Proton Therapy

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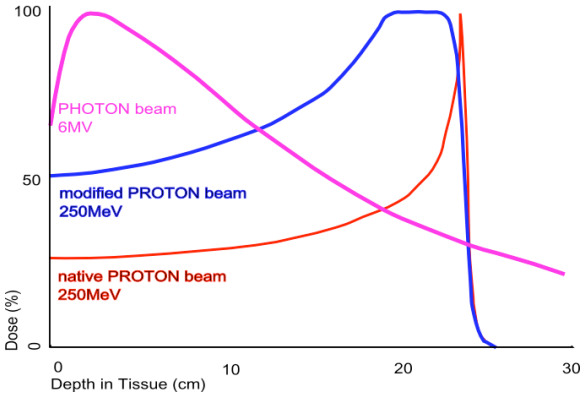
Cancer causes about thirteen percent of all deaths according to the American Cancer Society. Cancers can affect anybody of any age, race, or religious background. A form of radiation therapy is Proton therapy that works by aiming energetic ionizing particles at the targeted cancerous tumor.

Proton therapy has become a powerful method for cancer treatment; the result of this is the need for accelerators that can produce proton beams with energies up to 250 MeV. There are two reasons why these proton beams are used in cancer therapy; the first is that maximum proton range is the correct function of incoming beam energy that is required. The second is that the largest majority of proton energy is dissipated over a very small section that is at the maximum penetration depth. This effect is known as the Bragg peak.



History of Proton Therapy dates back to 1954 where the first treatments were performed on Particle accelerators that were built for physics research. Although before that Robert R. Wilson wrote a paper in 1946 on how it protons could be used successfully as cancer treatment. Over

Instead of requiring huge either particle accelerators or cyclotrons for proton therapy compact versions are now starting to come into production. More compact and controllable devices are needed so that treatments can be more easily administered. The first compact proton therapy machine was created from the result of defense related research. The system was developed at the Livermore National Laboratory that was jointly funded by UC Davis Cancer Center.

Compact proton therapy machines are possible due to the superconducting coil that is the center of the machine. Two of the four poles are accelerating magnetic poles, while the other two poles are field shaping magnets. The center is an ion source that allows for the controlled field of the magnets.

Reference:
"Design manufacturing and commissioning of compact Superconduction 250 MeV Cyclotrons for Proton Therapy." 13 Nov. 2008 <http://www.ewh.ieee.org/tc/csc/europe/newsforum/pdf/KleinU_final2appr_101907.pdf>
"Proton Therapy May Reduce Serious Side Effect of Lung Cancer Treatment." 14 Nov. 2008 <http://www.medicalnewstoday.com/articles/129478.php>
"First compact proton therapy machine for cancer treatment enters development." 13 Nov. 2008 <https://publicaffairs.llnl.gov/news/news_releases/2007/NR-07-06-06.html>