

End-to-end quality assurance test for radiosurgery

Value Proposition

Radiotherapy and radiosurgery is used to treat a variety of cancers as well as to perform non-invasive surgery. Treatment planning for these procedures requires the ability to localize the radiation dose in three-dimensional space as well as accurate characterization of the radiation dose. Quality assurance for treatment plans is generally performed by measuring radiation dose using point and/or film detectors. These methods do not provide the level of spatial sampling required for accurate characterization of complex multi-focal treatment plans. The proposed technology presents a novel system for end-to-end quality assurance that provides both high spatial as well as dosimetric accuracy for external beam radiotherapy systems.

Technology

The proposed technology uses a three-dimensional polymer phantom that undergoes a density change when exposed to radiation. These changes can be measured using imaging modalities such as CT and be converted back to a radiation dose. These forms a close-loop system for verification of the spatial distribution and radiation dose for specific treatment plans.

Other Applications

This technique could be broadly used to perform dosimetry for other external beam radiotherapy systems.

Advantages

The existing dosimetry products do not provide sufficient spatial sampling of the radiation field. The proposed technology is capable of accurately measuring radiation dose in three-dimensions with high accuracy. Additionally, this improves the ease of analysis and has thus improve procedure times. Lastly, the phantoms used in this procedure can be manufactured remotely.

Publications

- Adamson, J., J. Carroll, M. Trager, S. Yoon, J. Kodra, E. Maynard, M. Hilts, M. Oldham, and A. Jirasek. "Proof of Principle for End-To-End SRS QA Using a NIPAM 3D Dosimeter." In Medical Physics, 45:E358-59. WILEY, 2018.



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