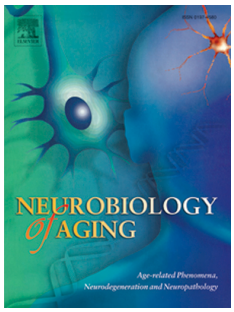
Accepted Manuscript



Age-dependent changes in gene expression and synaptic function in mouse auditory brainstem

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PII: S0197-4580(18)30093-9

DOI: 10.1016/j.neurobiolaging.2018.03.015

Reference: NBA 10195

To appear in: *Neurobiology of Aging*

Received Date: 23 December 2017

Revised Date: 13 March 2018

Accepted Date: 13 March 2018

Please cite this article as: Singh, M., Miura, P., Renden, R., Age-dependent changes in gene expression and synaptic function in mouse auditory brainstem, *Neurobiology of Aging* (2018), doi: 10.1016/j.neurobiolaging.2018.03.015.

Title: Age-dependent changes in gene expression and synaptic function in mouse auditory brainstem

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Abstract

Hearing acuity and sound localization are affected by aging and may contribute to cognitive dementias. While loss of sensorineural conduction is well documented to occur with age, little is known regarding short-term synaptic plasticity in central auditory nuclei. Age-related changes in synaptic transmission properties were evaluated at the mouse calyx of Held, a sign-inverting relay synapse in the circuit for sound localization, in juvenile adults (one month old) and late-middle age (18-21 months old) mice. Synaptic timing and short-term plasticity were severely disrupted in older mice. Surprisingly, acetyl-l-carnitine (ALCAR), an antinflammatory agent that facilitates mitochondrial function, fully reversed synaptic transmission delays in aged mice to reflect transmission similar to that seen in juvenile adults. These findings support ALCAR supplementation as an adjuvant to improve short term plasticity and potentially CNS performance in animals compromised by age and/or neurodegenerative disease.

Keywords: neurotransmission; acetyl-l-carnitine; calyx of Held, aging, synaptic plasticity; electrophysiology

Abbreviations: SOC, superior olivary complex; MNTB, medial nucleus of the trapezoid body; ALCAR, Acetyl-l-carnitine hydrochloride; EPSC, excitatory postsynaptic current

Declaration of conflicts of interest: none.