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Image analysis evaluation of astroglial and microglial markers distribution in the medial entorhinal cortex of trimethyltin hydrochloride treated rats

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Trimethyltin acute administration is a useful tool to investigate neurodegenerative processes (1). This research was carried out to characterize regions of the rat medial entorhinal cortex, where vimentin (VIM), glial fibrillary acidic protein (GFAp) immunoreactivity of reactive astroglia, and IBA1 immunoreactivity of microglia are related to neuronal loss after administration of trimetyltin hydrocloride. Male Sprague-Dawley rats, weighting 250 g were given a single intraperitoneal dose of 8 mg/kg of trimethyltin hydrochloride (TMT), or the vehicle only, and were sacrificed after 21 days. 10 μm horizontal serial sections of paraffin embedded brains of all specimens were stained with cresyl violet (CV) 10 μm horizontal serial sections of paraffin embedded brains of all specimens were stained with cresyl violet (CV) or immunocytochemically tested with anti-GFAp, anti-VIM or anti-IBA1 monoclonal antibodies. Each section was digitized using a 20x or 40x objective to get a 'mosaic' of all the entorhinal cortex. Such large images of three adjacent sections, the first VIM-, the second GFAp- and the third IBA1-immunotested (or CV-stained) were placed each one into a RGB stack and aligned showing VIM as red, GFAp as green and IBA1 or CV as blue false colors. In the medial entorhinal cortex of TMT-treated rats a few VIM-immunoreactive astrocytes were found mainly in the layer II and also, with less density, in the layer III, while GFAp-immunoreactive astrocytes appeared very numerous, increased in size and located in the layers I, II and III, and IBA1-immunoreactive microglial cells distributed at least partly similarly to GFAp-immunoreactive astrocytes. Such central core VIM - immunoreactive, surrounded by a halo GFAP – and IBA1 - immunoreactive, focused attention mainly on the layer II where was found a significant neuronal loss, and also, on the more lateral part of the layer III. In addition, some Iba1 - immunoreactive cells showed a morphology not type microglia, as they were similar to astrocytes or neurons, suggesting a possible neuroinflammatory-induced phenotypic plasticity process.

References

[1] Geloso MC, Corvino V, Michetti F (2011) Trimethyltin-induced hippocampal degeneration as a tool to investigate neurodegenerative processes. Neurochem Int. 58(7):729-38.

Keywords

Image analysis; rat; medial entorhinal cortex; reactive gliosis.