A subpopulation of astrocytes in the neurogenic regions of the adult human brain express GFAP-δ

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GFAP-δ mRNA is a product of alternative splicing of the Glial Fibrillary Acidic Protein gene (GFAP), whereby the last two exons of GFAP-α are replaced by a novel terminal exon residing within intron 7. This alternative terminal exon, termed exon 7+, alters the C-terminal protein sequence of the GFAP protein.

In this study we describe the location of GFAP-delta protein expressing astrocytes in the human central nervous system (CNS). We found that GFAP-δ protein is highly expressed in the adult human CNS by a ribbon of astrocytes following the ependymal layer of the cerebral ventricles. Recently it has been shown that this specific ribbon of astrocytes contain the neural stem cells in the adult human brain. In addition, GFAP-δ is not only expressed by this ribbon of astrocytes in the sub-ventricular zone but also by a small subpopulation of astrocytes in the subpial zone of the cerebral cortex, brain stem and spinal cord. We also show that in astrogliotic tissue GFAP-δ protein is expressed by reactive astrocytes in lesions of multiple sclerosis patients and in the subgranular astrocytes of Alzheimer's disease patients.

In addition, transfection studies showed that GFAP-δ has a dominant negative effect on GFAP cytoskeleton assembly, possibly referring to the extensive remodeling of the glial cytoskeleton observed during development. Overall we conclude that GFAP-δ could be a specific marker for the active germinal regions in the adult human brain, identifies a unique astrocyte population and therefore provide a unique tool to study the identity, location and organization of neural stem cells in the human CNS.

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