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Light Microscopy Approach for Simultaneously Identification of Glial Cells and Amyloid Plaques

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The close spatial relationship of glial cells (astroglia and microglia) to amyloid plaques is one of the histopathological features of Alzheimer's disease. The work aimed to develop a simple and informative method for the simultaneous detection of amyloid plaques and glial cells. The suggested method is based on a combination of histochemical staining for amyloid and non-fluorescent immunohistochemical staining of glial cells. The cerebral cortex samples of aged people ($n = 8$) and brain samples from transgenic $5 \times \text{FAD}$ mice ($n = 6$) were the material for this study. The proposed methodological approach involves immunohistochemical labelling of microglia or astroglia followed by Alcian blue staining. The developed protocol is simple and well reproducible. It is suitable for identifying the association of glial cells with amyloid plaques. It was noted that immunohistochemistry for Iba1 (ionized calcium binding adaptor molecule 1) and for GFAP (glial fibrillary acidic protein) allows the most effective identification of microglia and astrocytes, respectively. It is also suitable for assessing the functional status of these cells. Amyloid plaques are intensely stained with Alcian blue and are well detected. In comparison with double immunofluorescence staining technique for simultaneous detection of glial cells and amyloid plaques, the developed method is simple to implement and requires only a light microscope, which makes it accessible to most laboratories.

Keywords: amyloid plaques, astrocytes, microglia, immunohistochemistry, Alzheimer's disease