

Abstract

The process of aging causes the major changes in nervous tissue such as changes in the size of brain, architecture of glial cells and extracellular matrix. The size of brain is on the decrease as consequence of aging and there is a change of molecules as well as morphology at all levels. Extracellular space (ECS) is interstitium important especially in communication between cells mediated by diffusion. The limit of diffusion in extracellular space is given by size of ECS, which is discribed by volume fraction and tortuosity, that reflect amount of diffusion barriers. The changes of ECS diffusion parameters during aging were measured by real-time iontophoretic method in four parts of brain (cortex - Cx, hippocampus - Hp, inferior colliculus - IC and corpus trapezoideum - TB). Further, we studied influence of deficiency of Bral2 link protein at differences of ECS diffusion parameters and importance of Bral2 protein at aging and regulation mechanisms of cytotoxic brain edema. Our results show, that aging leads to decreasing of ECS volume v Cx and Hp, but it was not observed in IC and TB, where the intact perineuronal nets act like protecting shield against the degenerative disease induced by aging. However, small differences in composition of perineuronal nets, deficiency of Bral2 link protein, may lead to disruption of this protecting mechanism. Our data revealed, that aging has marked affect at regulation mechanisms of cell volume during cytotoxic edema. Worse absorption of cytotoxic edema may be cause of extended influence of elevated concentration of neurotoxic substances and arise to deepen damage of tissue.

Keywords: extracellular space, diffusion, extracellular matrix, ageing.