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New radiosurgery technology provides highly accurate treatment, greater patient comfort

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A new stereotactic radiosurgery system provides the same or a higher level of accuracy in targeting cancer tumors – but offers greater comfort to patients and the ability to treat multiple tumors at once – when compared to other radiation therapy stereotactic systems, according to researchers at Henry Ford Hospital in Detroit.

The study shows the Edge™ Radiosurgery Suite is able to target cancer tumors within 1 mm, providing sub-millimeter accuracy with extreme precision.

"Radiosurgery is just one shot of precision radiation with a very high dose to treat tumors," says study lead author Ning Wen, Ph.D., a physicist with the Department of Radiation Oncology at Henry Ford.

"The key is targeting the tumor and delivering the dose that we want while protecting surrounding normal tissue, which is why it is so important to regularly evaluate the systematic accuracy of such systems."

The study will presented Sept. 16 at the 56th annual American Society for Radiation Oncology (ASTRO) meeting in San Francisco.

Stereotactic radiation is a procedure that precisely delivers intense radiation doses to tumor targets in one to five treatments. The goal of this non-invasive procedure is to destroy, or make inactive, the tumor while minimizing dose exposure to the surrounding healthy tissue.

The Edge, created by Varian Medical Systems, is the latest advancement in stereotactic radiosurgery. It offers treatment in about 20 minutes and uses new real-time tumor tracking technology to help compensate for tumor motion during treatment. Its six degrees of freedom treatment couch provides flexibility needed to optimally position and adjust patients, allowing them to be comfortable and breathe freely during treatment.

Henry Ford was the first in North America and it is the only hospital in Michigan to have the Edge.

"The Edge truly represents a novel platform in radiosurgery, offering a system that provides a fully-integrated solution for planning and administering radiosurgery treatments," notes Benjamin Movsas, M.D., Chair of the Department of Radiation Oncology at Henry Ford and a co-author of the study.

For its study, Henry Ford sought to evaluate the accuracy of the Edge by comparing it to existing robot- or frame-based radiosurgery systems.

To do so, researchers took a novel approach using – for the first time – a phantom prototype cube to determine treatment precision.

The phantom includes implanted inserts and has four different densities for cone beam computed tomography, three Calypso beacons, 5 mm diameter steel BBs in the center for localization accuracy testing, 16 ceramic BBs for radiographic imaging, and simultaneous dual orthogonal film planes insert for dosimetric verification.

With the phantom prototype, targets were localized using all components of the Edge system, including optical surface monitoring system, electromagnetic beacon-based tracking, cone-beam CT, "snap-shot" planar x-ray imaging during treatment and a "robotic" six degree of

freedom couch.

Ten plans were created to study various treatment sites including brain, spine, lung and pancreas.

Overall, the study demonstrated that the "end-to-end" locational accuracy of the Edge was within 0.9 mm for single target treatment and 1.2 mm for single isocenter multi-targets treatment, making it highly accurate when compared to robot- or frame-based radiosurgery systems.

"With our radiosurgery team, everything we do is continuously under study," says Dr. Wen. "As pioneers in the field, we want to show we have done due diligence with this new system to ensure we're providing the best care to our patients."

Dr. Wen and his colleagues plan to continue to study the Edge, expanding their research to evaluation how tumors interact with treatment.

Provided by Henry Ford Health System

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