Exposure of Developing Male Rats to One or Multiple Noise Sessions and Different Housing Conditions: Hippocampal Thioredoxin Changes and Behavioral Alterations

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Exposure of developing rats to noise has shown to induce hippocampal-related behavioral alterations that were prevented after a week of housing in an enriched environment. However, neither the effect of repeated exposures nor its impact on key endogenous antioxidants had been studied yet. Thus, the aim of the present work was to reveal novel data about hippocampal oxidative state through the measurement of possible age-related differences in the levels of hippocampal thioredoxins in rats exposed to noise at different developmental ages and subjected to different schemes and housing conditions. In addition, the possibility that oxidative changes could underlie hippocampal-related behavioral changes was also analyzed. Developing male Wistar rats were exposed to noise for 2 h, either once or for 5 days. Upon weaning, some animals were transferred to an enriched cage for 1 week, whereas others were kept in standard cages. One week later, auditory and behavioral assessments, as well as measurement of hippocampal thioredoxin, were performed. Whereas no changes in the auditory function were observed, significant behavioral differences were found, that varied according to the age, scheme of exposure and housing condition. In addition, a significant increase in Trx-1 levels was found in all noise-exposed groups housed in standard cages. Housing animals in an enriched environment for 1 week was effective in preventing most of these changes. These findings suggest that animals become less susceptible to undergo behavioral alterations after repeated exposure to an environmental challenge, probably due to the ability of

adaptation to an unfavorable condition. Moreover, it could be hypothesized that damage to younger individuals could be more easily prevented by a housing manipulation.

behavior

enriched environment

hippocampus

noise

thioredoxin

thioredoxin

thioredoxin 1

thioredoxin 2

aerobic metabolism

animal behavior

animal experiment

Article

behavior assessment

behavior change

controlled study

elevated plus maze test

female

hearing

hippocampus

latent period

male

noise

nonhuman

open field test

passive avoidance test

rat