Aerobic exercise may protect cognitive abilities of heavy drinkers, study finds

April 16 2013

Aerobic exercise may help prevent and perhaps even reverse some of the brain damage associated with heavy alcohol consumption, according to a new University of Colorado Boulder study.

The study results indicated that regular aerobic exercise like walking, running or bicycling is associated with less damage to the brain's "white matter" among heavy alcohol users. White matter, along with gray matter , are the organ's two major physical components. White matter is composed of bundles of nerve cells that act as transmission lines to facilitate communication between various parts of the brain, said lead study author Hollis Karoly, a doctoral student in CU-Boulder's psychology and neuroscience department.

"We found that for people who drink a lot and exercise a lot, there was not a strong relationship between alcohol and white matter," said Karoly. "But for people who drink a lot and don't exercise, our study showed the integrity of white matter is compromised in several areas of the brain. It basically means white matter is not moving messages between areas of the brain as efficiently as normal."

A paper on the subject titled "Aerobic Exercise Moderates the Effect of Heavy Alcohol Consumption on White Matter Damage" was published April 16 in the journal *Alcoholism: Clinical & Experimental Research*. Co-authors on the study included CU-Boulder psychology and neuroscience professors Angela Bryan and Kent Hutchison, CU doctoral students Courtney Stevens and Rachel Thayer and Washington State University

Assistant Professor Renee Magnan.

"This study is preliminary, but promising," said Bryan, study co-author. "From my perspective, the major finding is the possibility that exercise might be able to either buffer against or undo some of the damage that heavy alcohol use does to the brain."

The new CU-Boulder study was funded by the National Institute on Alcohol Abuse and Alcoholism and by the National Institute on Drug Abuse.

The study group included 60 people, 37 men and 23 women, ranging from moderate drinkers to heavy drinkers and who were drawn from a larger pool of people under study for alcohol and nicotine issues, said Karoly. The study participants had each taken a standard, written test known as the Alcohol Use Disorders Identification Test, or AUDIT, used to detect hazardous or harmful drinking behavior. The subjects also self-reported their successes or failures in attempting to control their drinking, as well as the amount of exercise they were undertaking.

Each of the test subjects previously had undergone a modified type of MRI known as Diffusion Tensor Imaging, or DTI. The imagery allowed the researchers to track the position and direction of water molecules traveling parallel to axons, or nerve fibers, in the white matter as they move through the brain. DTI allows researchers to see the orientation of the axons—different colors represented different directions of travel—providing valuable information about the brain's communication superhighways.

The research team specifically looked at several parts of the brain, including the external capsule, a collection of white matter fibers connecting different layers of the brain. They also looked at the superior longitudinal fasciculus, two long bundles of neurons connecting the front

and back of the cerebrum, which is the largest part of the brain and is believed to be the place where the origin of thoughts, perception, judgment, decision-making and imagination takes place, according to neurologists.

"What our data suggest is that beyond just giving people a different outlet for cravings or urges for alcohol, exercise might also help to repair the damage that may have been done to the brain," said Bryan. "It might even be a more promising treatment approach for alcohol problems because it is both a behavioral treatment and a treatment that has the potential to make the brain more healthy. The healthier the brain is, the more likely a person with alcohol issues is to recover."

In general, aerobic exercise is recommended because of its benefits to brain, heart and muscles, said Karoly. Other studies have shown that aerobic exercise is associated with greater white matter volume and integrity among older healthy adults.

"This is an exploratory study and it is not our intention to suggest a person can erase the physiological damage of years of heavy drinking by exercising," said Karoly. "Some of the specific mechanisms in the brain linked to heavy drinking and exercise are not well understood, and we hope our study will inspire future research on the subject."

Provided by University of Colorado at Boulder