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Aquaporin 4 expression increases in the rat hippocampus and cortex during trimethyltin-induced neurodegeneration

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Trimethyltin (TMT) is a neurotoxicant know to produce significant and selective neuronal degeneration in the rodent CNS (for review, 1). Magnetic resonance imaging (MRI) investigation in TMT-treated rats has evidenced dilation of lateral ventricles, possibly correlated to alterations in blood brain barrier permeability .In order to explore the molecular mechanisms involved in the phenomenon we have investigated in the hippocampus and cortex of TMT-treated rats the expression of aquaporin 4 (AQP4), a glial water channel protein believed to play a role in brain oedematous conditions. AQP4 expression was tested both by real-time PCR and western blotting analysis in hippocampus and cortex homogenates. To confirm molecular results and visualize the AQP4 cell distribution double-label immunofluorescence for AQP4 and GFAP was performed. Real-time PCR and western blotting data show a significant upregulation of AQP4 starting from 14 days of TMT treatment both in the hippocampus and the cortex. Accordingly, the immunofluorescence shows an intense astrogliosis and AQP4 immunoreactivity diffusely pronounced in the hippocampal and cortex areas starting from 14 days after intoxication. In particular, AQP4 immunolabelling was localized in astrocytic end-feet encircling the blood vessels. The study of the Rhodamine B fluorescent tracer, intraperitoneally administered, also revealed an intense vascular reaction, characterized by hypertrophic vessels with abnormal course and dimensions in the brain of TMT-treated rats, indicating a vascular involvement in the TMT-induced neurodegenerative processes.. AQP4 over-expression and astrogliosis occurring in the brain of TMT-treated rats might putatively play a role in alterations of vascular permeability and brain oedema formation evidenced by MRI studies.

References

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