



# Overview of Proton Therapy

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Director of Development

# Outline of Presentation

- History of Proton Therapy
- Protons versus Photons (X-rays)
- Proton Therapy in Cancer



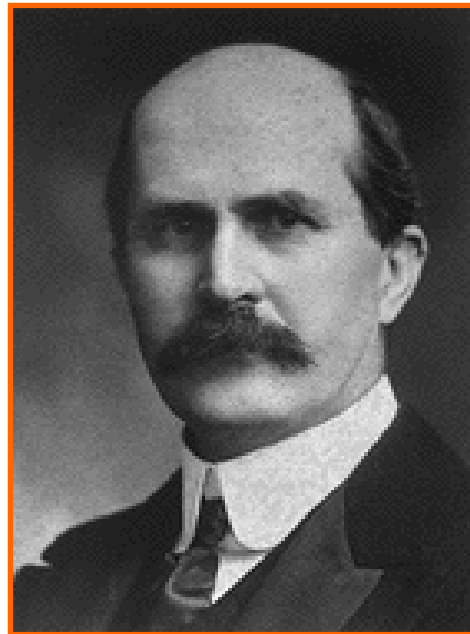
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# Part One: History of Proton Therapy



# William Bragg – 1904

- Energy deposited from positively charged particles sharply increases near the end of the beam path
- Discovery known as the “Bragg Peak”



## Robert R. Wilson - 1946

"Higher-energy machines are now under construction, however, and the ions from them will in general be energetic enough to have a range in tissue comparable to body dimensions. It must have occurred to many people that the particles themselves now become of considerable therapeutic interest."



# Clinical Applications

- 1950's: University-based physics research facilities treating a few patients
- 1990's: Loma Linda- first hospital-based center in the U.S.
- 2006: UFPTI is the first center in the southeast





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## Part Two: Protons versus Photons (X-Rays)



# High End Image Guidance with Linear Accelerators

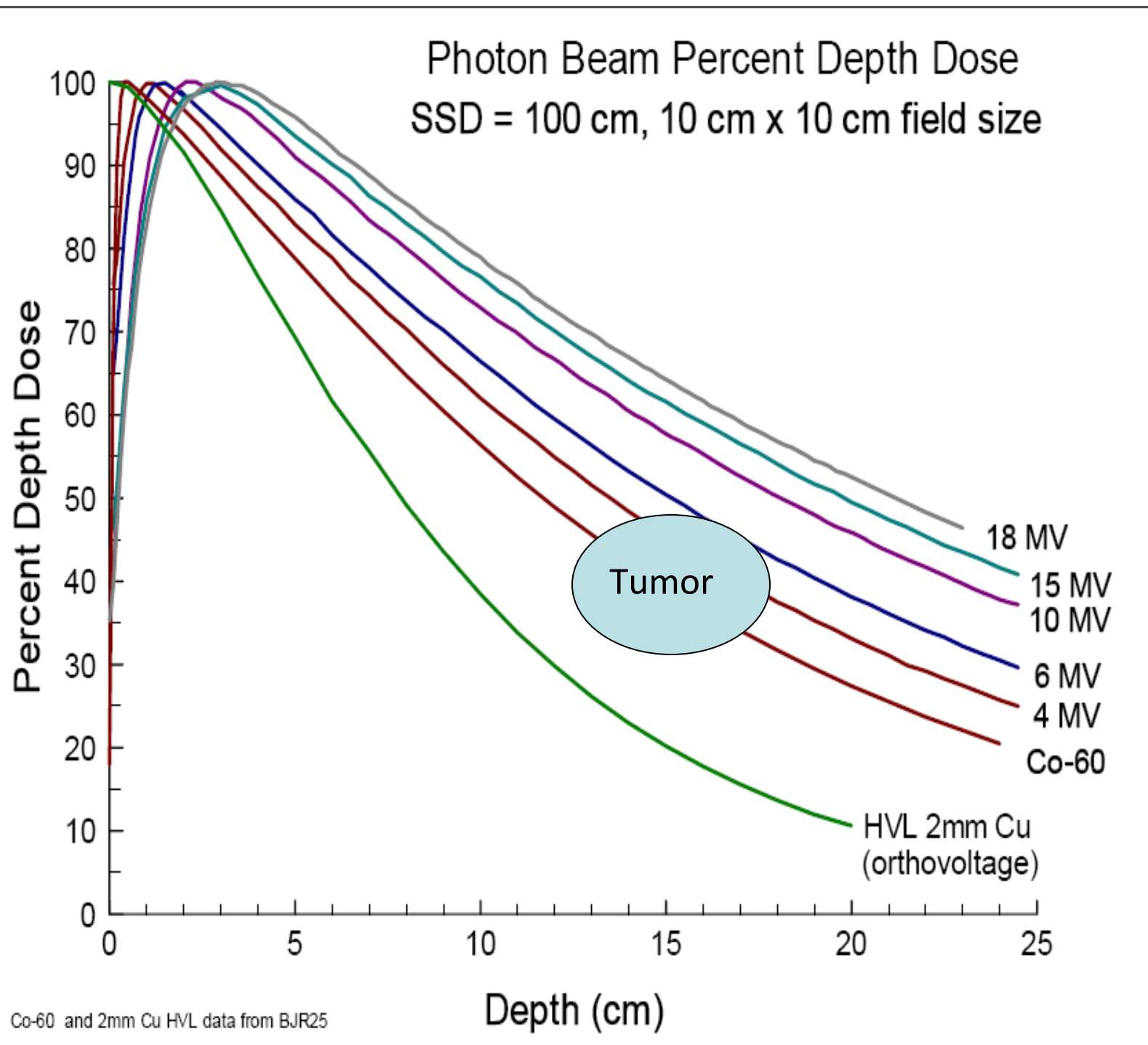




High End Image Guidance

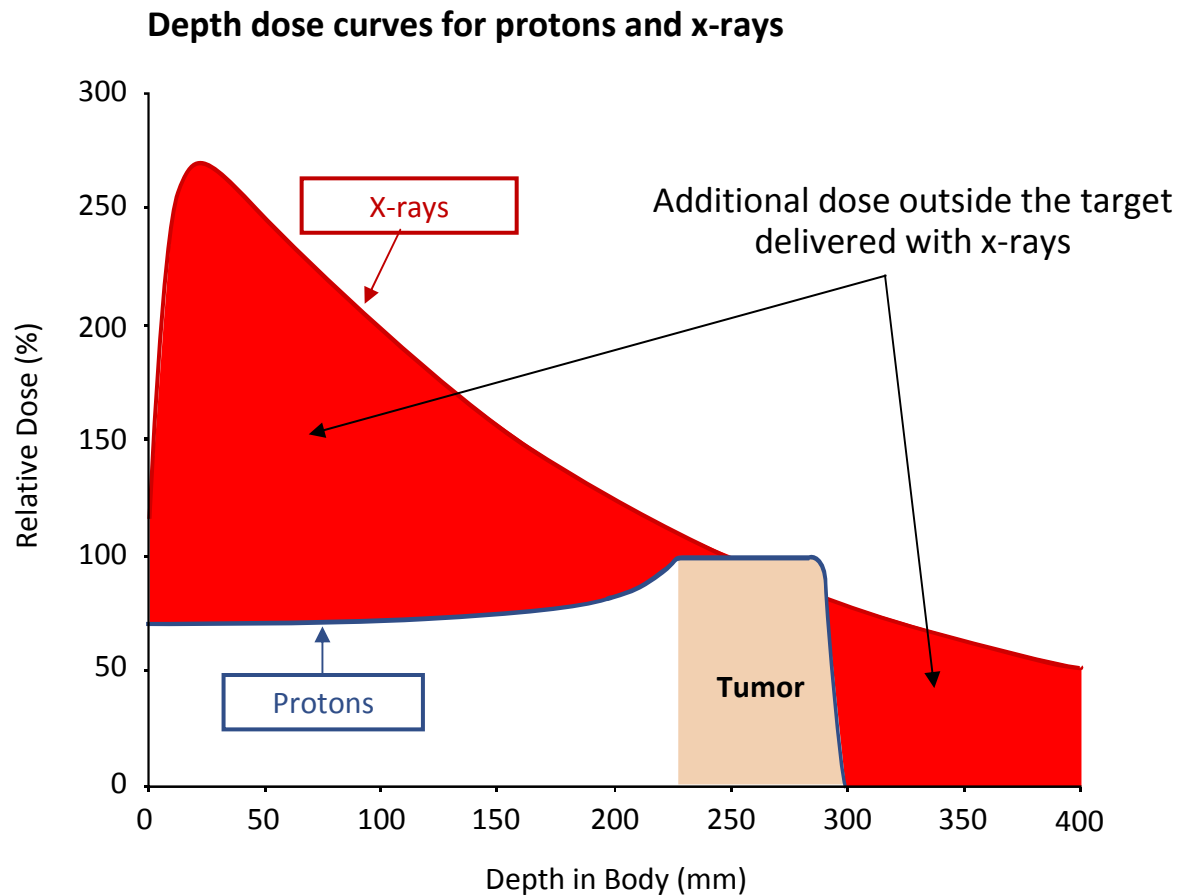
These are all  
the same –  
they have 6  
MV X-Rays





# The Physics of Protons

*In order to deliver the same dose to the tumor, x-rays must deliver a greater dose outside the target than protons do*



Before ....



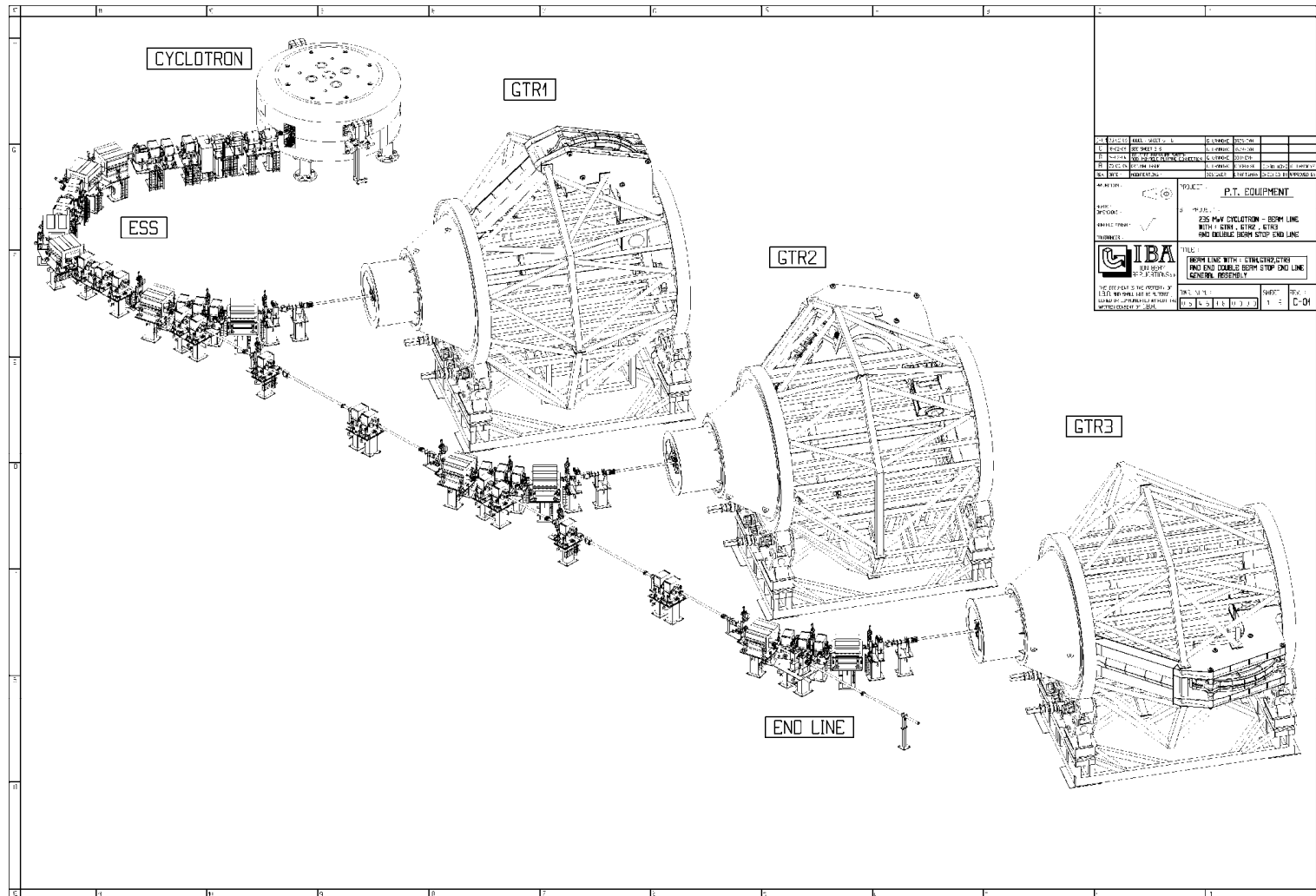
After ....



## Basic Information

- First Treatment: August 14, 2006
- Hours of Operation: 6:30 a.m. – 10:30 p.m.
- 108 Patients Treated Daily (on Average)
- 3000 patients treated so far
- Types of cancers treated: prostate, head and neck, lung, brain, central nervous system, lymphoma, pancreas, sarcoma and cancers in children.

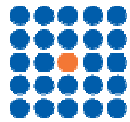




The cyclotron is the key piece of equipment that allows UFPTI to harness the proton to treat cancer. The gantries serve as the treatment areas.



The cyclotron is a \$54 million piece of equipment that weighs 440,000 pounds.

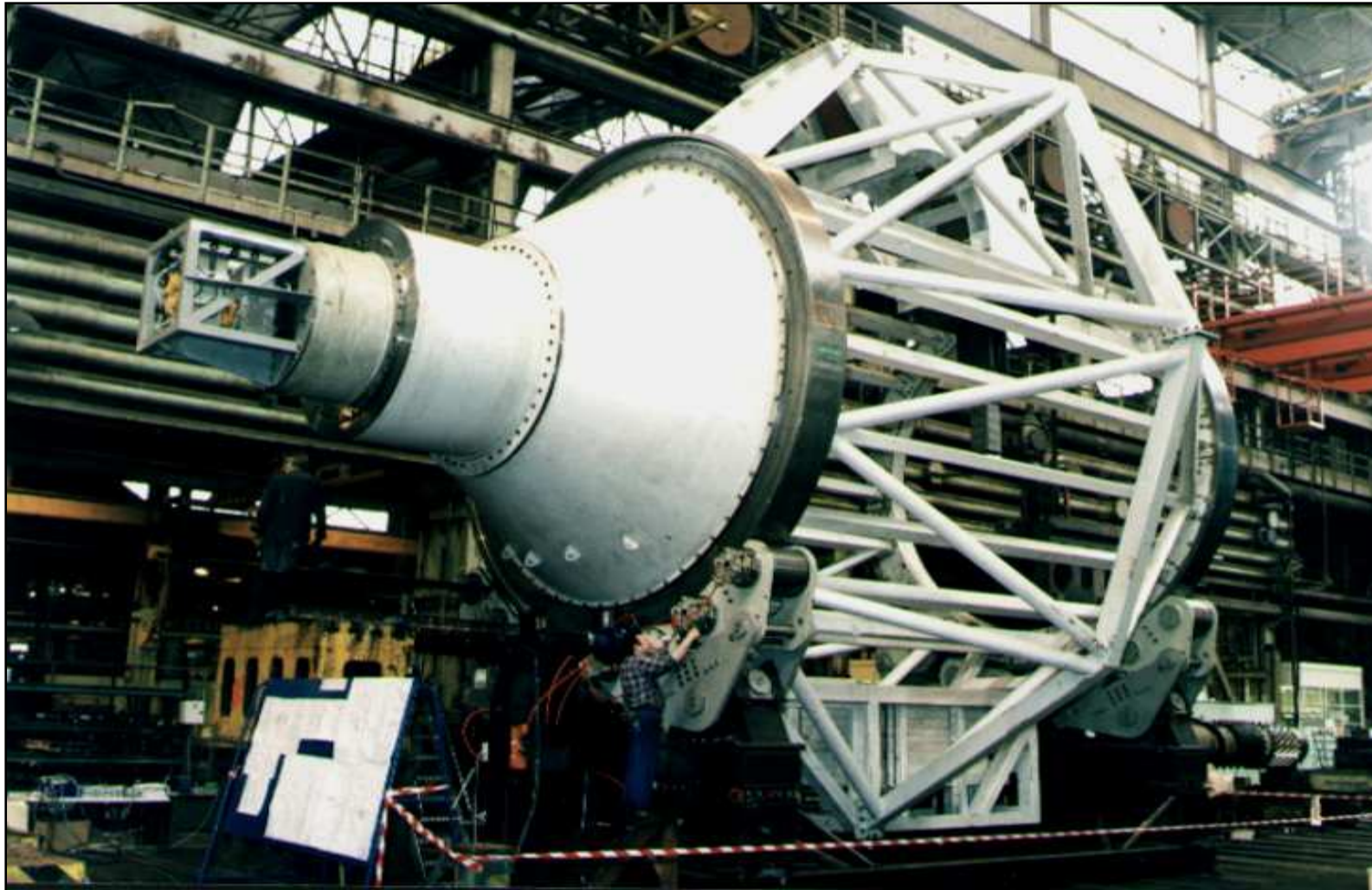


Protons exit at 100,000 miles per second





The proton beam is brought through the “beamline” to the treatment gantries.  
The proton beam passes through the beamline at 62% of the speed of light.



Each gantry weighs 200,000 pounds. UFPTI has three gantries.





Gantry installation.



Gantries are 35 feet square and 37 feet tall.





One of the gantries at the Proton Therapy Institute.



Here, a patient receives treatment.



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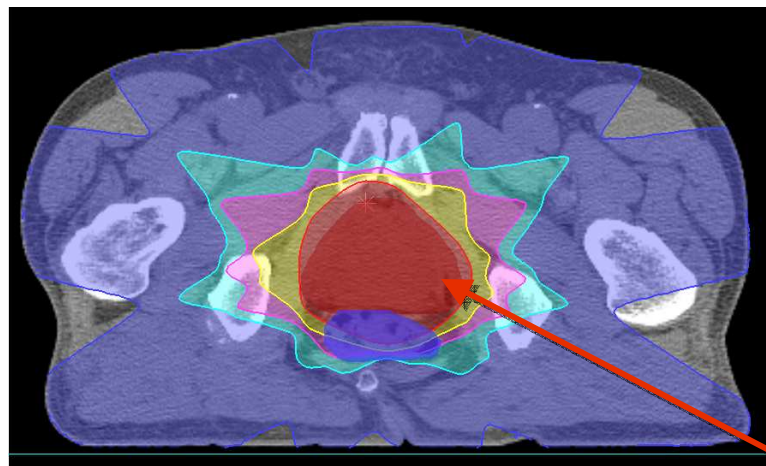
# Part Three: Proton Therapy in Cancer





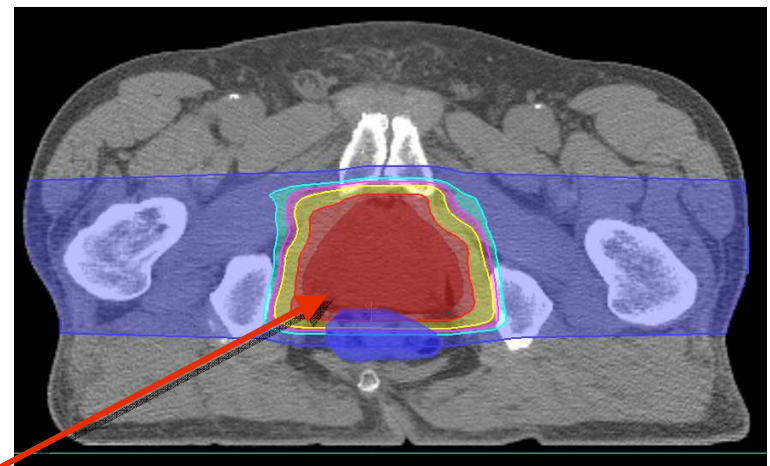
# IMRT vs Protons in Prostate Cancer

IMRT



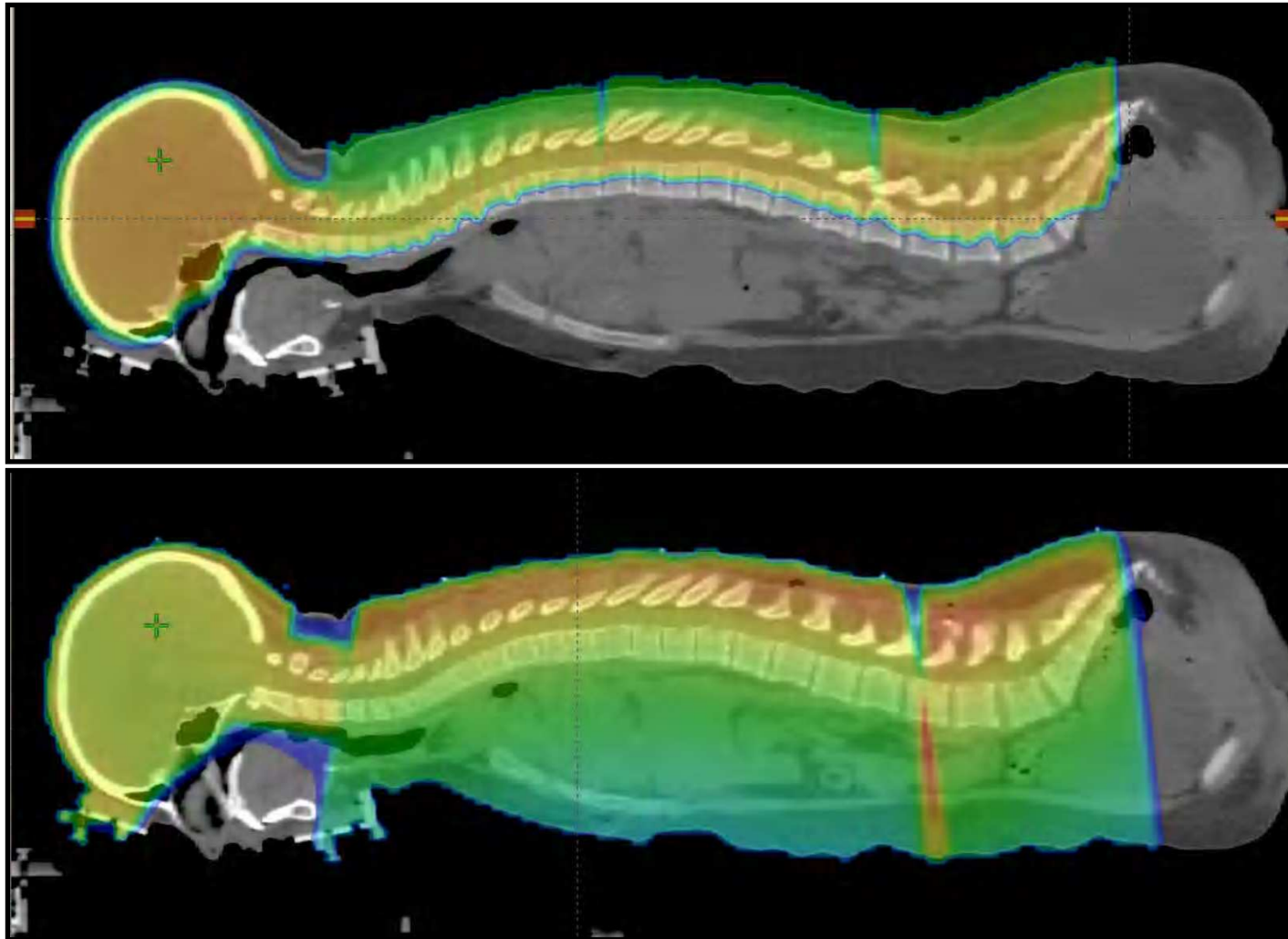
Blue –	13%
Green –	51%
Purple –	63%
Yellow –	76%
Red –	95%

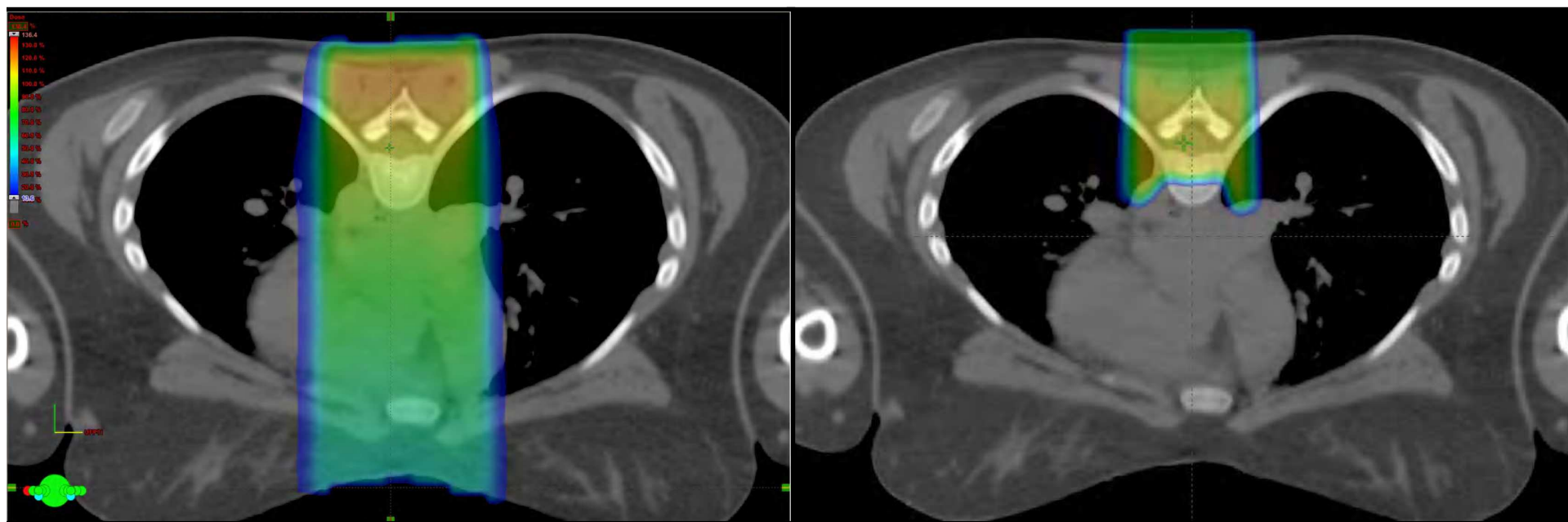
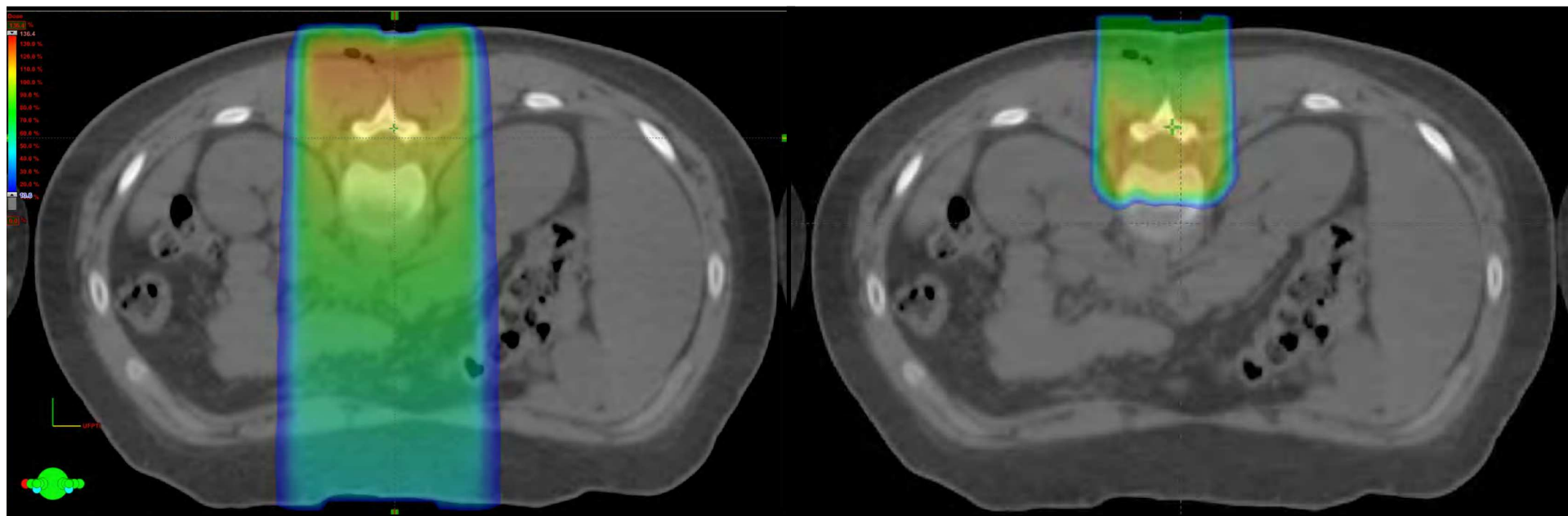
Protons



Prostate

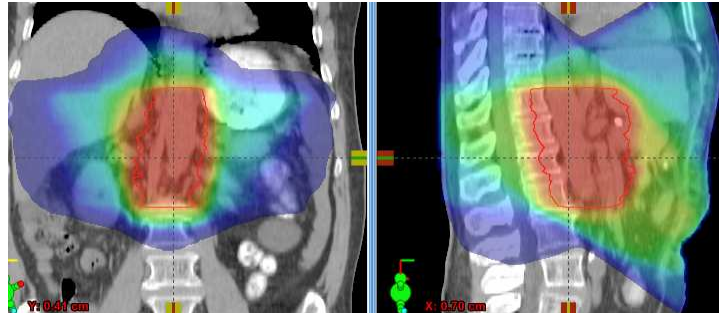
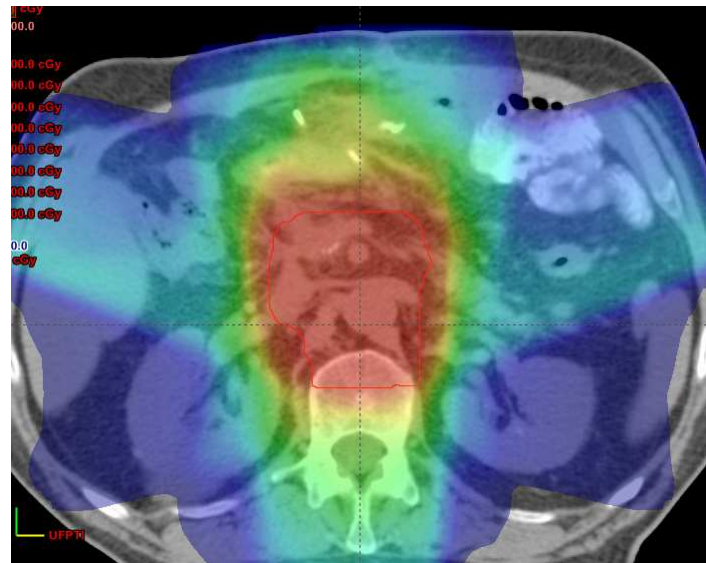
## Craniospinal Irradiation



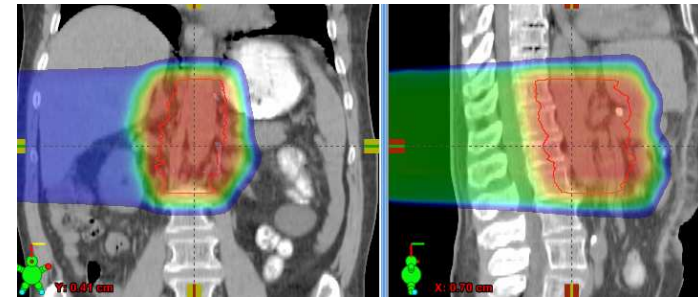
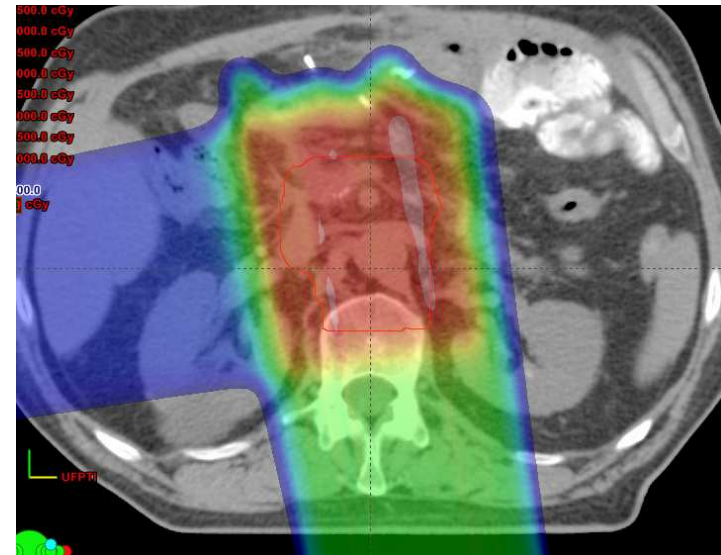




## Pancreatic Cancer



IMRT



Proton

## Hodgkin's Lymphoma

