More Accurate Method for Generating Proton Therapy Treatment Planning Images

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a method that provides more accurate proton stopping power data for improved proton radiation therapy treatment planning.

Overview

Proton therapy is a form of external beam radiation therapy in which a particle accelerator is used to target a tumor with a beam of protons. Protons have a certain range, or stopping power, and few protons penetrate beyond this stopping distance, which helps prevent damage to surrounding healthy tissue and also delivers a maximum dose of radiation to the tumor site.

To obtain electron stopping power information from a patient image for proton therapy treatment planning, current methods calibrate and convert the information based on X-ray CT images. Most X-ray CT data sets are reconstructions made from incomplete projections, leading to errors of about three to five percent. A more accurate method of proton therapy treatment planning is needed.

The Invention

UW–Madison researchers have developed a method of preparing a treatment control sequence for proton radiation therapy involving a program and/or an electronic computer that receives patient data. This method greatly improves the accuracy of converting X-ray photon attenuation to proton stopping power from a conventional X-ray CT image by segmenting tissues into different tissue types and then converting each segment using conversion functions that are unique to each tissue type. The derived proton stopping power data is used to produce the treatment control sequence to accurately target the tumor and preserve healthy tissue.

Applications

- Proton therapy treatment planning and acquisition software

Key Benefits

- Significantly more accurate electron density reconstruction
- Improves results in kilovolt CT machines and essentially eliminates the error in megavolt CT machines
- Overcomes tissue thickness limitations of proton imaging
- Provides accurate proton stopping power data
- Eliminates the need for proton imaging

Tech Fields

- Radiation Therapy : External beam therapy
- Radiation Therapy : Treatment planning

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