Study Shows that RapidArc® Radiosurgery Substantially More Efficient and Comparable in Quality to Gamma Knife® in the Treatment of Multiple Brain Metastases

Article in "Neurosurgery" describes how RapidArc Radiosurgery treatments can be specially optimized to treat multiple brain metastases at the same time

PALO ALTO, Calif., July 30, 2014 -- RapidArc® Radiosurgery can be used to deliver treatments for multiple brain metastases that are substantially less time consuming and comparable in quality to Gamma Knife® (GK) treatments, according to a new research study recently posted online and slated for publication in the October issue of the journal ‘Neurosurgery’. The research team found that the RapidArc Radiosurgery treatment plans for treating multiple tumors in a single fraction are comparable to Gamma Knife plans in terms of how precisely they can conform high doses to match the shape of the targeted tumors, as well as the extent to which RapidArc plans can minimize exposure of normal brain tissue outside the treatment area.

For their paper entitled Comparison of Plan Quality and Delivery Time between Volumetric Arc Therapy (RapidArc) and Gamma Knife Radiosurgery for Multiple Cranial Metastases, a clinical team at the University of Alabama, Birmingham (UAB) took 28 previously treated GK cases involving a total of 112 lesions and re-planned them using single fraction RapidArc Radiosurgery. They used a special approach to RapidArc planning that calls for the beam to be delivered using non-coplanar arcs or rotations of the treatment machine around the patient, to maximize the number of treatment angles and enhance precision. In addition, the UAB approach incorporates key optimization criteria that minimize the amount of low dose "spill" reaching normal brain tissues during treatment.

"These findings show that it is possible to deliver radiosurgery to multiple brain metastases with precision comparable to a Gamma Knife treatment, but with far greater efficiency," said researcher Evan Thomas, PhD, primary author of the paper.

"The authors conclude that the RapidArc plans yield 'clinically equivalent conformity.' And the RapidArc treatments are substantially faster to deliver, making them more time efficient and potentially less taxing for patients," said Calvin Huntzinger, senior director of marketing for Varian's Surgical Sciences group.

The UAB approach to RapidArc Radiosurgery planning for multiple metastases, which was previously described in an earlier paper published in 2012, makes use of key features that are built into Varian's Edge™ and TrueBeam™ STx platforms for image-guided radiosurgery, including Varian's HD120 high-definition multileaf collimator for ultra-fine beam shaping; the High Intensity Mode for delivering high doses quickly; and jaw tracking for extra shielding of normal tissues

RapidArc Radiosurgery treatments are faster than Gamma Knife treatments for a variety of reasons, including a dose delivery rate that is at least six times faster as well as the ability to treat
multiple metastases simultaneously, rather than sequentially. RapidArc Radiosurgery treatments at UAB are completed using frameless immobilization, without affixing the patient's skull to an immobilization frame as required for most Gamma Knife treatments.

"As we point out in our paper, brain metastases impact some 170,000 cancer patients in the US each year, and over 70 percent of those cases involve multiple metastases," said John Fiveash, MD, professor and vice chairman for academic programs at UAB, and senior author of the study. "Using Varian's latest medical linear accelerators and RapidArc technology for volumetric modulated arc therapy (VMAT), we can devise treatments that offer the same level of conformity as Gamma Knife technology. It's important to note that a RapidArc Radiosurgery treatment for multiple metastases can be completed in 22 minutes or less.* A comparable Gamma Knife treatment might take between one and five hours, depending on the number of metastases involved."

One limitation of the study was that the Gamma Knife® Perfexion™, which claims performance improvements over previous models, was unavailable for the comparison. In this study of mostly-spherical cranial metastasis, the authors did not expect the use of their Model 4C beam data to have a meaningful impact on the results of their dosimetric comparison. Also, the authors report that improvements in treatment efficiency previously published for the Perfexion are modest when compared to the results reported in this study.

*Individual results will vary. Refers to the time that the patient is in the treatment room.