

Exercise can aid recovery after brain radiation

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Exercise is a key factor in improving both memory and mood after whole-brain radiation treatments in rodents, according to data presented by Duke University scientists at the Society for Neuroscience meeting.

"This is the first demonstration that exercise can prevent a decline in memory after whole-brain [radiation](#) treatment," said lead researcher and graduate student Sarah Wong-Goodrich of the Duke Department of Psychology and Neuroscience. Whole-brain radiation is sometimes used to treat brain cancers in humans.

"We found that exercise following radiation prevented a decline in erasable memory in mice and this is analogous to the type of [memory problems](#) people have after whole-brain radiation for brain tumors," said senior researcher Christina Williams, Ph.D., professor of psychology and neuroscience. "This is the type of short-term memory people use to find their car after they have parked it in a large lot. After radiation, this type of memory becomes impaired in many people."

In the experiment, one group of mice that had [brain radiation](#) stayed in their cages under normal conditions, living with other mice, eating and playing as they liked. But a different group of mice that had radiation were given daily access to a cage with a running wheel, which they could use if they wanted to.

The animals were tested for how well they remembered spatial features in their environment for locating a preferred escape hole to exit a well-lit

maze and hide. The mice completed tests at the two-week and the three-month mark after their [irradiation](#) to get a baseline and then to see how they fared over time.

Mice that had radiation plus access to running did as well at remembering where the hole was as normal mice that didn't exercise. Irradiated mice that had no access to an exercise wheel eventually showed no particular preference for the section of the maze with the escape hole.

"It was remarkable that the irradiated, running mice were just like the normal, non-irradiated mice that didn't exercise," said Wong-Goodrich, who conducted the experiments in the Williams' laboratory. "We were expecting some memory retention issues with a longer delay and there weren't any."

Exercise appears to actually protect against the loss of memory and the increase in depressive-like behaviors, Wong-Goodrich said.

The mice also were tested for depressive-like behavior, using gentle restraints which they worked to escape from. Two weeks after radiation, the irradiated mice gave up sooner than the normal mice. Three months after radiation, the runners that had brain radiation, however, tried just as hard as the normal mice, while their non-running counterparts gave up more readily.

Researcher Lee W. Jones, Ph.D., research director of the Duke Center for Cancer Survivorship and associate professor in the Duke Department of Radiation Oncology, said the findings show "how powerful exercise is and how many benefits it can provide, and even restore, after radiation."

Jones said that he is beginning to look at neurocognitive outcomes for cancer patients at Duke who undergo radiation, in addition to their body

health indicators. "Once a patient gets a doctor's clearance, I think exercise is a good thing during whole-brain radiation," he said. "I think telling patients to take it easy is the worst advice we can give, because we know they will become deconditioned physically, and this study shows exercise potentially could provide cognitive and psychological benefits."

Radiation knocks out the ability of the brain to produce new nerve cells, called neurons. Williams said that they were able to measure increases in certain growth factors in the exercising mice that might be necessary to help cells divide.

[Exercise](#) might help by increasing blood flow to the hippocampus area of the brain, which is an important structure for learning, [memory](#), and spatial navigation, Wong-Goodrich said.

Source: Duke University Medical Center ([news](#) : [web](#))

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