

OVERVIEW OF PROTON THERAPY TECHNOLOGY

The technology that is used for the production and delivery of therapeutic proton beams is reviewed. Increased interest in this treatment modality has inspired a new generation of technology development and research into methods that will make proton treatment facilities more widely available (less expensive) and more efficient. Proton beam therapy has been in use for over 40 years; it remains a treatment modality of interest because it provides a highly conformal dose distribution to a wide variety of disease sites and the potential for improving clinical outcomes.

Charged particle accelerators are used to energize the protons needed for desired therapeutic penetration. A variety of accelerator techniques are used including the standard implementations of cyclotrons and synchrotrons, as well as more modern concepts.

Recent advances in beam scanning technology may represent the ultimate in external beam radiotherapy dose conformality and treatment delivery efficiency. We describe how this new technology can be integrated into a proton therapy facility.

All technologies introduce the possibility of errors and tolerances that must be considered for therapy and are added to the considerations which will be described in the companion talks of this session.

Learning Objectives

1. Familiarization with the types of technologies used to accelerate Protons for therapy.
2. Learn some of the methods used to deliver the proton beam.
3. Identify some of the differences between proton and photon therapy beam delivery.