# 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-MSC) 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-MSC 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-MSC experimental therapy in the hyh mouse model of congenital hydrocephalus.

## Methods
BM-MSC 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-MSC showed lower ventriculomegaly. In these animals, BM-MSC were found undifferentiated and spread into the periventricular astrocyte reaction. There, BM-MSC 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-MSC. Furthermore, astrocytes showed increased expressions of aquaporin-4 (water channel protein) and Slit-2 (neuroprotective and anti-inflammatory molecule).

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