iPSC differentiation into ependymal progenitors to treat ventricular damage during hydrocephalus

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Introduction

During both obstructive congenital hydrocephalus and post-hemorrhagic hydrocephalus additional pathological events are intimately associated with their ethiology: a) a detrimental inflammatory response; b) severe damage of the underlying periventricular nervous tissue, including white matter, and c) damage on the ventricular wall. Therapeutic approaches have been directed to overcome a) and b), however recovery of damaged neuroepithelium/ependyma is, in our present, an important therapeutic gap.

Methods

Human and mouse induced pluripotent stem cells (iPSC) have been artificially differented into ependymal progenitors. Intracerebroventricular (ICV) injections of iPCS are performed ex vivo and in vivo in the damaged ventricular wall. Their integration and differentiation has been studied by immunohistochemistry and histopathological analysis. Also, the effect of TNF-alpha on the recovery of the ventricular wall will be tested.

Results

Mice and human ependymal progenitors are able to integrate and differentiate into ependyma in damaged ventricular wall. Stage of ependymal differentiation by the time of the injection defined different degrees of integration.

Conclusions

iPSC appear to be a good ependymal progenitor source with no ethical controversy associated.