

'Chemo brain': Study finds fog-like condition related to chemotherapy's effect on new brain cells and rhythms

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(Medical Xpress)—It's not unusual for cancer patients being treated with chemotherapy to complain about not being able to think clearly, connect thoughts or concentrate on daily tasks. The complaint – often referred to as chemo-brain – is common. The scientific cause, however, has been difficult to pinpoint.

New research by Rutgers University behavioral neuroscientist Tracey Shors offers new clues for this fog-like condition, medically known as chemotherapy-induced cognitive impairment. In a featured article published in the *European Journal of Neuroscience*, Shors and her



colleagues argue that prolonged chemotherapy decreases the development of new <u>brain cells</u>, a process known as <u>neurogenesis</u>, and disrupts ongoing brain rhythms in the part of the brain responsible for making <u>new memories</u>. Both, she says, are affected by learning and in some cases are necessary for learning to occur.

"One of the things that these brain rhythms do is to connect information across <u>brain regions</u>," says Shors, Professor II in the Department of Psychology and Center for Collaborative Neuroscience at Rutgers. "We are starting to have a better understanding of how these natural rhythms are used in the process of communication and how they change with experience."

Working in the Shors laboratory, postdoctoral fellow Miriam S. Nokia from the Department of Psychology at the University of Jyvaskyla in Finland and Rutgers neuroscience graduate student Megan Anderson treated rats with a chemotherapy drug – temozolomide (TMZ) – used on individuals with either <u>malignant brain tumors</u> or <u>skin cancer</u> to stop rapidly dividing cells that have gone out of control and resulted in cancer.

In this study, scientists found that the production of new healthy brain cells treated with the TMZ was reduced in the hippocampus by 34 percent after being caught in the crossfire of the drug's potency. The cell loss, coupled with the interference in brain rhythms, resulted in the animal being unable to learn difficult tasks.

Shors says the rats had great difficulty learning to associate stimulus events if there was a time gap between the activities but could learn simple task if the stimuli were not separated in time. Interestingly, she says, the drug did not disrupt the memories that were already present when the treatment began.



For cancer patients undergoing long-term chemotherapy this could mean that although they are able to do simple everyday tasks, they find it difficult to do more complicated activities like processing long strings of numbers, remembering recent conversations, following instructions and setting priorities. Studies indicate that while most cancer patients experience short-term memory loss and disordered thinking, about 15 percent of cancer patients suffer more long-lasting cognitive problems as a result of the chemotherapy treatment.

"Chemotherapy is an especially difficult time as patients are learning how to manage their treatment options while still engaging in and appreciating life. The disruptions in <u>brain rhythms</u> and neurogenesis during treatment may explain some of the cognitive problems that can occur during this time. The good news is that these effects are probably not long-lasting," says Shors.

Provided by Rutgers University

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