Glial fibrillary acidic protein (GFAP)-delta is a novel isoform that differs in its C-terminal sequence from other GFAP isoforms. Previous studies suggest restriction of expression to the subpial layer, subventricular zone and the subgranular zone astrocytes, with an absence in pathological conditions causing reactive gliosis. GFAP-delta is speculated to have roles in regulation of astrocyte size and motility and a subpopulation of GFAP-delta-positive glia may be multipotent stem cells. The aim of this study was to investigate its expression in common causes of lesion-related refractory epilepsy.

METHODS: Hippocampal sclerosis (HS), focal cortical dysplasia (FCD) type IIB, cortical tuberous sclerosis (TSC) lesions, gangliogliomas, grey matter heterotopias and hemimegalencephaly from a wide age range of patients using both surgical and post mortem tissue specimens were studied.

RESULTS: GFAP-delta expression was observed in CA4 and CA1 astrocytes in HS with less frequent labelling in the granule cell layer, even where granule cell dispersion was present. No significant labelling was noted in the subiculum in HS cases or in any subfields in non-HS epilepsy cases. Balloon cells in FCDIIB and hemimegalencephaly, giant cells in TSC and the astrocytic component of gangliogliomas showed immunoreactivity, colocalizing with conventional GFAP. No neuronal expression for GFAP-delta was seen in any of the pathologies. Quantitative analysis in 10 FCDIIB and five TSC cases revealed greater numbers of GFAP-delta-positive balloon cells than conventional GFAP. There was no GFAP-delta expression within nodular heterotopia.

CONCLUSIONS: GFAP-delta expression patterns in HS overall appears to mirror regional reactive gliosis. It is a useful marker for the demonstration of balloon cells in FCD and TSC, which may be relevant to their abnormal size and localization. The lack of GFAP-delta within heterotopia supports their composition from cells destined for deeper cortical layers [1)].

1)
Martinian L, Boer K, Middeldorp J, Hol EM, Sisodiya SM, Squier W, Aronica E, Thom M. Expression patterns of glial fibrillary acidic protein (GFAP)-delta in epilepsy-associated lesional pathologies. Neuropathol Appl Neurobiol. 2009 Aug;35(4):394-405. doi: 10.1111/j.1365-2990.2009.00996.x. PubMed PMID: 19508443.