

# Careers in Academic Medical Physics

*The hardest and best job you will ever have!*

John D. Hazle, Ph.D., FAAPM, FACR  
Professor and Chairman  
Department of Imaging Physics  
Bernard W. Biedenhorn Chair in Cancer Research

THE UNIVERSITY OF TEXAS  
MDAnderson Cancer Center

---

---

---

---

---

---

---

---

## 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!

MDAnderson  
Cancer Center  
1975

---

---

---

---

---

---

---

---

## 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

MDAnderson  
Cancer Center  
1975

---

---

---

---

---

---

---

---

## MDACC effort distributions

	Clinical effort	Research effort	Other academic
Clinical (nTT)	80-90%	5%	5-15%
Clinical (TT)	20-70%	20-70%	10%
Research (TT)	0%	85%	15%
Research (nTT)	0%	95%	5%

MDAnderson  
Cancer Center

---

---

---

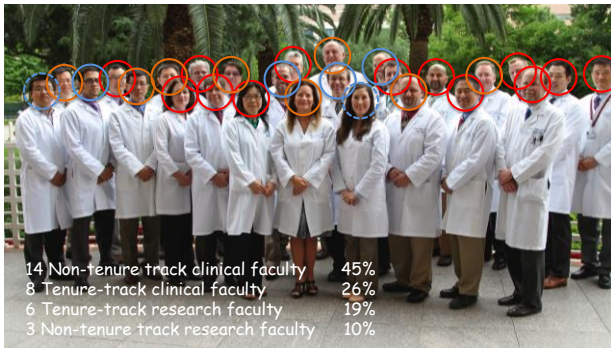
---

---

---

---

---




---

---

---

---

---

---

---

---

## 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.***
    - Compete for the best CAMPEP accredited residency you can get into.
- **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!!!***

MDAnderson  
Cancer Center

---

---

---

---

---

---

---

---

## 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.**

MDAnderson  
Cancer Center  
1515 Holcombe Blvd  
Houston, TX 77030

---

---

---

---

---

---

---

---

## 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

MDAnderson  
Cancer Center  
1515 Holcombe Blvd  
Houston, TX 77030

---

---

---

---

---

---

---

---

## 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.

MDAnderson  
Cancer Center  
1515 Holcombe Blvd  
Houston, TX 77030

---

---

---

---

---

---

---

---

## 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!

---

MDAnderson  
Ganaroo Center  
10000  
10000

---

---

---

---

---

---

---

---

## 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.

---

MDAnderson  
Ganaroo Center  
10000  
10000

---

---

---

---

---

---

---

---

## 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 you 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!

---

MDAnderson  
Ganaroo Center  
10000  
10000

---

---

---

---

---

---

---

---

## 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.

---

MDAnderson  
Cancer Center  
1151 Foothold Drive  
Houston, Texas 77030

---

---

---

---

---

---

---

---

---

---

## 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.**

---

MDAnderson  
Cancer Center  
1151 Foothold Drive  
Houston, Texas 77030

---

---

---

---

---

---

---

---

---

---

## 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.

---

MDAnderson  
Cancer Center  
1151 Foothold Drive  
Houston, Texas 77030

---

---

---

---

---

---

---

---

---

---

## 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.

MDAnderson  
Ganoni Center  
1115 Foothold Drive  
Houston, TX 77030

---

---

---

---

---

---

---

---

---

---

## 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!!!*

MDAnderson  
Ganoni Center  
1115 Foothold Drive  
Houston, TX 77030

---

---

---

---

---

---

---

---

---

---

## 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.

MDAnderson  
Ganoni Center  
1115 Foothold Drive  
Houston, TX 77030

---

---

---

---

---

---

---

---

---

---