HISTOLOGICAL AND ULTRASTRUCTURAL (IMMUNO-ELECTROM MICROSCOPY) STUDY OF COTTON WOOL PLAQUES IN A PATIENT OF ALZHEIMER DISEASE WITH PRESENILIN 1 MUTATION

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Aims: Electron microscopical study has rarely been reported on cotton wool plaques. To clarify the presence of amyloid deposition and degenerative neuritis in the plaques, we studied the plaques in an AD patient with presenilin 1 mutation.

Methods: As the specimen was fixed in formalin for 2 years and the tissue preservation was very poor, we used the frozen brain tissue. Some specimens were put in liquid nitrogen, cracked less than 1 mm cube, and then defrosted in a) room temperature or b) sherbet-like cooled 2.5% glutaraldehyde (GA) or GA·1% paraformaldehyde (PF) fixative, and embedded in Epon. For immuno-electron microscopy, ultrathin sections (GA·PF-blocks) were penetrated by 10% sodium periodate and then immunostained with MBC42 for overnight, and reacted with 10 nm gold for 2 hours.

Results: The plaques were mainly composed of accumulation of many synaptic devices, glial processes, occasional tangles and a few wisps of amyloid bundles. The degenerative neurites were very rarely encountered. Post-synaptic dendrites were very atrophic in the plaques. Some thin sections were stained with oolong tea and then double stained with uranyl acetate and lead citrate. The synaptic structures were well demonstrated by oolong tea staining.

Conclusions: Sherbet-like cooled fixation was the best method for tissue preservation for frozen stored specimen. As the fine structures of cotton wool plaques have minimal degenerative neurites and amyloid fibrils, it is distinct from that of banal AD.