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Have antioxidants any effect on the functional alterations in the nervous system of rats treated with nano-manganese?

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Occupational inhalation of Mn-containing dust results in elevated brain Mn concentration that can induce oxidative stress, as well as alterations in neurotransmitter metabolism with concurrent neurobehavioral and motor deficits. Potentially, these effects can be counteracted by antioxidants. Male Wistar rats were intratracheally instilled with a suspension of MnO₂ nanoparticles (4 mg/kg b.w.) 5 days a week for 4 weeks. On the 5th week the rats were daily treated orally with antioxidants (ascorbic acid, curcumin, rutin; 100 mg/kg b.w.). After the 4th and 5th weeks, open field (OF) activity of the rats was tested. At the end of treatment period, cortical spontaneous and evoked potentials, and tail nerve action potentials, were recorded in urethane anaesthesia. Body and organ weights were also measured. Mn increased the time of local activity and immobility while decreased ambulation and rearing in the OF. Rutin was the only antioxidant which normalized these parameters to the control level. Latency of the cortical evoked potentials was lengthened and conduction velocity of the tail nerve was slowed after nano-Mn exposure, and these effects were also most efficiently reduced by rutin. Antioxidants, popular as food additives, may be useful in prevention of Mn-induced occupational neurological abnormalities.