PROCEDURE TO IMPROVE THE PERFORMANCE OF ON-TABLE ADAPTIVE RADIOTHERAPY

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Value Proposition: *First clinical application of super resolution (SR) MRI reconstruction for 2D cine MRI in real-time radiotherapy.*

Technology Description

Researchers at Washington University in St. Louis have developed a novel application for super-resolution (SR) cine MRI to enhance the existing MRI spatial resolution through deep-learning post-processing techniques, thereby improving the accuracy of tumor targeting and reducing healthy tissue toxicity during radiotherapy.

Existing MRI systems require hardware upgrades or suffer from artifacts and blurring due to data sharing methods. This invention utilizes deep-learning frameworks for SR reconstruction, improving MRI spatial resolution without altering the MRI hardware or scanning parameters, and can generate high-resolution (HR) cine MRI from low-resolution (LR) cine MRI during real-time radiotherapy.

Stage of Research

Proof of concept

Publications

- Taeho Kim. et al. Inter-fractional portability of deep learning models for lung target tracking on cine imaging acquired in MRI-guided radiotherapy. Phys Eng Sci Med 47, 769–777 (2024). https://doi.org/10.1007/s13246-023-01371-z.

- Jaehee Chun…Taeho Kim. MRI super-resolution reconstruction for MRI-guided adaptive radiotherapy using cascaded deep learning: In the presence of limited training data and unknown translation model. The International Journal of Medical Physics Research and Practice (2019). https://doi.org/10.1002/mp.13717.

Applications

- Radiotherapy

Key Advantages

- Enhanced spatial resolutions and image quality

- Improved tumor motion tracking and gating efficiency
- Potential for better disease control and reduced toxicity to healthy tissues
- Does not alter MRI hardware or scanning parameters

Patents

Patent granted - US12005271B2

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