Parallel Field Beam Delivery Treatment Device

Tech ID: 34806 / UC Case 2025-503-0

ABSTRACT

Researchers at the University of California, Davis have developed a radiotherapy device that integrates ultra-high magnetic fields with high-energy X-ray beams to precisely target tumors while minimizing radiation exposure to healthy tissue.

FULL DESCRIPTION

This technology introduces a treatment device integrating a magnet system generating a strong magnetic field and an accelerator producing a high-energy X-ray beam, designed to suppress the lateral spread of charged particles during radiotherapy. By combining electric and magnetic forces, the system enhances dose precision for small brain tumors and other targets. The device includes components such as a superconducting coil, an opening to receive the target, and a controller that tracks and adjusts the position of the magnet system and accelerator in real-time based on position data, ensuring the radiation beam remains accurately aligned. This approach improves the focus of the beam and reduces irradiation of the surrounding healthy tissue. This is particularly valuable in treating multiple metastases and non-oncological neurological conditions.

APPLICATIONS

- Advanced brain tumor radiotherapy treatment.
- Management of multiple brain metastases.
- Reirradiation therapies requiring high precision.
- Neurological and functional disorder treatments involving radiotherapy.
- Healthcare facilities seeking next-generation radiotherapy devices.
- Research and development in oncology and radiation physics.

FEATURES/BENEFITS

- Improves dose precision by reducing lateral spread of secondary charged particles.
- Tracks target position in real time and adjusts magnet/accelerator alignment during delivery.
- Combines high magnetic flux density (≥7 T) with a high-energy X-ray beam (=6 MV) to enable magnetically guided dose shaping.
- Targets tissue non-invasively while minimizing radiation exposure to surrounding healthy structures.
- Integrates with X-ray linear accelerators positioned outside the magnetic system.
- Expands clinical utility by supporting treatment of small tumors, multiple metastases, and select non-oncology neurological/functional indications.
- Eliminates lateral dose spread that reduces accuracy in conventional stereotactic radiotherapy. Enables precise irradiation of small brain tumors and multiple metastases.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

accelerator, brain tumors, imaging, linear accelerator, Lorentz force, magnetic field, radiation therapy, stereotactic device, SRS, SBRT, tumor targeting, ultra-high magnetic field

CATEGORIZED AS

- **Medical**
  - Devices
  - Disease: Cancer
  - Imaging

RELATED CASES

2025-503-0

- Reduces unintended dose to healthy tissue during treatment and reirradiation.
- Corrects for motion and setup drift by providing real-time tracking and positional adjustment.

PATENT STATUS

Patent Pending

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- Polar Vision Drop-In Probe for Intraoperative Cancer Detection
- Lightweight Directional Gamma and X-Ray Detection System

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