Animal study shows how exercise may energize brain cell function

19 November 2015

As we age or develop neurodegenerative diseases such as Alzheimer's , our brain cells may not produce sufficient energy to remain fully functional. Researchers discovered that an enzyme called SIRT3 that is located in mitochondria—the cell's powerhouse—may protect mice brains against the kinds of stresses believed to contribute to energy loss. Furthermore, mice that ran on a wheel increased their levels of this protective enzyme.

Researchers led by Mark Mattson, Ph.D., of the National Institute on Aging Intramural Research Program and Johns Hopkins University School of Medicine, used a new animal model to investigate whether they could aid neurons in resisting the energy-depleting stress caused by neurotoxins and other factors. They found the following:

- Mice models that did not produce SIRT3 became highly sensitive to stress when exposed to neurotoxins that cause neurodegeneration and epileptic seizures.
- Running wheel exercise increased the amount of SIRT3 in neurons of normal mice and protected them against degeneration; in those lacking the enzyme, running failed to protect the neurons.
- Neurons could be protected against stress through use of a gene therapy technology to increase levels of SIRT3 in neurons.

These findings suggest that bolstering mitochondrial function and stress resistance by increasing SIRT3 levels may offer a promising therapeutic target for protecting against age-related cognitive decline and brain diseases. The research team report their findings online Nov. 19 in the journal *Cell Metabolism*.

More information: Cheng, A. Mitochondrial SIRT3 mediates adaptive responses of neurons to exercise, and metabolic and excitatory challenges. *Cell Metabolism*. E-published Nov. 19, 2015.

Provided by Johns Hopkins University School of Medicine