

Provocative Questions in Medical Physics Education

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Disclosures

- I currently serve as the chair of the AAPM Education and Training of Medical Physicists Committee, and as a member of the CAMPEP Board of Directors

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Definitions



- Provocative - thought provoking; incites a strong reaction
- Provocative questions
 - Allows us to view a perceived problem in a new light
 - Allows us to consider alternatives to the current state

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Background

- In 2011 the National Cancer Institute (NCI) established the Provocative Questions (PQs) initiative
 - Support research projects designed to use sound and innovative research strategies to solve specific problems and paradoxes in cancer research
 - Challenge cancer researchers to think about and elucidate specific problems in key areas of cancer research
- Modelled after the NCI's PQs, the AAPM Working Group on Future Research and Academic Medical Physics (FUTURE) held a workshop on PQs in Medical Physics in September 2016 to "define highest-level problems in oncology that medical physics should attack"

<https://provocativequestions.nci.nih.gov/about-pqs/history>

<https://www.aapm.org/meetings/2017AM/PRAbs.asp?mid=1276&aid=36242>

R. Jeraj, Provocative Questions for Medical Physics in Oncology, AAPM Annual Meeting, 2017

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Objective

- In a similar vein, the intent of this presentation is to identify and discuss provocative questions in medical physics education
- Learning Objective:
 - Understand ways in which the graduate education experience can be enhanced to ensure our students become essential team members in healthcare research and delivery and can play an active role in addressing provocative questions in medical physics education

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Provocative Question #1:

- What if the value of medical physics education was better recognized by our institutions?
 - Faculty granted release time to develop and update teaching material and techniques
 - Recognition of graduate programs from GME offices – potentially results in increased benefits to students
 - Clearly defined role for students in the clinic – enhance their understanding of the clinic and how to be engaged

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Provocative Question #2:

- What if medical physics didactics were offered by a few, large institutions, e.g., through on-line education?

A. Fielding et al., Med Phys 2018; 45:1: 1-4

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Graduate Programs – CAMPEP Accredited Programs

Programs	2013	2014	2015	2016	2017	2018 (YTD)
MS/PhD	44	46	48	52	52	52
DMP	1	2	3	3	4	5
Certificate	12	19	22	26	26	25

B. Loughery et al., J Appl Clin Med Phys 2017; 18:6: 275-287

B. Clark, chair of CAMPEP GEPRC, personal communication July 18, 2018

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Provocative Question #2:

- What if medical physics didactics were offered by a few, large institutions, e.g., through on-line education?
 - Cost effective
 - Ensure high educational caliber of all programs
 - With a smaller number of dedicated faculty, curriculum may be more readily adapted to the advances and changes in the field

A. Fielding et al., Med Phys 2018; 45:1: 1-4

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Provocative Question #3:

- What if you had the freedom to reconceive the medical physics curriculum at your institution without being held to specific standards and guidelines?

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Graduate Medical Physics Curriculum

- AAPM Report 197 – recommended curriculum for medical physics graduate programs (MS/PhD)
- AAPM Report 197S – recommended minimum didactic curriculum for alternative pathway candidates
 1. Radiological physics and dosimetry
 2. Radiation protection and radiation safety
 3. Fundamentals of imaging in medicine
 4. Radiobiology
 5. Anatomy and physiology
 6. Radiation therapy physics
- Per CAMPEP's graduate educational standards, graduate education programs shall, as a minimum, include the core topics defined by Report 197S plus professionalism and ethics

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Challenges with Graduate Curriculum

- How do we add content without taking out older, important material?
- When do you stop talking about older, less relevant topics (e.g., LDR gyn) and replace the content with new material (e.g., adaptive RT)?
- How do we find room to teach soft skills (e.g., ethics, professionalism, communication, teamwork, leadership, patient interactions)?

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Provocative Question #3:

- What if you had the freedom to reconceive the medical physics curriculum at your institution without being held to specific standards and guidelines?
 - Recruit faculty with a diverse background – beneficial for students, clinic, and research and development
 - Expand opportunities for our learners and educators
 - Provide opportunities professional mentoring and potential internships
 - Ensure medical physics education is dynamic to keep up with the field

The Working Group on Medical Physics Graduate Education Program Curriculum is preparing to update AAPM Report 197. They welcome your feedback on the future of MP graduate curriculum.

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Provocative Question #4:

- What if we routinely updated our educational paradigm to keep up with our learners?
 - AAPM Committee on Medical Physicists as Educators



- Transition away from traditional lecture based teaching
 - Flipped class rooms
 - Project/Problem/Practice-based learning
 - Class wide discussions

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Provocative Question #4:

- What if we routinely updated our educational paradigm to keep up with our learners?
 - Be mindful of our "clients"
 - As an educator, educate yourself on the best teaching practices and available tools
 - Many of us have little formal training in education
 - Similar to physics, education is a dynamic field

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Provocative Question #5:

- How do we educate, train, and prepare medical physics students for the future of our profession?

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Medical Physics 3.0

- Initiative to redefine and reinvigorate the role of physics in modern medicine
- Position physicists to be "scientific agents of precision, innovation, and value in the development and practice of medicine"
- In line with the mission of AAPM Working Group FUTURE

<https://www.aapm.org/MedPhys30/articles/PhysicsModernMedicine.asp>
E. Samei, What is Medical Physics 3.0?, AAPM Annual Meeting, 2017

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Provocative Question #5:

- How do we educate, train, and prepare medical physics students for the future of our profession?
 - Ensure students are truly competent in medical physics
 - Prepare students to be critical thinkers
 - Include course offerings in other disciplines
 - Immunotherapy, cancer & molecular biology, biostatistics, neuroscience
 - Computer science, big data and machine learning, virtual reality
 - Systems and process engineering, safety engineering
 - Leadership skills, business classes

E. Samei, What is Medical Physics 3.0?, AAPM Annual Meeting, 2017
E. Chin, MP 3.0 – Medical Physics Education: Overview of Challenges and Future Potential, AAPM Annual Meeting, 2017

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Provocative Question #5:

- How do we educate, train, and prepare medical physics students for the future of our profession?
 - Improve integration with other healthcare decision makers
 - Improve communication and administrative skills

E. Samei, What is Medical Physics 3.0?, AAPM Annual Meeting, 2017
E. Chin, MP 3.0 – Medical Physics Education: Overview of Challenges and Future Potential, AAPM Annual Meeting, 2017

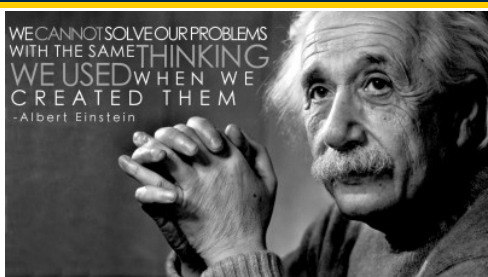
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If you have any thoughts or comments you would like to share, contact me:

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