THE ROLE OF EXTRACELLULAR MATRIX MOLECULES IN THE REGENERATION OF FROG OPTIC NERVE

Zsuzsa Máthéné Szigeti, Department of Anatomy, Histology and Embriology

University of Debrecen, Medical and Health Science Center, Hungary

In the first part of our study we observed, with the aid of specific histochemical reactions, the distribution pattern of hyaluronan (HA), tenascin C and fibronectin, extracellular matrix (ECM) molecules in the central nervous system of the frog. We obtained that all of the three molecules were present in the gray and white matter in telencephalon, diencephalon, mesencephalon, cerebellum, rhombencephalon and spinal cord, but we did not find any distribution that can be connected to specific structures. In the gray matter the most important difference was that the HA and tenascin C reaction can be found in the perineuronal net (PN) around perikaryon, while the fibronectin reaction was found in the cytoplasm of neurons. The cause of the similarities between the distribution of HA and tenascin C can be that HA is connected to tenascin C in the PN. We showed the differences of the HA and tenascin C reaction in the termination areas of the optic nerve by measuring their optical density.

In the second part of our study we examined the changes of the HA and tenascin C distribution after transecting the optic nerve. From the fifth survival day the intensity of reaction decreased in nucleus of Bellonci (nB) and lateral geniculate body (LGB) in both sides. Till the third postoperative week less decreasing can be found in the intact optic nerve fibers receiving side in both nuclei. The intensity of the reaction in nB decreased in a less degree than in LGB in all investigated stages and this difference could be observed in both sides. With both of the reactions we found disintegration of the PN in the LGB on the regenerating optic nerve fibers receiving side between the second-fourth weeks. This finding indicates to that HA and tenascin C are important for the initiation of regeneration. Increasing of the reaction intensity in later reintegration stages shows that reexpression of HA and tenascin C can contribute to the stabilization of new synaptic connections in the reintegrating PN. The degree of changes was less in the layers of the optic tectum than in the diencephalic centers. According to our results it can be established that the optic nerve regeneration is accompanied by qualitative and quantitative changes of HA and tenascin C in the optic centre of frog.