Our Gamma Knife Center recently celebrated its 20th anniversary and treated its 5,000th patient. Do the same patients benefit from stereotactic radiosurgery today as compared with 20 years ago?

When our Gamma Knife Center opened in 1998, it predominantly treated inoperable or high surgical risk neurosurgical conditions. In its first year, 174 patients were treated using the Gamma Knife. Of these patients, over a third had a pain disorder known as trigeminal neuralgia, a quarter had benign brain tumors, and another quarter had brain metastases. Typically, only one lesion per patient was treated during each Gamma Knife session.

Not only has the number of Gamma Knife cases increased to 300-350 cases per year, but our patients have also changed. With improved cancer survival, more patients with brain metastases need Gamma Knife treatment to keep their disease under control. Gamma Knife has become first line treatment for brain metastases.

How has the technology changed over the last 20 years?

While the Gamma Knife technology has evolved, our ability to use the head frame both as a localizer and as an immobilizer during radiosurgical treatment remains. The head frame is the best method to achieve submillimeter precision in the delivery of radiation allowing the Gamma Knife to treat targets less than 5mm in size with guaranteed accuracy. With the original Model C, all the coordinates for treatment targeting were set by hand and only single target treatments were possible. Today, multiple targets can be treated using our Gamma Knife Icon, which is designed so that the patient’s head is held in one position and the whole bed moves around to bring the targets into the correct position for treatment. The Icon can also deliver mask-based radiosurgical treatments. When treatments are several hours long, patients can often sleep comfortably in one position for the duration of their treatment.

What are the research priorities for the Gamma Knife Center?

Our team is continually focused on new research to benefit patients with metastatic cancer. Newer cancer treatments, such as targeted therapies and immunotherapies, can cross into the brain and cause unintended consequences. In some cases, the therapies can be helpful in conjunction with Gamma Knife radiation, but many times the interaction can be harmful to the patient. Therefore, our research focuses on new combinations to determine when Gamma Knife should be used. Our physicians collaborate closely with our colleagues in medical oncology at Smilow Cancer Hospital to lead the field nationally in research in this area.

Veronica L.S. Chiang, MD, FAANS
Professor of Neurosurgery; Director, Gamma Knife Center