

Bone marrow-derived mesenchymal stem cells characterization and transplantation in an animal model of congenital hydrocephalus

M. García Bonilla, M. Cifuentes, A. Ho Plágaro, K. Shumilov, L. Santos Ruiz, J.M. Pérez Fígares, A.J. Jiménez
Facultad de Ciencias. Universidad de Málaga, Málaga

Congenital hydrocephalus is a disorder presenting a degeneration of the periventricular cerebral parenchyma and the white matter, which causes significant mortality and life-long neurological complications. There are currently no effective therapies for congenital hydrocephalus. Bone marrow-derived mesenchymal stem cells (BM-MSK) are considered as a potential therapeutic tool in neurodegenerative diseases, due to their ability to migrate to degenerated tissues and the production of growth factors. In the present study, using an animal model of congenital hydrocephalus, the hyh mouse, it has been studied the capacity of the BM-MSK to reach the degenerated regions exhibiting glial reactions and their probable neuroprotector effects.

The BM-MSK were isolated from two different sources: a) transgenic mice expressing the monomeric red fluorescent protein (mRFP1); b) wild type mice. In the second case, the BM-MSK were labelled in vitro using bromodeoxyuridine, a fluorescent cell tracker and the lipophilic DiR. Before application, the cells were analysed using flow cytometry and immunofluorescence. The BM-MSK were injected into the retro-orbital sinus or into the lateral ventricle of hyh mice. After 24/96 hours of administration, the BM-MSK were detected under light, confocal and electron microscopes.

The injected BM-MSK reached the degenerated periventricular regions and the disrupted neurogenic niches. They were detected in the periventricular parenchyma, around periventricular blood vessels and in the ventral meninges. Most of the applied BM-MSK expressed the glial cell-derived neurotrophic factor (GDNF), in the same way as the periventricular reactive astrocytes, suggesting a possible neuroprotector effect.

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Áreas Temáticas:

1^a: Trastornos y reparación del sistema nervioso

2^a: Nuevos métodos y tecnologías

Presenting author: María García Bonilla email: mgbonilla@uma.es