

ALUMINUM NEUROTOXICITY: ULTRASTRUCTURAL CHANGES IN THE RAT BRAIN REGIONS; EVALUATION OF ANTIOXIDANT STATUS AND ESTIMATION OF REGIONAL ALUMINUM AND IRON

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ABSTRACT:

There is unequivocal evidence that aluminum is a potent neurotoxic agent (Goluf and Tarara 1999). The ability of aluminum to potentiate the iron catalyzed free radical production and to initiate lipid peroxidation has been repeatedly described (Bondy and Kirstein 1996). Moreover selective accumulation of aluminum and iron in the neurofibrillary tangles has already been evaluated by Good et al (1992) using a laser microprobe. Young adult rats, weighing 250 ± 20 g, were administered aluminum chloride 100 mg/kg b.w. orally (by gavage) daily for 90 days. Age matched controls received equal volume of normal saline. For electron microscopy, perfusion fixation by Karnovsky's fixative and processing of the dissected out hippocampus was done by standard technique (Hasan et al. 1972). TBARS of brain regions was measured by the method of Okawa et al (1979). Estimation of aluminum and iron in various brain regions was done after acid digestion using an atomic absorption spectrophotometer. Remarkable ultrastructural alterations were detected in the hippocampus which showed neuronal apoptosis and perturbation of macroglia. Astrocytosis evidenced by the crowding of 5 astrocytes in a single field was often discernible. On the other hand, mitosis of oligodendrocytes and a tendency for giant cell formation was also apparent. Interestingly, both aluminum and iron were found to be significantly increased in all the brain regions.

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