Prenatal Exposure to Diesel Exhaust Particles Causes Alters Expression of Hippocampal Pro-inflammatory Cytokines and NMDA Receptor Subunits, with Anxiety, Spatial Memory Disorders in Adult Male Mice Offspring

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Abstract

Air pollution by Diesel exhaust (DE) consists of gaseous compounds and diesel exhaust particles (DEPs). Previous studies show associations between prenatal exposure to diesel exhaust affects the central nervous system (CNS). However, there was not reported that these effects were caused by gaseous compounds, diesel exhaust particles, or both. A limited number of studies in rodent models have shown that exposure to DEPs can result in CNS. Here, we explored the effects of prenatal exposure to DEPs on anxiety and learning and memory in NMRI mice male offspring. Three groups of pregnant mice were exposed to 350-400μg DEPs/m^3 for 2, 4 and 6 hours daily in a closed system room. We examined anxiety and learning and memory in 8-to-9-week-old male offspring using the Elevated plus maze and Morris water maze (MWM) test. Hippocampi were isolated after the behavioral tests and measured pro-inflammatory cytokines and N-methyl-D-aspartate (NMDA) receptor expression by quantitative RT-PCR analysis. Mice exposed to DEPs in utero showed deficits in the Elevated plus maze and Morris water maze test. In addition, DEPs exposed mice exhibited decreased hippocampal NR2A and NR3B expression. Taken together, our data suggest that maternal DEP exposure is associated with anxiety, disrupts learning and memory and reduction hippocampal NR2A and NR3B expression in male offspring.

Keywords: *Diesel exhaust particles, Neuroinflammation, Prenatal exposure, Learning, Memory, NMDA receptor, Hippocampus*

Professional Biography

Dr. Mojtaba Ehsanifar has completed his PhD from Iran University of medical Sciences and now he continues his research on Air pollution and Health effects Such as effect of the Nano particular matter, PM, using in-vivo models (mouse) and health effects and focused on the molecular mechanisms involved in neurodegenerative diseases, lung diseases, and reproductive system in Kashan University of Medical Sciences. He has published more than 35 papers in reputed journals and presented in congresses. Also he has Cooperation as reviewer with reputed journals.



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