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Lasers for America Cancer Treatment and Isotope Replacement

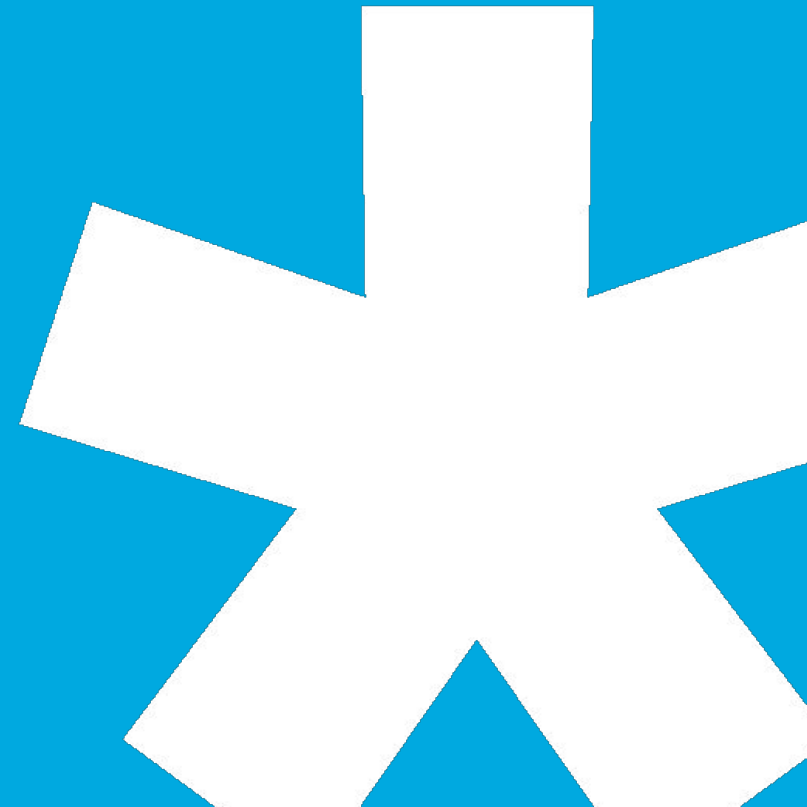
December 12, 2017

Lasers for America Congressional Briefing

James E. Clayton PhD

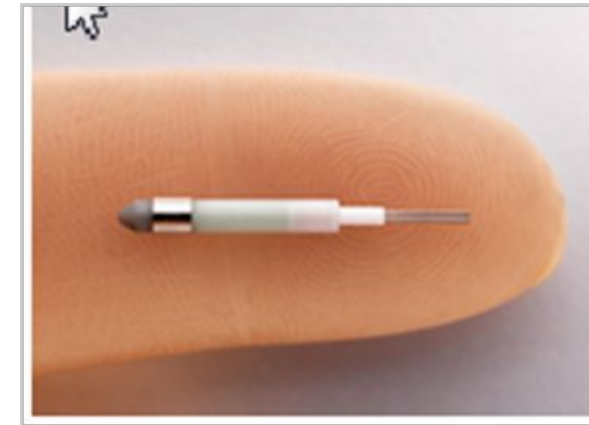
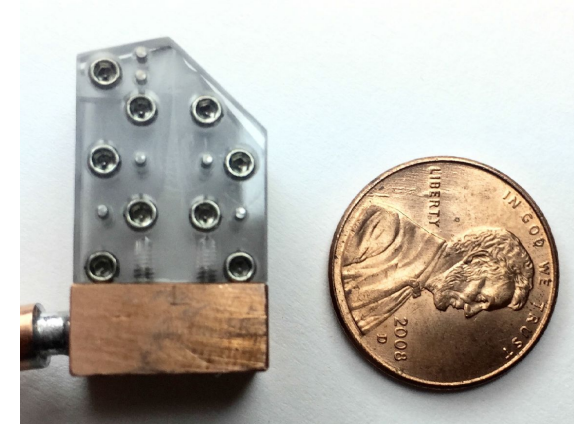
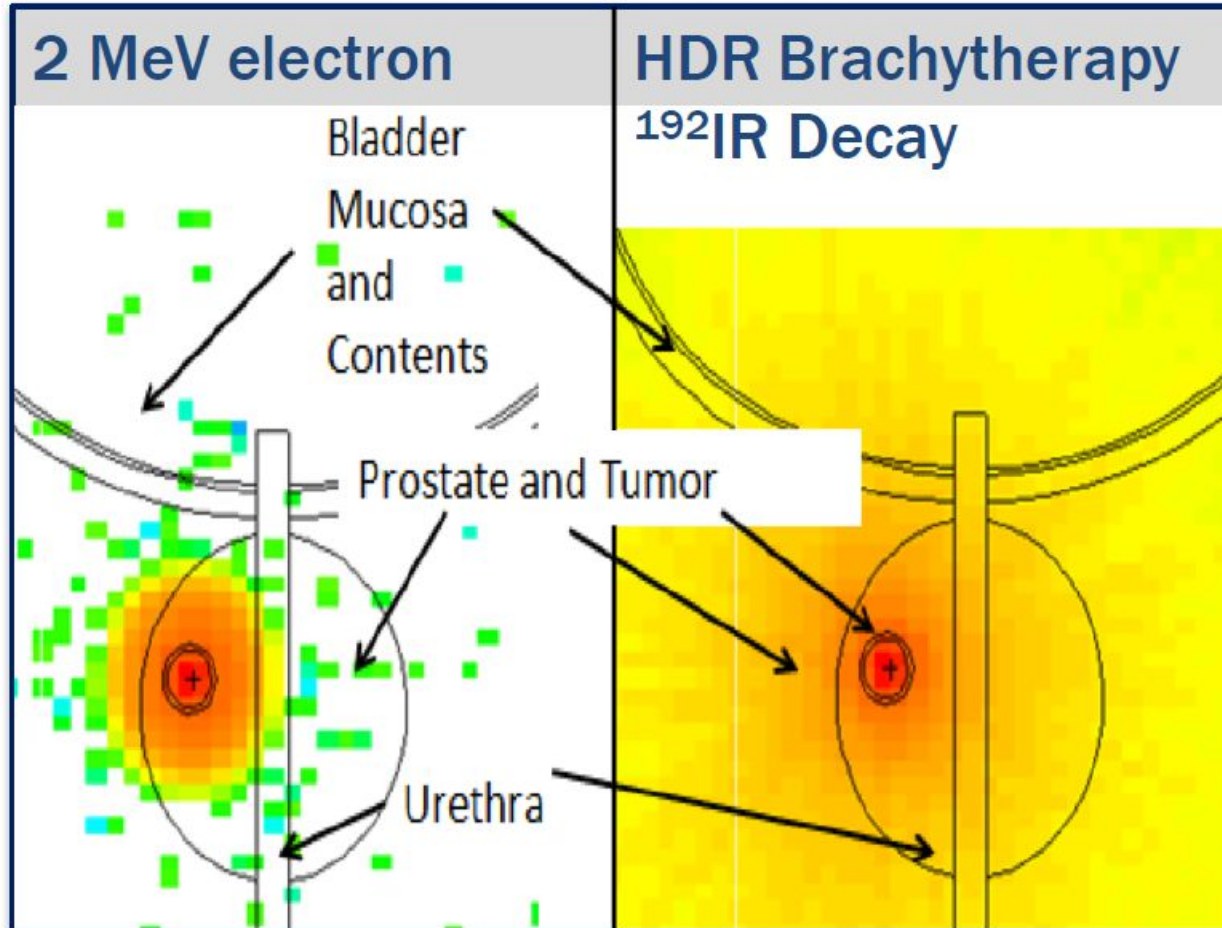
Senior Scientist

Varian Medical Systems



Internal Electron Treatments (Brachytherapy) Spares Healthy Tissue Improving Quality of Life and Tumor Treatment

Dose Profile



Smaller is Better

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Varian Electron Linear Accelerator Operation Range ~ 9 Tons



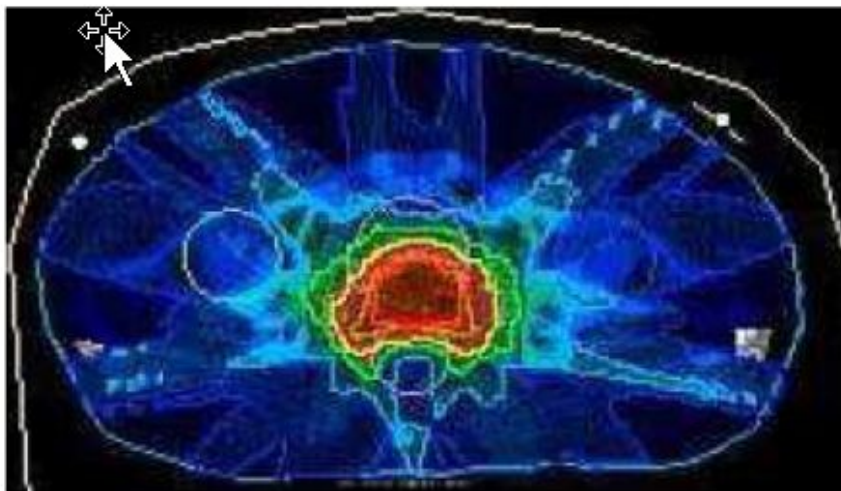
Varian Proton Therapy Gantry Protons ~120 Tons



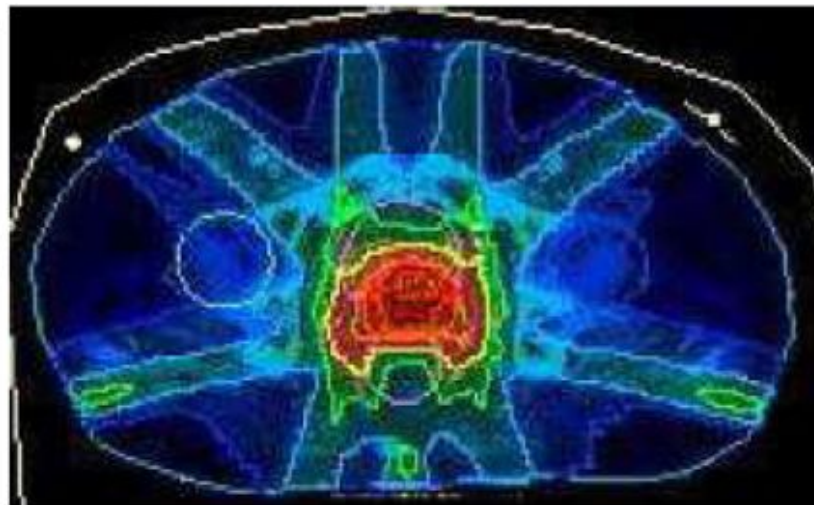
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Prostate Treatment Plan: External Beam Therapy

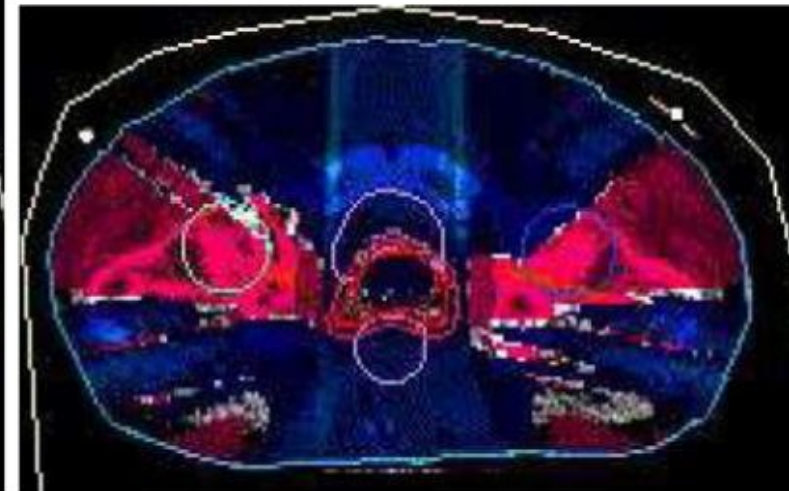
6 MV X-rays vs. 200 MeV Electrons



**High Energy
Electrons**



**Medium Energy
X-Rays**



**Difference in
Treatment Plans
Electrons Sparing
Critical Organs
and Structures**

V Malka et al., Proc. of SPIE Vol. 6881, 2008

Homeland Security Issues

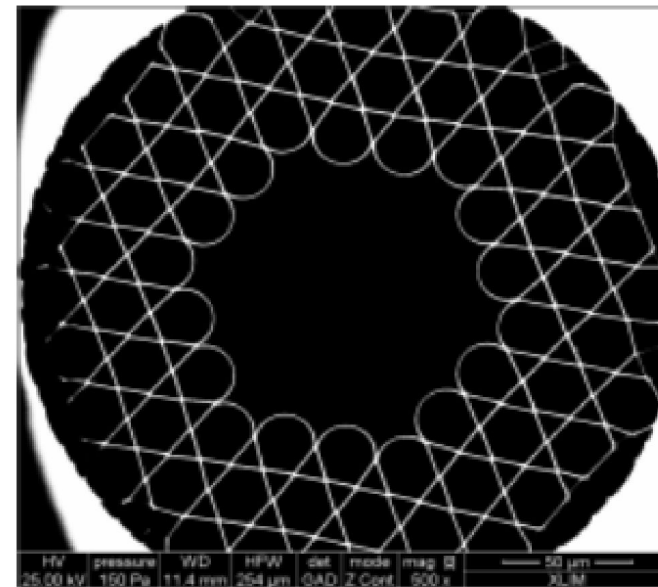
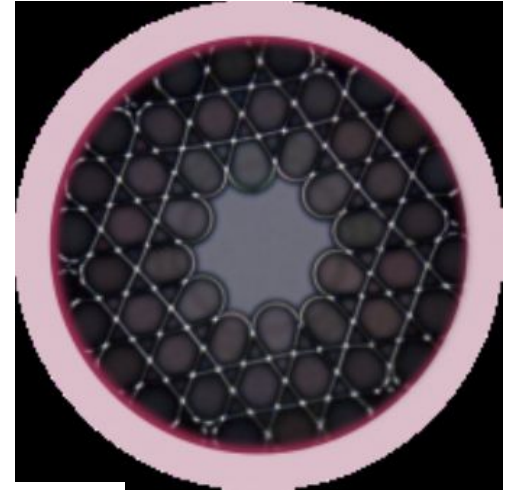
Elimination of Radioisotopes

Isotope	Physical Form	Half-life	Emission
Cesium-137 (Cs-137)	Solid (powder)	30.1 years	beta gamma
Cobalt-60 (Co-60)	Solid (metal)	5.3 years	beta gamma
Iridium-192 (Ir-192)	Solid	74 days	beta gamma

No Radiation when the Power is OFF!

Medical Treatment Possibilities with R&D in Laser Technology and Fiber Delivery Development

- **Lower Healthcare Costs**
- **High Paying Technical and Manufacturing Jobs Located in the United States**
- **Minimal Radiation Shielding for Brachytherapy System**



(Thank You)