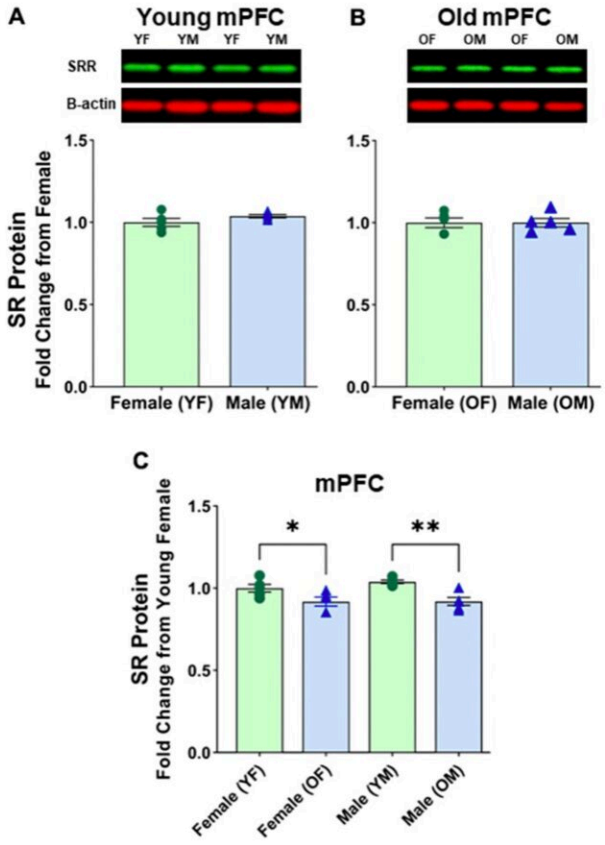
Study: Serine racemase expression in the brain during aging in male and female rats

June 5 2024



No sex differences in protein levels of serine racemase in the mPFC were observed. Credit: *Aging* (2024). DOI: 10.18632/aging.205841

A new research paper titled "Serine racemase expression profile in the prefrontal cortex and hippocampal subregions during aging in male and

female rats" has been published in *Aging*.

Aging is associated with a decrease in N-methyl-D-aspartate (NMDA) receptor function, which is critical for maintaining synaptic plasticity, learning, and memory. Activation of the NMDA receptor requires binding of the neurotransmitter glutamate and also the presence of co-agonist D-serine at the glycine site. The enzymatic conversion of L-serine to D-serine is facilitated by the enzyme serine racemase (SR).

Subsequently, SR plays a pivotal role in regulating NMDA receptor activity, thereby impacting synaptic plasticity and memory processes in the central nervous system. As such, age-related changes in the expression of SR could contribute to decreased NMDA receptor function. However, age-associated changes in SR expression levels in the medial and lateral prefrontal cortex (mPFC, lPFC), and in the dorsal hippocampal subfields, CA1, CA3, and dentate gyrus (DG), have not been thoroughly elucidated.

In this new study, researchers Linda Bean, Prodip K. Bose, Asha Rani, and Ashok Kumar from Indiana University School of Medicine, North Florida/South Georgia Veterans Health System, and the University of Florida aimed to determine the SR expression profile, including protein levels and mRNA, for these regions in aged and young male and female Fischer-344 rats. Their results demonstrate a significant reduction in SR expression levels in the mPFC and all hippocampal subfields of aged rats compared to young rats. No sex differences were observed in the expression of SR.

"These findings suggest that the decrease in SR levels may play a role in the age-associated reduction of NMDA receptor function in brain regions crucial for cognitive function and synaptic plasticity," the researchers note.

More information: Linda Bean et al, Serine racemase expression profile in the prefrontal cortex and hippocampal subregions during aging in male and female rats, *Aging* (2024). DOI: 10.18632/aging.205841