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Iron oxide nanoparticles alters monoamine levels in mice brain

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The magnetic and paramagnetic properties of iron oxide (Fe2O3) nanoparticles (NPs) attract the attention of clinicians for its various biomedical applications including neurodiagnostics and therapeutics. The neurotoxicity of Fe2O3-NPs in association with behavioural changes has already been proved, but the neurochemical changes underlying such events have not been investigated so far. Thus, this research is focused to understand the levels of monoamines such as dopamine (DA), norepinephrine (NE) and epinephrine (EP) upon exposure to Fe2O3-NPs. In this study, mice were exposed to Fe2O3-NPs by oral intubation daily for 30 days. The levels of DA, NE and EP were found to be altered in the subjected brain regions in correspondence to the expression of monoamine oxidases (MAO). In addition, increased intracellular calcium (i[Ca2+]) and decreased expression of growth associated protein 43 (GAP43) indicate the impaired vesicular exocytosis. Further, enormous lipid peroxidation of the treated brain regions and axonal demyelination might affect the normal impulse conduction. This background information accounting all these events could open further avenues to unravel the entire nexus between Fe2O3-NPs and neurotoxicity and behavioural changes.

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