



# Proton Therapy

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# **Proton Therapy**

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Proton therapy is a form of radiation treatment using proton beam. The main advantage of proton therapy is the precise targeting of a tumor with practically no dose distal to the tumor and a lower dose to the proximal region of the tumor which leads to a better sparing of normal tissues. Proton therapy is, therefore, a good indication for cancers lying in or near critical structures (e.g., brain, heart, eyes) and for pediatric cancers. The radiobiological effectiveness value of 1.1 for protons indicates that in comparison with classical radiotherapy using photon beam the potential of proton beam lies in the physical properties of the beam rather than on its biological effects in tissue. The physics of proton therapy has undergone considerable advancement since it was first suggested in 1946 by the Harvard Physicist Robert R. Wilson. The first efforts to use protons for treating cancer were started in 1950s in selected nuclear research facilities; however, the hospital-based proton therapy treatments were first started in 1990 at Loma Linda University Medical Center, USA. In order to understand the physics of proton therapy, it is important to know how protons are obtained from hydrogen atoms, their acceleration, beam transport, and the passive scattering as well as active scanning dose delivery techniques to get a desired dose distribution to a tumor while minimizing the dose to the normal tissues of a patient along with shielding design to protect workers and general population from the harmful effects of radiation.

**Keywords:** Proton therapy, proton beam