

Long-time effects of an experimental therapy with mesenchymal stem cells in congenital hydrocephalus

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Introduction

Bone marrow-derived mesenchymal stem cells (BM-MSK) are a potential therapeutic tool due to their ability for migrating and producing neuroprotector factors when they are transplanted in other neurodegenerative diseases. Moreover, some investigations have shown that BM-MSK are able to modulate astrocyte activation and neuroprotector factor production. The aim of this study was to evaluate the long-time effects of a BM-MSK experimental therapy in the hyh mouse model of congenital hydrocephalus.

Methods

BM-MSK were characterized *in vitro* and then transplanted into the ventricles of young hydrocephalic hyh mice, before they develop the severe hydrocephalus. Non-hydrocephalic normal mice (wt) and hydrocephalic hyh mice sham-injected (sterile saline serum) were used as controls. Samples were studied by analyzing and comparing mRNA, protein level expressions and immunoreaction related with the progression and severity of hydrocephalus.

Results

Fourteen days after transplantation, hydrocephalic hyh mice with BM-MSK showed lower ventriculomegaly. In these animals, BM-MSK were found undifferentiated and spread into the periventricular astrocyte reaction. There, BM-MSK were detected producing several neuroprotector factors (BDNF, GDNF, NGF, VEGF), in the same way as reactive astrocytes. Total neocortical levels of NGF, TGF- β and VEGF were found increased in hydrocephalic hyh mice transplanted with BM-MSK. Furthermore, astrocytes showed increased expressions of aquaporin-4 (water channel protein) and Slit-2 (neuroprotective and anti-inflammatory molecule).

Conclusions

BM-MSK seem to lead to recovery of the severe neurodegenerative conditions associated to congenital hydrocephalus mediated by reactive astrocytes.