

# ADVANCES IN RADIOSURGERY

## LETTER FROM THE DIRECTOR



With the coming of a new year, it's often a time for reflection – to contemplate the accomplishments of the past and set goals for the future. 2010 marks almost a decade since Henry Ford Hospital started performing radiosurgery on spine and body tumor sites, and two decades since our experience with brain radiosurgery began. During 2009, our team treated a total of 393 patients with 520 radiosurgery procedures. There were 146 patients treated with spine radiosurgery, 151 patients treated with brain radiosurgery, and 56 patients treated with lung stereotactic body radiotherapy (SBRT). Other body sites we have treated with radiosurgery have included head and neck, liver, adrenal gland, and others.

During our 20 years of radiosurgery experience, Henry Ford physicians and researchers conducted two important prospective clinical trials, the results of which became the basis of how spine radiosurgery is practiced worldwide. In addition, our physics staff has conducted research to improve and develop the techniques of radiosurgery, and we have done biological laboratory research to explore radiosurgical effects to tumors and normal tissues.

These efforts resulted in numerous articles published in peer-reviewed journals and solicited chapters for books, as well as the publication of a book, "Spine Radiosurgery," which I edited. We have also trained many clinicians and researchers from other institutions over the years. Our experience culminated in developing NCI-sponsored nationwide randomized phase II and III clinical trials of radiosurgery of localized spine metastasis through the Radiation Therapy Oncology Group (RTOG) as a principle investigator institution.

I am most proud of the team that makes up our radiosurgery program – a truly collaborative effort with multidisciplinary experts from an array of specialties. With our ongoing efforts, I believe that we continue to pioneer the use of radiosurgery.

Wishing you a bright New Year!

*Samuel Ryu, M.D.*  
*Director of Radiosurgery*  
*Josephine Ford Cancer Center*



**JOSEPHINE FORD  
CANCER CENTER**  
*Radiosurgery*

## RADIOSURGERY OF BENIGN TUMORS IN THE BRAIN OR SPINE

As most oncologists would agree, the most important goal of treatment for malignant tumors is tumor control or the disappearance of the tumor. With this concept, after single or multi-modality oncological therapy, we generally classify the tumor response as complete response, partial response, minimal response, stable tumor or no response.

The goal of benign tumor treatment can be looked at a little differently though. Treatment options for benign tumors usually include close observation, surgery or radiation. The treatment goals of these approaches can vary. In general, surgical resection is the mainstay of treatment and is used to remove the tumor, and thus the goal is tumor disappearance. Since radiation therapy does not remove the tumor, the fundamental goal with this option is to stop tumor growth. Radiosurgery of a benign tumor is no exception. This means that the tumor shadow is still shown on follow-up imaging studies. Since most benign tumors grow very slowly, long-term follow-up is needed to draw a conclusion about whether the goal has been achieved. Although this treatment goal is explained to the patients before radiosurgery procedures, clear communication is key because it sometimes causes confusion for the patient and their family members when the follow-up study results are shared.

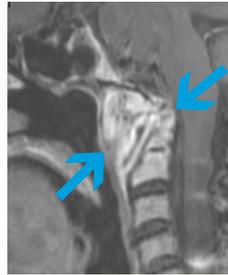
Common benign tumors treated with radiosurgery are located in the brain or spinal column. These tumors include, but are not limited to, meningioma, acoustic neuroma, schwannoma, neurofibroma, and other rare benign conditions such as glomus tumors. After radiosurgery, clinical symptoms may improve, but most of these tumors show the same tumor configuration (shape and size) on the follow-up MRI scans, which means the tumor is stable. In some tumors, the tumor actually shrinks to a smaller size, though this is not the primary goal of radiosurgery. An example of neurofibroma which shrank after radiosurgery is shown in Figure 1. This patient was treated with a single dose of radiosurgery of 18 Gy. One year after the radiosurgery, an MRI scan showed a significant tumor reduction. This patient also had significant symptom improvement with voice function and swallowing, which were secondary to the cranial nerve deficits.

# RADIOSURGERY

FIGURE 1



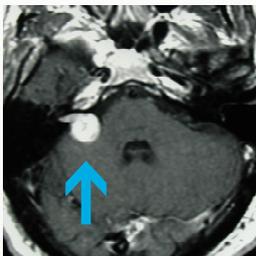
Before Radiosurgery



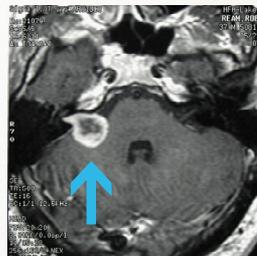
After 1 Year

Another important goal of radiosurgery for benign tumors is to preserve the neurological function or other clinical symptoms, depending on the location of the tumor. A typical example is the treatment of acoustic neuroma. While the tumor size may not change after radiosurgery, the more important goal is to preserve hearing function and prevent facial weakness. After radiosurgery, hearing is preserved in approximately 70 to 80 percent of our patients. The chance of facial weakness as a treatment complication is less than 15 percent. Tumor shrinkage indeed occurs in approximately 50 percent of patients. An example of tumor response in acoustic neuroma is shown in Figure 2. The patient was treated with 12 Gy radiosurgery. An MRI scan 18 months after radiosurgery shows no change of tumor size (i.e. stable), but there are signs of tumor destruction in the central part of the tumor.

FIGURE 2



Before Radiosurgery



After 18 Months

These are only two examples of radiosurgery for benign tumors. Treatment of benign tumors is highly individualized depending on the clinical symptoms, the shape and location of the tumor, and the patient's understanding about the tumor behavior and the likely outcome of the treatments. Once all of these factors are taken into account and expert opinions have been considered, the patient and physician can make the final decision about treatment options.