Cell Therapy

Neural Stem Cells from cerebrospinal fluid of premature babies with intraventricular haemorrhage

A research group from Andalusian Public Health System, in collaboration with the University of Malaga, has isolated neural stem cells (NSCs) from the cerebrospinal fluid (CSF) of preterm infants with intraventricular haemorrhage (IVH) suitable as advanced therapy for the autologous treatment of infants with IVH or for developing allogeneic therapies for different neurological disorders.

Oficina de TRANSFERENCIA DE TECNOLOGÍA
Sistema Sanitario Público de Andalucía

Description

Intraventricular haemorrhage (IVH) remains a significant problem in infants with very low birth weight (VLBW <1500 g) and extremely low birth weight (ELBW <1000 g). Premature infants with severe IVH present higher risk to develop post-hemorrhage hydrocephalus (PHH) or periventricular leukomalacy, and exhibit long-term neurological deficits with cognitive and psychomotor disabilities. No cure for IVH has been developed so far.

Neural stem cells (NSCs) have been tested in clinical trials for spinal cord injury, amyotrophic lateral sclerosis, glioma, cerebral palsy and other neurological disorders. NSCs can be isolated from the central nervous system (CNS) of foetuses and adult tissue, but these procedures require human embryos or invasive procedures, respectively. Nonetheless, NSCs from the CNS of foetuses remain the most used cell type for clinical use. Despite the encouraging results of some of these clinical trials, the scarcity of source material and the ethical problems associated with isolation of the NSC is an obvious constraint for the use of these cells as a therapy.

Our research group has demonstrated that NSCs can be easily and robustly isolated from preterm infants with IVH. The cell population obtained from the CSF have been characterized and is very similar to foetal forebrain NSCs, and not to other stem cell types, such as CD34 positive cord blood or bone marrow mesenchymal stem cells. However, these CSF-NSCs present several distinctive hallmarks such as an increased expression of podocalyxin (PODXL) or IL1RAP.

These CSF-NSCs could be useful for the development of autologous therapies for infants with IVH and PHH as well as for developing allogeneic therapies for different neurological disorders. In addition, they may be used as an *in vitro* model for the study of different diseases and the effect of drugs on neural stem cells.

Advantages

1. CSF-NSCs are directly isolated from discarded liquid obtained during neuroendoscopic irrigation performed as treatment of PHH, so pose no ethical concerns.
2. CSF-NSCs are phenotypically stable through passages and adequately proliferate maintaining a stable karyotype.
3. Gene-expression profile of our cells is closer to foetal NSCs than to IPS-derived NSCs, bone marrow mesenchymal or cord blood hematopoietic stem cells. However, CSF-NSCs overexpress 112 markers that differentiate them from foetal NSCs which can be useful to isolate them.
4. Fibroblast-like cells can be isolated from these samples meaning that non-hemorragic CSF can be a new source for fibroblast/mesenchymal stem cells isolation.

Intellectual property

Technology covered by a European patent application which will be extended to PCT.

Aims

Looking for a partner interested in a license and/ or a collaboration agreement to develop and exploit this asset.

Clasificación

Area: Cell therapy / Pathology: Central Nervous System

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