3. How much independence will you have?
4. Will there be regular opportunities for discussing your research and career goals?
5. Will you be working with anyone else?
6. Will you be able to publish your results?
7. How is authorship decided?
8. Will you be able to attend conferences and workshops?
9. What is the PI's mentorship record?

a. # of F, K awardees, what positions do they hold now?

b. Broader perspective

- i. Seek out mentors in addition to Mentors (PI's)
- ii. Peers, 1-2 years ahead of you, 3-5 years ahead
- iii. Find people who are doing what you want to be doing

2. Identifying a research question

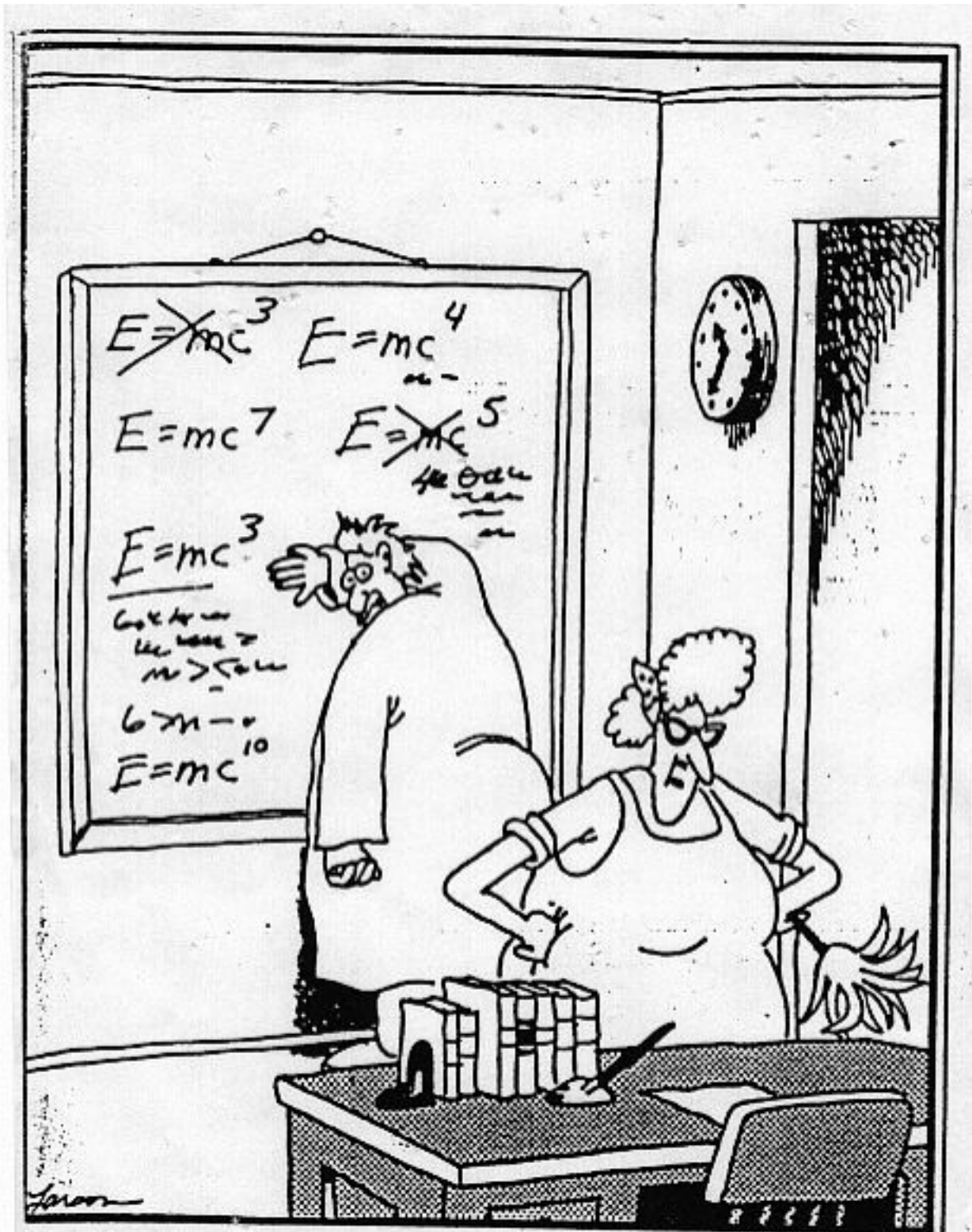
a. Outstanding research (Kahn, NEJM, 1994)

- i. Asks an important question
- ii. Makes a seminal observation: creates new knowledge, leads to new ways of thinking, lays the foundation for future research

b. How to pick a research problem

- i. Anticipate the results before doing the study

1. Should be interesting regardless of positive or negative findings
- ii. Look for an under-occupied niche
- iii. Consider approaches from other disciplines



"Now that desk looks better. Everything's squared away, yessir, squaaaaared away."

Focus on 1 project

iv. Choose carefully, consider multiple options

c. Important factors for choosing a research question

i. Feasibility

1. Depends on mentee availability and skill
2. Mentor's resources
3. The question itself
4. Assume delays

ii. Interest/importance

1. Your interest, mentor's interest, interest to the field, interest outside the field
2. Important clinical research has (Lipowski. AmJHSP, 2008)
 - a. Size (of the effect)
 - b. Scope: how big is the target population?
 - c. Scalability
 - d. Sustainability

d. What is a research question?

i. A research question asks if there is an association between 2 or more variables.

1. E.g., Is smoking associated with lung cancer?

ii. A research question is the purpose of the study stated as a question

iii. Hypotheses derive from research questions.

1. Hypotheses are declarative statements about the predicted relationship between 2 or more variables that can be tested empirically.

2. The hypothesis answers the research question

3. E.g., Smoking is associated with a higher risk of lung cancer.

iv. A good research question matches an appropriate and feasible study design

1. E.g., Is smoking associated with lung cancer? → observational

2. E.g., Does smoking cause lung cancer? → RCT
- v. **PICO** is helpful for clinical research questions (Bragge, Injury, 2010)
1. **Patient/problem**
 2. **Intervention** (or exposure, dx test, prognostic factor)
 3. **Comparison** intervention (if relevant)
 4. **Outcome**
 5. Format: In [Population], what is the effect of [Intervention] on [Outcome] compared with [Comparison Intervention]
 6. Designed for interventional research but adaptable for epidemiology
 7. E.g., In *hospitalized patients with diabetes*, what is the effect of *insulin dose* on the *risk of hypoglycemia*?
 8. E.g., In *ICU patients receiving IV insulin*, what is the effect of *eating* on *glycemic control*, compared with *not eating*?
- e. Steps to forming a research question
- i. Discuss with mentor for preliminary ideas
 - ii. Review literature
 - iii. Start with broad question and narrow based on feasibility, interest
 - iv. Use PICO format
 - v. Match with hypothesis
 - vi. Should be an iterative process