Careers in Academic Medical Physics

The hardest and best job you will ever have!

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What is Medical Physics?

- AAPM vision
  - The American Association of Physicists in Medicine is the premier organization in medical physics, a broadly-based scientific and professional discipline encompassing physics principles and applications in biology and medicine.
- Wiki
  - Medical physics (also called biomedical physics, medical biophysics or applied physics in medicine) is, generally speaking, the application of physics concepts, theories and methods to medicine or healthcare.
- My comments
  - Medical physics is NOT JUST CLINICAL QMP in radiology, nuclear medicine or radiation oncology!

Career options in Academic Medical Physics

- Clinical
  - Typically non-tenure track faculty or professional staff
  - They still have an academic component, but usually only limited expectation to publish and teach physics to physicians
- Academic-clinical
  - Typically tenure-track faculty
  - Expectations to publish regularly and obtain external funding for research
  - Teaching expectations vary, depends on whether you have graduate program or residency
- Primarily research
  - Typically tenure-track faculty, but increasing number are not tenure track
  - Expectation to publish regularly and obtain nationally peer-reviewed grants
  - Teaching expectations vary, but usually there is some component
So what kind of medical physicist do you want to be?

- First decision is purely clinical, academic clinical or research only.
- If you want to be purely clinical, then
  - Consider the Doctor of Medical Physics programs
  - Shortest path to QMP
  - Guaranteed clinical training for ABR qualification!!
  - Get in the best CAMPEP accredited graduate program and do the best you can.
- For research only – QMP doesn’t matter.
  - Get the best undergraduate and graduate education that you can.
  - Find the best post-doctoral fellowship with the strongest mentor that you can.
  - Success is based on innovation, creativity and research productivity!!
So what kind of medical physicist do you want to be?

- If you want to be academic clinical (QMP status required), then
  - Get the best undergraduate education you can, making sure to meet the requisites for ABR certification.
  - Get in the best CAMPEP accredited graduate program and do the best you can.
  - Get in the best CAMPEP accredited residency that you can.

- If you want to be REALLY academic and do impactful research
  - Get the best undergraduate education you can, making sure to meet the requisites for ABR certification.
  - Get in the best CAMPEP accredited graduate program and do the best you can.
  - Enter an extended hybrid residency/post-doctoral programs that allows you to continue your research through your clinical training period.

Besides physics, what do you need to know?

- Medical physicists should be well-grounded in the fundamentals of physics as a core competency:
  - General physics, quantum mechanics, E&M, modern physics
- To converse with your biomedical science colleagues you should know some
  - Biochemistry
  - Molecular biology
  - Cancer biology
  - Immunology
  - Physiology
  - Anatomy
  - Metabolism
  - Medical terminology
  - Biostatistics

What should you look for in a graduate program?

- If you want to be a QMP, then CAMPEP accreditation is critical.
  - If not, don’t worry about CAMPEP accreditation.
- Name recognition of the university is important, but...
- Find a program that has faculty doing research in areas that interest you.
- Do they have a culture that promotes excellence in graduate education?
- Make sure the program is well resourced
  - Do they have the infrastructure to support graduate research?
  - Low student/faculty ratio
  - Physical resources
  - Funding for stipend, travel, supplies, etc.
Graduate program selection

• Visit the program and meet with faculty doing research in the areas that you are interested in.
  — Also meet with program director and department leadership.
• If you know the area you want to do research, make sure it is a priority for the department/institution.
• Be VERY OBJECTIVE in assessing the strengths and weaknesses
  — Appreciate the history and reputation of the program, but
  — Make sure it is a good fit for you!

What are measures of a good graduate education?

• Publications!!!
  — Publishing your work during graduate school is critical.
  — Validates your science and communication skills through objective peer review.
  — Don’t wait until the end to publish! Write as you go!
• Grants
  — Nationally competitive fellowships are highly appreciated!
• References
  — Not just from your advisor, but other program faculty.
  — Faculty from other institutions that have seen your work at meetings.

Post-doctoral fellowship selection

• Visit the program.
  — Spend time with faculty you will be doing research under and their labs.
  — Also meet with program director and department leadership.
• Make sure your research is a priority for the department/institution.
• Make sure your advisor has the resources for you to be successful.
• Be VERY OBJECTIVE in assessing the strengths and weaknesses!
  — Appreciate the history and reputation of the mentor, but
  — Make sure their lab is a good fit for you!
What are measures of a post-doctoral fellowship?

- **Publications!!!**
  - Publishing your work during post-doctoral research is even more critical.
  - Validates your science and communication skills through objective peer review.
  - Don’t wait until the end to publish! Write as you go!
- **Grants**
  - Nationally competitive fellowships are highly appreciated!
- **References**
  - Not just from your advisor, but other faculty at your institution.
  - Faculty from other institutions that have seen your work at meetings.

Residency program selection

- **Consider only CAMPEP accredited programs!**
- **Visit the program.**
  - Meet with program director and department leadership.
  - Spend time with as many of the faculty you will be training under as possible.
  - Meet with current residents to assess their satisfaction with the training.
- **Make sure that residency training is a priority for the department.**
- **Make sure the program has access to the resources necessary for your comprehensive clinical training.**
  - The instrumentation should be contemporary, or preferably state-of-the-art.
- **Make sure the program is financially stable – they can provide for your stipend, supplies for small research project, travel, etc.**

What are measures of a residency?

- **Breadth of training**
  - Employers will want to know that you are competent on the full range of clinical activities in their practice and on all types of equipment.
- **References**
  - Not just from your advisor, but other program faculty.
  - Faculty from other institutions that have seen your work at meetings.
Hybrid residency program selection

• Consider only CAMPEP accredited programs!
• Visit the program.
  – Meet with program director and department leadership.
  – Spend time with as many of the faculty you will be training under as possible.
  – Meet with current residents to assess their satisfaction with the training.
• Make sure that your hybrid training program is a priority for the department and that leadership will work to make you successful.
• Make sure the program/department have access the resources you need.
  – The instrumentation should be contemporary, or preferably state-of-the-art.
  – Make sure there is a well described plan for the feathering of your clinical and research effort. This included documentation.

Parting thoughts...

• Academic medical physics is rewarding, but challenging.
• Securing a good job in academic medical physics requires sustained scientific productivity from graduate school through post-doctoral fellowship or residency training.
  – Every step matters and every minute counts!
• Productivity or success is measured primarily by impactful publications and grants.
• When securing a job, make sure that the institution is committed to your success and has the resources to fulfill your academic expectations.
  – If money is the most important thing to you, you have chosen poorly!!!

Parting thoughts...

• Choose you positions carefully – especially that first one!
  – Don’t deceive yourself about the resources necessary to be a successful!!!
    • You MUST have protected time.
    • You MUST have access to instrumentation.
    • You MUST have the support of the department for overcoming unforeseen situations where resources ($$$) will have to be made available to get you through storms.
    • GET THIS ALL IN WRITING!!!
• Don’t underestimate the value of mentoring and networking.
  – Having a good mentor is critical throughout training and early career development. You want someone who genuinely cares about YOUR success.