



## The Necessity of Innovation in Medical Physics

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## Disclosures

- Principal employer: University of Wisconsin
- AAPM President & Board Member
- Chairman of the Board - Society of Directors of Academic Medical Physics Programs
- Scientific Advisory Board member – ViewRay

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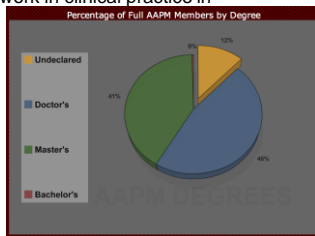
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## AAPM - Medical Physicists

- AAPM is a scientific and professional organization of over 8,000 physicists working in medicine.
- Most AAPM members work in clinical practice in radiation therapy.



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### Objective

- Is Innovation necessary to be successful as a Clinical Medical Physicist?

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### Diversity and Complexity of Today's Clinical Medical Physics

- patient simulation
- treatment planning systems
- delivery systems
- daily image guidance

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### Diversity and Complexity of Today's Clinical Medical Physics

- a multitude of recommendations from AAPM
  - 149 Task Group reports produced
  - 76 Task Groups currently active
  - 8 Miscellaneous reports produced
  - Multiple practice guidelines in development

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### Have we become so prescriptive that innovation is unnecessary?

- Has Clinical Medical Physics matured such that execution of prescribed activities encompasses our scope of work?

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### No

- Innovation by Clinical Medical Physicists has always been necessary for to improved care.

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### Examples of QMPs being innovative

- use of the MLC
- creation of daily image guidance
- implementation of technologies into the clinical space, becoming mainstream

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### Why do Medical Physicists hold the stature we do in Medicine?

- ...the ability to develop and implement technology into the clinic and enable our physician colleagues to practice medicine at a much higher level.

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### Are Clinical Medical Physicists Scientists?

- No
- ... but do they need the scientific training?
- Absolutely, to fundamentally understand:
  - the problems they face
  - the technologies for solving those problems
  - the process of solving the problem

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### Innovative Medical Physicists changing Clinical Practice

- Rock Mackie (Pinnacle), Rock Mackie (Tomo), David Jaffery (CBCT IGRT), Andy Beavis (VIRTUAL), Ken Gall (Mevion), Jim Dempsey (ViewRay), Ben Helms (QA software), Bill Simon (measurement tools)




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### Do Clinical Medical Physicists need to be Innovative?



<http://www.businessweek.com/articles/2012-03-20/memo-to-ceos-stop-blathering-about-innovation-and-do-something>

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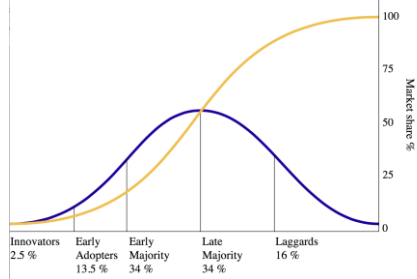
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### Implementation of Technology



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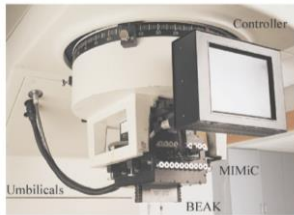
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### Nomos Peacock for IMRT



Mackie, Phys. Med. Biol. 51 (2006) R427-R453

Figure 2. Photograph of the NOMOS Peacock serial tomotherapy system. Courtesy NOMOS Corporation.

30 of 61 installs in 1<sup>st</sup> 5 years were non-academic centers.\*

\*Personal communications w/ Bruce Curran

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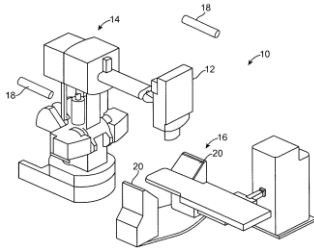
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### Accuray Cyberknife

- Two of first five installs were at community based centers with single Medical Physicist.




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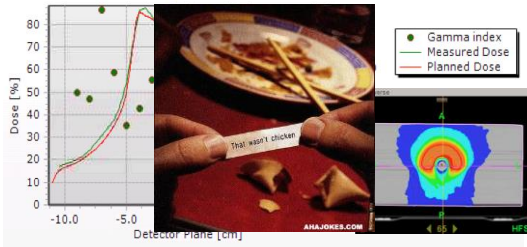
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### The IMRT QA Problem




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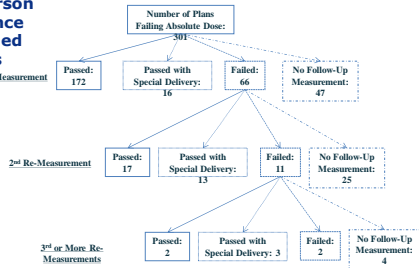
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### MD Anderson Experience with failed DQA's



3%/ 3mm Film and ion chamber

- Only 3/301 failed cases were re-planned!
- Extreme majority treated as is...

From Stephen Kry

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ViewRay MRI & Radiation Therapy

Task Group-911?



How to write the acceptance testing procedure into the purchase agreement for this equipment?  
How to commission the new system to perform specific tasks?

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Fundamentally Understanding the Problem & the Technology



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## Clinical Medical Physics in changing Healthcare Environment

- Do we really improve patient care?
- CMS Metrics: Clinical Quality Measures (CQMs)
  - how to apply them in medical physics.

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## Clinical Medical Physics in changing Healthcare Environment

- Gather the data!
- Is A better than B?
- Quality Metrics
  - Identify
  - Capture
  - Analyze

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## Conclusions

- Innovation has been, is currently, and will be essential for the success of Clinical Medical Physics
- As is developing and nurturing critical thinking skills
- Healthcare economics will likely amplify these needs.

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