Investigation of Age-Dependent Changes in Hippocampal Long-Term Depression Related Tau Phosphorylation

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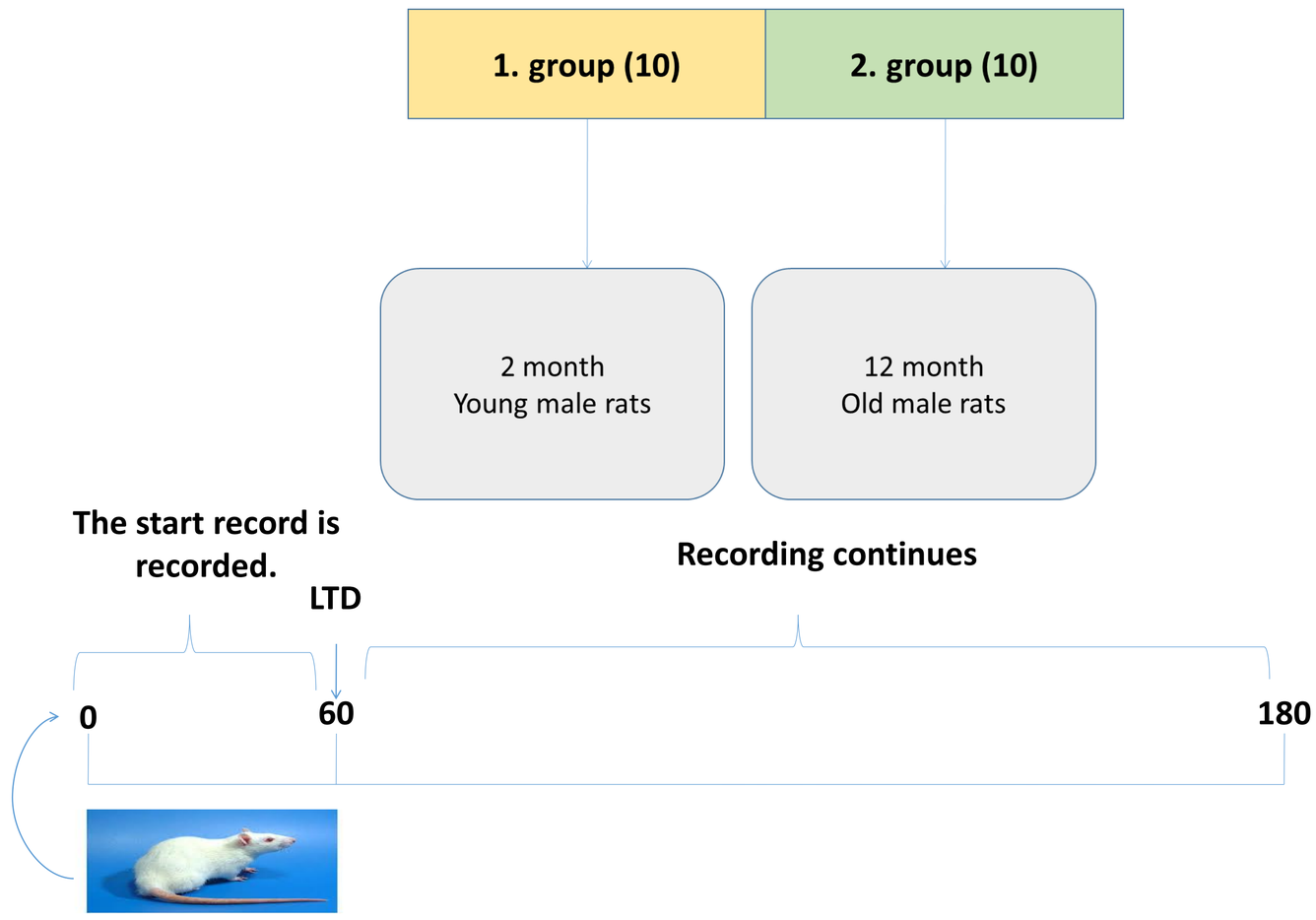
INTRODUCTION

Dementia is disruption of memory and other mental abilities with a severity that will affect daily life. 60-80% of diseases associated with dementia are Alzheimer's type dementia. Aging is an important factor in the formation of Alzheimer's disease, which is characterized by tau protein accumulation and tangle, especially in the cortex and hippocampus, since the majority of cases are 65 years old or older. The aim of this study is to investigate the effect of old age on hippocampal LTD (Long term depression) and how the phosphorylation levels of different Tau epitopes are affected in stimulated hippocampus.

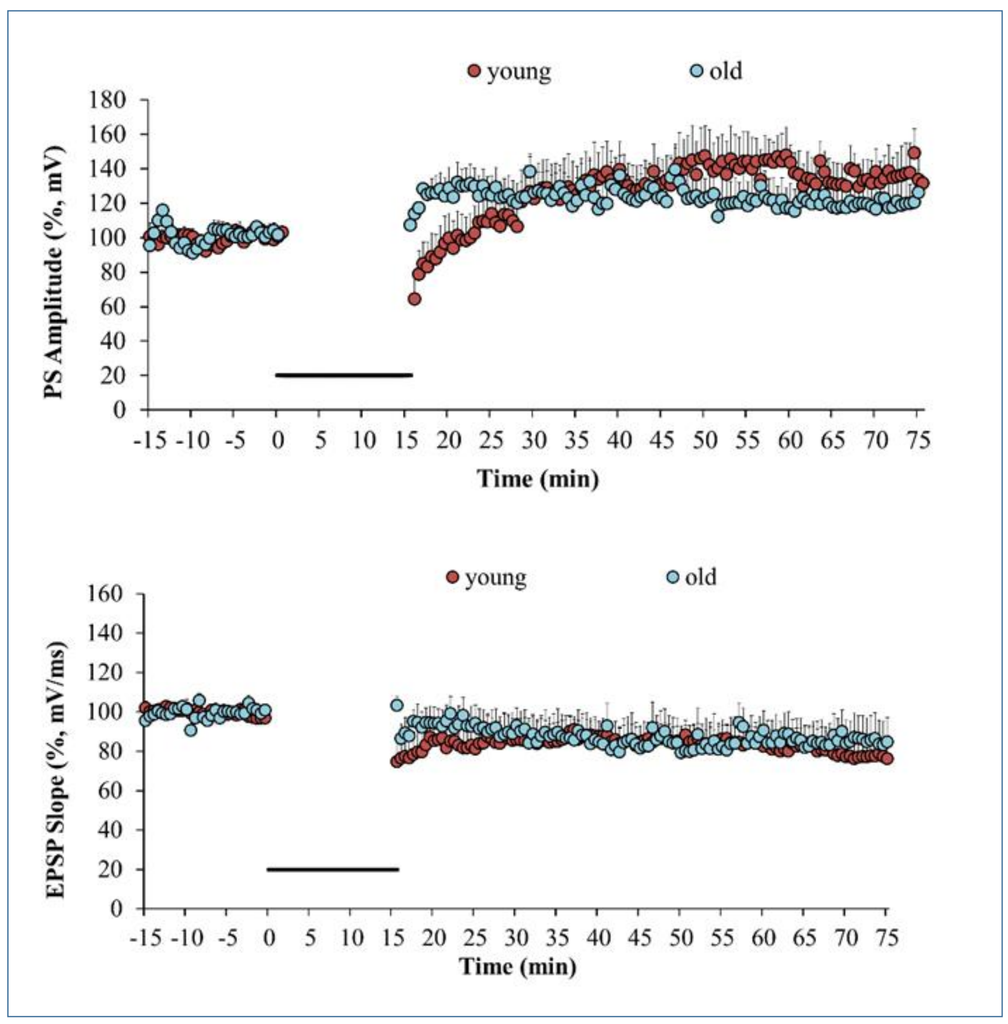
METHODS

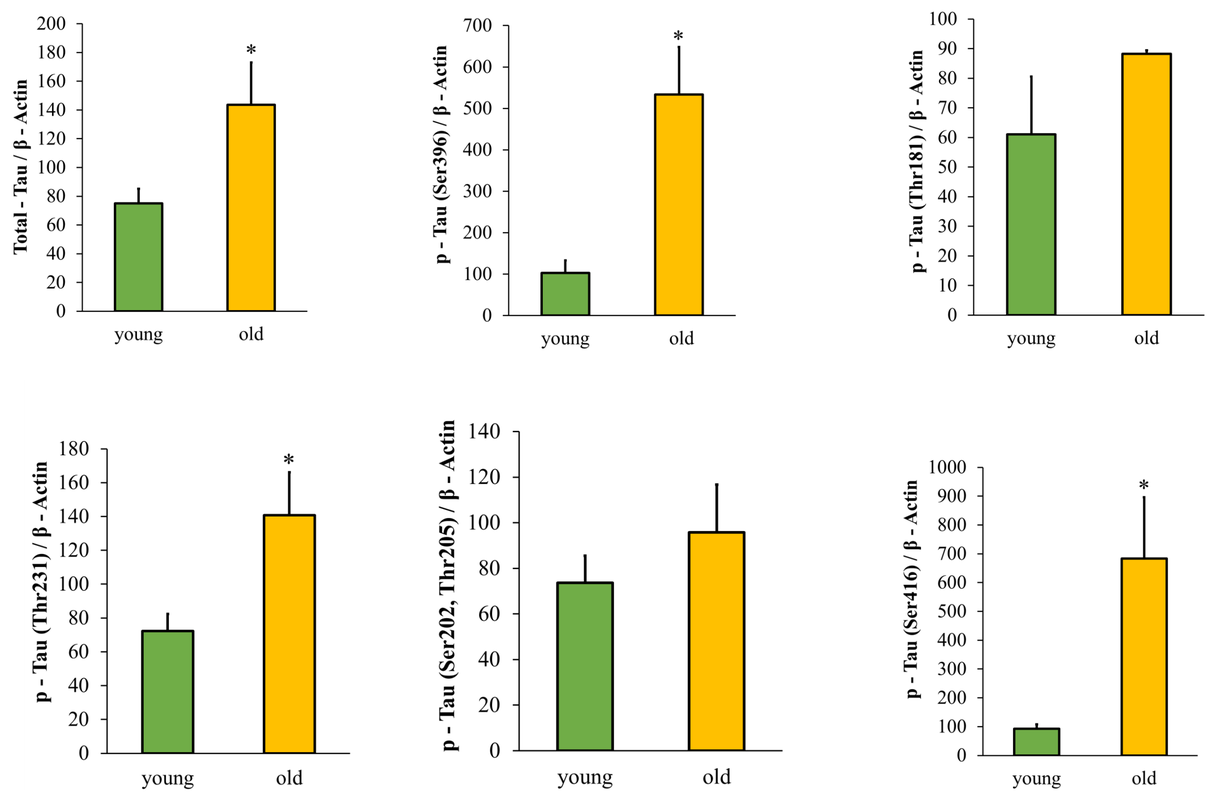
The study was carried out on 2-month and 12-month old (n = 10/group) Wistar albino male rats. Potential changes occurring in the hippocampal dentate gyrus region were recorded by applying LFS (Low frequency stimulation) to the perforant pathway (1Hz,900 impuls,15 minutes) to induce LTD. To evaluate LTD, EPSP slope and PS amplitude were measured by taking the average of the first 5 minutes after the LTD induction and in the last 5 minute intervals. For protein analysis, hippocampus stimulated in electrophysiological studies were used. Protein analyzes were performed by western blot method.

The data obtained were compared using Kruskal-Wallis and Man-Whitney U tests. One sample t test was used for LTD data.



RESULTS





For LTD, it was found that there was a significantly less suppression with aging in the induction period of EPSP and PS (population spike) ($p < 0.05$), but no significant. It was found that the total-Tau protein level and the phosphorylation levels of p-TauThr231, p-TauSer396, p-TauSer416 epitopes were increased, while the p-TauSer202,Thr205 epitopes did not change with aging.

CONCLUSION

Impaired LTD that occur with aging may be among the underlying causes of dementia that occurs in older ages. In addition, Tau epitopes known to play a role in the pathogenesis of Alzheimer's disease may support increased phosphorylation-impaired LTD responses with aging. These results may explain the causes of cognitive functions such as impaired learning and memory in old age.

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