MedicalXpress

Protecting specific area of the brain during radiation therapy substantially reduces memory loss

September 23 2013

Protecting the stem cells that reside in and around the hippocampus – a C-shaped area in the temporal lobe on both sides of the brain associated with the ability to form and store memories – substantially reduces the rate of cancer patients' memory loss during whole-brain radiotherapy without a significant risk of recurrence in that area of the brain, a new study shows. Results of the Phase II clinical trial of patients with brain metastases are being presented today at the American Society for Radiation Oncology (ASTRO) annual meeting.

"Memory loss, especially short-term recall, is an important consideration for patients receiving whole-brain radiotherapy," says the study's co-principal investigator, Minesh P. Mehta, M.B., Ch.B., professor of radiation oncology at the University of Maryland School of Medicine. "We found that reducing the radiation dose to the stem-cell niches surrounding the hippocampus during treatment was clearly associated with memory preservation without an inordinate risk of relapse in that portion of the brain. The findings far exceeded our expectations."

Based on previous research, the predicted rate of cognitive decline at four months for patients receiving whole-brain radiation for brain metastases was 30 percent. Researchers designed the clinical trial so that a positive result would be a rate reduced by half, to 15 percent. The observed rate in the trial was actually 7 percent – significantly better than the baseline rate of 30 percent. With a third fewer patients to

evaluate, the rate of decline observed at six months was 2 percent, although comparable data from the historic control study were not available.

"These Phase II results, while not absolutely conclusive, offer very important insights which we hope to validate in a larger, randomized Phase III clinical trial," says Dr. Mehta, a radiation oncologist at the University of Maryland Marlene and Stewart Greenebaum Cancer Center who chairs the Radiation Therapy Oncology Group (RTOG) brain tumor committee. The RTOG, which managed the Phase II trial, also plans to manage the Phase III Study.

Co-principal investigator Vinai Gondi, M.D., will present the findings at the plenary session at the ASTRO annual meeting in Atlanta. He practices at Central DuPage Hospital Cancer Center in Warrenville, Ill.

E. Albert Reece, M.D., Ph.D., M.B.A., vice president for medical affairs at the University of Maryland and the John Z. and Akiko K. Bowers Distinguished Professor and Dean of the University of Maryland School of Medicine, says, "Preserving neurocognitive function is extremely important in treating patients with brain metastases, and the results of this latest study on hippocampal-avoidance radiotherapy led by Dr. Mehta are very encouraging. This technique, if validated in a randomized clinical trial, will give physicians a significant new tool to help maintain patients' quality of life while aggressively treating their cancer."

Patients in the study, the majority of them with lung cancer that had spread to the brain, were treated with intensity-modulated radiation therapy (IMRT), which enabled doctors to shape the radiation beams to avoid the hippocampus. Researchers used a standardized cognitive function assessment – the Hopkins Verbal Learning Test (HVLT) – to measure patients' baseline memory, such as their ability to recall

information immediately or after a delay, with follow-up at two, four and six months.

A total of 113 patients were recruited between 2011 and 2013; investigators were able to evaluate 42 patients at four months and 29 patients at six months. The median survival for the participants was 6.8 months. Three patients (4.5 percent) experienced progression of their disease in the hippocampal region, which was within the expected range.

Dr. Mehta says that the radiation affects cognitive function by damaging nerve cells as well as stem cells, which help to regenerate nerve cells that support memory formation. "These stem-cell niches are exquisitely sensitive to radiation and are involved in neurogenesis – the process of generating new neurons, or nerve cells. Although we call it hippocampal-avoidance radiotherapy, we really are targeting the stem-cell niches in and around the hippocampus," Dr. Mehta says.

He notes that factors other than radiation may also contribute to cognitive decline in patients with brain metastases, including medicines to control seizures or swelling in the brain. The cancer itself may also have an effect.

Provided by University of Maryland