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***Study shows that implantation of radioactive seeds after surgery  
Is effective in controlling single metastatic brain tumors***

***Whole-brain radiation, once a standard treatment,  
Is no longer viewed as optimal for many patients***

CINCINNATI – A study involving brain tumor specialists at The Neuroscience Institute at the University of Cincinnati and University Hospital is helping physicians move away from a standard but potentially harmful treatment for metastatic brain tumors in favor of a safer, more localized treatment strategy. The study, published in the March issue of the journal *Neurosurgical Focus*, revealed that the implantation of tiny radioactive seeds following the removal of a single brain metastasis was as effective as the standard treatment of radiating the entire brain following surgery.

The standard treatment, known as whole-brain radiation therapy (WBRT), can cause long-term radiation toxicity. It results in cognitive problems in up to 10 percent of patients.

“Patients may develop cognitive problems similar to Alzheimer’s disease after whole-brain radiation therapy,” said Ronald Warnick, M.D., a neurosurgeon with The Neuroscience Institute and a study co-investigator. “Those patients may become non-functional, with very little remaining quality of life.”

The study illuminates the effectiveness of highly focused, local therapy in the treatment of a single brain metastasis. The finding is important because more than 100,000 cases of metastatic brain cancer occur in the United States each year. Brain metastasis, which represents the spread of cancer from another area of the body, is the most common type of adult brain tumor. It occurs in 15 to 30 percent of patients with cancer. About 20 to 30 percent of patients who develop brain metastasis will suffer a single lesion.

In addition to Dr. Warnick, who is Chairman of the Mayfield Clinic and Professor of Neurosurgery at the University of Cincinnati, study co-investigators included John Breneman, M.D., a radiation oncologist with The Neuroscience Institute and UC Radiology and Professor of

Radiology at UC. The dual-site study also included brain tumor specialists at the University of California San Francisco

The radiation seeds study involved a retrospective review of patients treated at the two institutions from 1997 to 2003. It grew out of the experience that Drs. Warnick and Breneman had in using permanent iodine-125 seeds in the treatment of primary brain tumors (tumors that have originated in the brain). The seeds are titanium casings about the size of a grain of rice that are filled with I-125 radioactivity.

“Dr. Breneman and I theorized that we might be able to utilize treatment with iodine-125 seeds for metastatic tumors at the time of their removal,” Dr. Warnick said. “It made perfect sense, because when you remove a metastatic tumor, the microscopic cells that are inevitably left behind do not infiltrate far; they remain only a few millimeters from the margin of the cavity. We thought that by inserting these seeds at the time of the operation, we could treat the microscopic disease that was remaining, with the ultimate goal of avoiding whole-brain radiation.”

But eliminating WBRT was controversial. The goal of WBRT is to kill microscopic and undetectable cancer cells not only around the tumor but also in other parts of the brain where they have not yet been detected with MRI scans.

In the event that microscopic cancer grew into tumors in other parts of the brain, Drs. Warnick and Breneman had a backup strategy: they would eliminate any subsequent tumors with precisely focused radiosurgery, a non-invasive procedure. “We knew we had a second treatment to fall back on,” Dr. Warnick said. “Our plan was to use radiation seeds to treat the area around the tumor and to follow the patient and treat tumors if they developed elsewhere.”

A year following treatment with surgery and radioactive seeds, without WBRT, only one of the 26 patients had a recurrence at the tumor site. Nine of the patients developed brain tumors in different areas of the brain. Seven of those patients were then treated with radiosurgery, and two with WBRT. The average survival rate was 18 months, with 46 percent surviving two years. Previous studies have reported the average survival rate of surgery and WBRT at 10 to 12 months.

“Only two of 26 patients went on to require whole-brain radiation, while 24 patients were spared the risk of WBRT,” Dr. Warnick said. “The important conclusion is that patients with a single metastatic tumor of the brain that is surgically accessible can avoid the risks of whole-brain radiation and can be effectively treated with surgery, radiation seeds, and watchful follow-up every three months.”

Dr. Warnick said that he often sees patients who had a single, accessible lesion that was treated only with whole-brain radiation. “They come to me fairly affected by that treatment, and most of them could have been treated with surgery and seeds,” he said.

The Neuroscience Institute, a regional center of excellence at the University of Cincinnati and University Hospital, is dedicated to patient care, research, education, and the development of new treatments for stroke, brain and spinal tumors, epilepsy, multiple sclerosis, trauma, Alzheimer’s disease, and Parkinson’s disease.

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