Characterization of neural stem cells and proliferating cells in the brain of loach (Misgurnus anguillicaudatus)

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Abstract

Loach (Misgurnus anguillicaudatus) is an essential commercial fish in China. We aimed to give some notes on brain histology of loach fish and characterize the sites of stem cells in the brain. As well as, we showed the sites of proliferating cells with detection of their glial property. To this end, we histologically observed the structure of the brain via hematoxylin and eosin stain. We also used fluorescent in situ hybridization to evaluate the localization of Msi1, Bmi1, and Sox2. They are essential genes expressed in brain stem cells of loach. Proliferating cells were evaluated by PCNA immunofluorescence. As well as GFAP immunofluorescence was used for detection of the gial property of proliferating cells. Our results indicated that the neural stem cells were located in the granular cell layer of the cerebellum, vagal lobe, facial lobe, optic tectum, and beside the third ventricle because these sites exhibited expression of Sox2. There were several areas of the brain that contained proliferating cells, including the cerebrum, in the torus longitudinalis, and in between the optic tectum and cerebellum. In the cerebellum, the proliferating cells were present in the molecular cell layer, around the intracerebellar ventricle, in the lobus caudalis cerebella, in the eminentia granularis, and around the rhombencephalic ventricle. Proliferating cells were also observed in the three layers of the vagal lobe and throughout the facial lobe. These proliferating cells were all negative for GFAP. The present study provides valuable insight into neural stem cells in loach brain, and these findings can be used to guide future studies.

Keywords

Loach (Misgurnus anguillicaudatus); brain; development; proliferation; stem cell