'Sharp' older brains are not the same as younger brains

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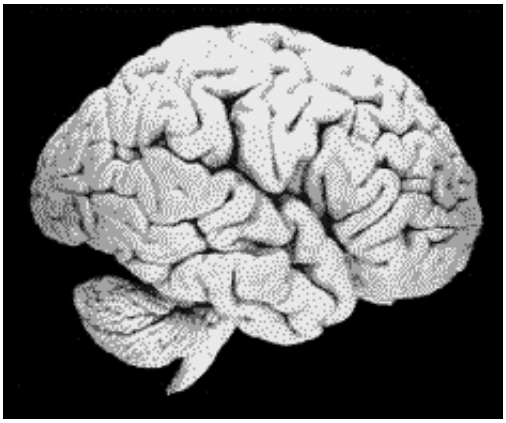

Researchers working with rats have found the first solid evidence that still "sharp" older brains store and encode memories differently than younger brains.

This discovery is reported by a Johns Hopkins team in the issue of *Nature Neuroscience* released online Nov. 13. Should it prove to apply as well to human brains, it could lead eventually to the development of new preventive treatments and therapies based on what healthy older brains are doing, rather than on the less relevant, younger brain model, according to study co-author Michela Gallagher, chair of the Department of Psychological and Brain Sciences at Johns Hopkins' Zanvyl Krieger School of Arts and Sciences.

"We found that aged rats with preserved cognitive abilities are not biologically equivalent to young rats in some of the basic machinery that neurons use to encode and store information in the brain," said Gallagher, who collaborated with Alfredo Kirkwood and Sun Seek Min of Johns Hopkins' Krieger Mind/Brain Institute and Hey-Kyoung Lee, now of the University of Maryland College Park. Lee was a research associate at the Mind/Brain Institute when the research was done.

The Gallagher-Kirkwood team compared the brains of 6-month-old rats with those of 2-year-old (considered "aged") rodents that had performed in the "young" range on various learning tasks. The aged rats' brains also were compared with those of older rats which showed declines in their abilities to learn new things. The researchers were looking at a key set of nerve cell connections that store information by modifying the strength of chemical communications at their synapses. (Synapses are the tiny gaps between nerve cells, where chemicals released by one cell act upon another.) Synaptic communication is the way brains register and preserve information to form memories.

The team found that while the older rats with compromised cognition had brains that had lost the ability to adjust the force of those synaptic communications, the older rats whose memories remained sharp still had that capacity. Interestingly enough, the successful older rats also relied far less than did younger rats on a synaptic receptor that is linked to a common mechanism for storing memories, the team learned.

"Instead, successful agers relied more than young rats on a different mechanism for bringing about synaptic change," Gallagher said. "This 'switch' could serve the same purpose – storing memories – but through a different neurochemical device."

Source: Johns Hopkins University

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