

Mrs. Gump:

Well, I happened to believe you make your own destiny Life is a box of chocolates, Forrest. You never know what you're gonna get.



Fostering a Successful Career in Research

Lessons from a Career in (or Involving) Research

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AAPM Annual Meeting, Washington DC
July 31-August 4, 2016

Career Involving Research in Medical Physics

Research & Development + Clinical

For research to be relevant, clinical knowledge is essential

For enhancing clinical effectiveness, it is important to understand what is possible through research

Beats insecurity of being a pure researcher

Importance of Research & Development in Medical Physics

- Contributions to the knowledge base
- Contributions to the improvement in safety, quality and clinical effectiveness of treatments and diagnostic procedures
- Enhancement of the stature of physicists and the recognition of the intellectual and creative contributions we can make
- Avoidance of
 - Being considered expensive technicians
 - The risk of being automated
- ...

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Challenges Facing Career in Research in the Current Environment

- Focus on
 - Short-term vs. long-term
 - "Billables", margins and bottom line vs. creative contributions and advancement of the state of the art
- Reduced research funding
- Job insecurity
- Disparity in clinical versus research compensation
- ...

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Is it then appropriate to recommend a purely research career in medical physics?

A career that combines clinical and research may be a
safer and more effective

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**Environments Needs to Change
for the Future Wellness of our Field**

**And the younger generation
can be the agent of such change**

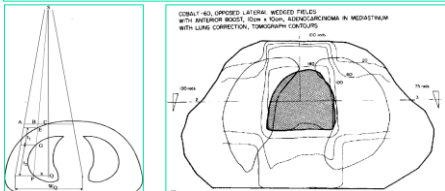
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**Lessons Learned
Personal Perspectives**

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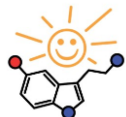
**My First Task as Medical Physicist (Early 70's @MSKCC)
Treatment Planning System (2D)**

The high you get when you see the results of what you created



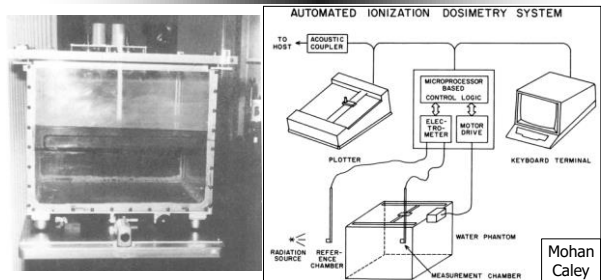
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The Thrill of Discovery



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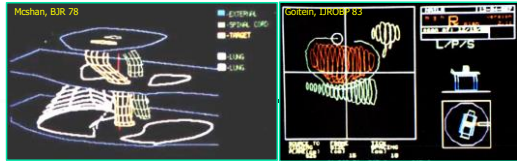
The Very First Computerized Dose Distribution Measurement System (Early 70's @MSKCC)



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Use your impatience / frustration with routine and repetitive tasks and inefficient practices as drivers of innovation and solutions

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"3D Conformal Therapy is Impractical" – RM in 1978

"No radiation oncologist is going to draw tumor and normal tissue contours on so many CT sections"

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Fortunately ...

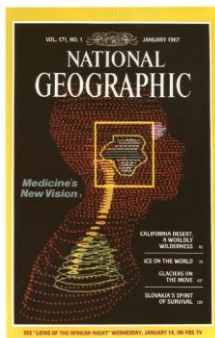
John Laughlin (Chair @MSKCC) prevailed ...



NCI Contract (1983-1987) to Develop and Evaluate 3DCRT

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3DCRT & MLC (1980's)



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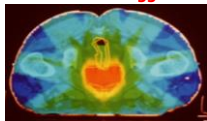
Be Open to New Ideas and Different Points of View

Embrace Change

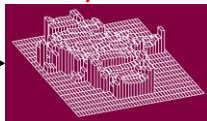
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**IMRT & DMLC (Circa 1995 @MSKCC) –
A Collaboration with Bortfeld**

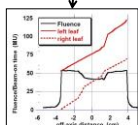
The "Photon Bragg Peak"



Intensity Distribution



Sliding Window Delivery
With Dynamic MLC



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Comments at my presentation in 1996

"IMRT is too complicated and not Practical"

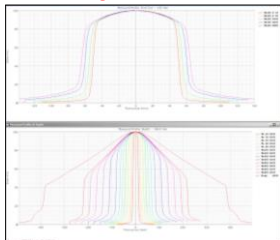
"Why do we Need it? We have been doing intensity modulation with wedges and compensators for ever"

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Ridding the 50 Year Fetish with Flat Fields

In this day and age of intensity modulation, who needs flattening filter?

- High dose rates
- Cleaner beams
- Reduced shielding
- Reduced secondary cancers
-



Vassiliev, et al (MDACC)

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"If people aren't laughing at your dreams...then they aren't big enough!"
Grayson Marshall

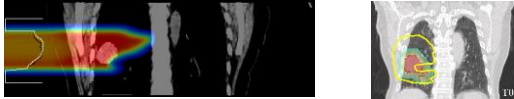
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Proton Therapy – Hype of Hope (MDACC)

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Physical and Biological Uncertainties in Proton Therapy

- "There is no problem"
- "We will scare patients and providers"

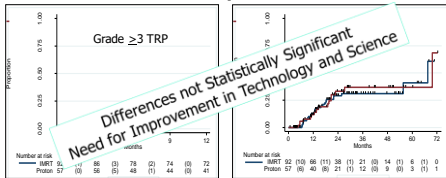


- Acknowledging the problem is the first step in solving it
- → Program project grants and awards (2009-2014, 2014-2019) to improve our understanding and enhance the effectiveness of proton therapy

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Protons vs. Photons Randomized Lung Trial (Part of the P01 Program Project)

- "Unnecessary – We already know protons are better."
- "Unethical to randomize patients to an arm known to be inferior"
- "Patients will not accept to be randomized"



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Question everything, be curious

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And More Advice ...

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**Failing Forward
(Whitelaw)**

**"Failure is merely an opportunity to
intelligently begin again."- Henry Ford**

Persistence Pays Off

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Focus and finish

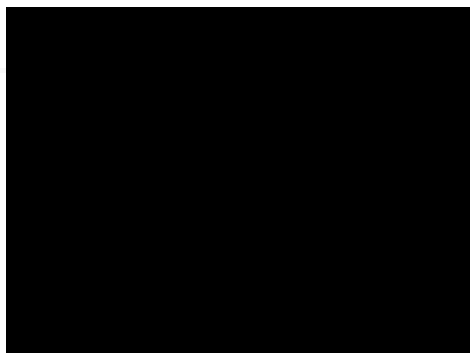
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Collaborativeness is an Essential Ingredient of R&D

Be the First to Trust

Don't Jump to Conclusions

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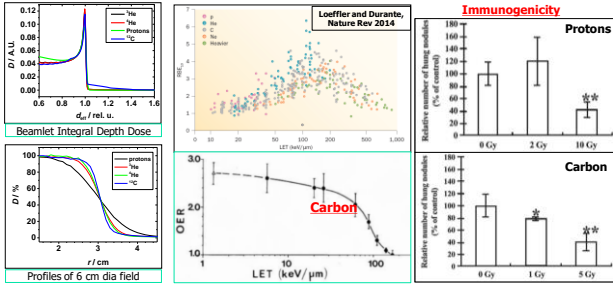
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**Dream Big
And
Out of the Box**



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**Heavy Ion Therapy ...
Physical, Biological and Immunogenic Properties**



Thank You

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Passion for Values

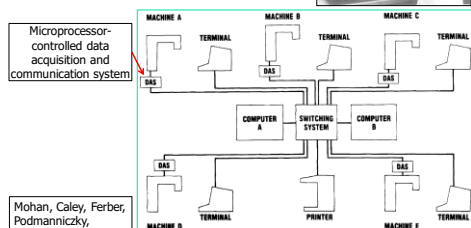
- Caring and respect
- Integrity and honesty
- Excellence
- Openness and free flow of communication
- Teamwork and collaboration
- Rewarding progress and demanding commitment and accountability
- "Hatred for" bureaucracy and resisting desire to control
- Recognizing change as an opportunity for growth

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Working closely with physicians to understand the clinical and biological response

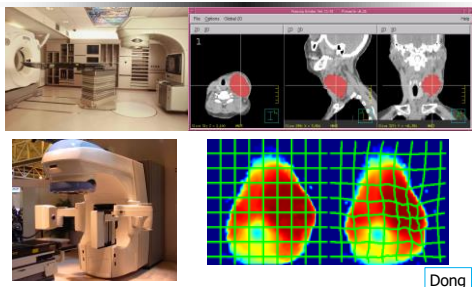
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The Very First Record and Verify System (Late 70's)



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IGRT, Deformable Registration, Auto-Segmentation Dose Accumulation, Adaptive RT – 2000's



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"The biggest risk is not taking any risk. In a world that is changing really quickly, the only strategy that is guaranteed to fail is not taking risks."

Mark Zuckerberg

Research, by definition, is risky

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**"New ideas pass through three periods:
1) It can't be done; 2) It probably can be done, but it's not worth doing; 3) I knew it was a good idea all along"**

Arthur C. Clarke

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"No idea is so outlandish that it should not be considered."

Winston Churchill

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