

Two forms of radiosurgery for brain metastases are equally effective

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While two advanced radiosurgery approaches—Gamma Knife and RapidArc—offer different strengths, they are equally effective at eradicating cancer in the brain, say researchers at Sidney Kimmel Cancer Center.

Their study, published online Jan. 25, 2016 in *Frontiers in Oncology*, compared the two different devices in brain radiosurgery. Six patients, each with three or four brain metastases, were studied.

The Gamma Knife was slightly more effective than RapidArc at focusing the beam of radiation, thus limiting spread to normal tissue, and RapidArc offered much quicker treatment compared to the Gamma Knife, researchers say. Gamma Knife treatment usually take 60-100 minutes, about 3-5 times longer than RapidArc, they say.

"In the end, using one or the other doesn't make a significant clinical difference and that is important to know because physicians and patients now know they have a choice of treatments," says the study's senior author, associate professor Wenyin Shi, M.D., Ph.D., co-director of the Jefferson Brain Tumor Program.

Thomas Jefferson University was one of the first institutions in the country to treat patients with RapidArc technology. Its physicians have been using Gamma Knife technology for 21 years.

Understanding the benefits of advanced radiosurgery technology is essential because there has been, and will continue to be, an increase in cases of brain metastases—tumors that spread to the brain from cancer somewhere else in the body, says co-author Adam Dicker, M.D., Ph.D., Chair and Professor of Radiation Oncology, Pharmacology and Experimental Therapeutics at the Sidney Kimmel Medical College at Thomas Jefferson University.

"As drug therapy for cancer becomes better at

controlling systemic cancer, disease in the brain increases over time. The brain is a sanctuary for cancer—chemotherapies and targeted agents can't reach the brain and the central nervous system because of the blood-brain barrier," Dr. Dicker says. "The results are that a number of different cancers are now showing up in the brain."

Radiosurgery delivers a focused dose of radiation on tumors in order to shrink or kill the [cancer](#), while sparing normal [brain](#) tissue. The Gamma Knife, invented in Sweden, features a circular array of 201 beams of gamma radiation that meet at a single point. The downside of the treatment, which is very accurate, is that patients wear a helmet that is fixed to the skull, Dr. Shi says. The procedure can also take a long time, he says.

RapidArc radiation is a type of linear accelerator that emits high-energy X-rays (also known as photons). Very small beams with varying intensities are aimed at a tumor and then rotated around the patient. This results in attacking the target in a complete three-dimensional manner. A single treatment can take as little as 10-15 minutes.

"We can do a comparison study like this because our Brain Tumor Program is a long-standing extremely collaborative group of specialists," Dr. Dicker says.

Study co-authors include Haisong Liu, PhD, David W. Andrews, MD, James J. Evans, MD, Maria Werner-Wasik, MD, and Yan Yu, PhD, MBA, from Thomas Jefferson University.

More information: Haisong Liu et al. Plan Quality and Treatment Efficiency for Radiosurgery to Multiple Brain Metastases: Non-Coplanar RapidArc vs. Gamma Knife, *Frontiers in Oncology* (2016). [DOI: 10.3389/FONC.2016.00026](https://doi.org/10.3389/FONC.2016.00026)

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