

Reactive changes of retinal astrocytes and Müller glial cells in kainate-induced neuroexcitotoxicity.

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摘要

Abstract

The aim of this study was to investigate reactive changes of astrocytes and Müller glial cells in rats subjected to kainate treatment, which leads to neuronal degeneration in the ganglion cell layer and the inner border of the inner nuclear layer as confirmed by labelling with Fluoro-Jade B, a marker for degenerating neurons and fibres. Both the astrocytes and the Müller glial cells reacted vigorously to kainate injection as shown by their up-regulated expression of nestin, glial fibrillary acidic protein and glutamine synthetase. A major finding was the induced expression of nestin together with glial fibrillary acidic protein beginning at 1 day post-injection of kainate. The marked nestin expression appeared to be most intense at 1 day and was sustained till 2 weeks as compared with the untreated/normal retina. Western blotting analysis confirmed a marked increase in expression of nestin, glial fibrillary acidic protein and glutamine synthetase as compared with untreated/normal retina. Double labelling study revealed that astrocytes and Müller glial cells expressed the radial glia marker nestin, and incorporated bromodeoxyuridine to re-enter into their cell cycle. The induced expression of these proteins in astrocytes and Müller glial cells indicated an induction of gliotic responses and de-differentiation that may be associated with regenerative efforts after kainate-induced injury. Indeed, with the acquisition of an immature molecular profile as manifested by the induced expression of brain lipid-binding protein and doublecortin in astrocytes and Müller glial cells, the potential of these cells to de-differentiate in retinal neurodegeneration is greatly amplified.