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Are olfactory ensheathing cells a promising cell therapy tool?

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Olfactory Ensheathing Cells (OECs) show a peculiar plasticity and represent a unique population in the olfactory system supporting the continuous neuronal turnover and sheathing olfactory axons. They exhibit antigenic and morphological characteristics both of astrocytes and of Schwann Cells. In vitro, OECs promote axonal growth, moreover in vivo they can form myelin, promoting remyelination of damaged axons. In the last two decades, OECs have emerged as possible supportive cells for regeneration and functional recovery of damaged Central Nervous System (CNS).

A characterization was performed both by flow cytometry and immunocytochemistry for the following markers: Vimentin, S-100β, Nestin, Glial Fibrillary Acidic Protein, Myelin, Neural Cell Adhesion Molecule, Low-affinity Nerve Growth Factor Receptor p75, Microtubule Associated Protein-2 and Protein Gene Product 9.5. In order to study the modulation of these markers, OECs were also grown in different culture conditions: standard or serum-free media with/without Growth Factors (GFs), such as basic Fibroblast Growth Factor and Glial Derived Neurotrophic Factor. Basal apoptosis was evaluated by annexin and propidium iodide analysis as well as after exposition to 6-hydroxydopamine (6-OHDA). Neural stem cells and a neuroblastoma cell line (SH-SY5Y) were used as control, primary OECs were prepared from postnatal mouse (P1) olfactory bulbs. Moreover, neuroprotective properties of OECs on 6-OHDA-treated cells were evaluated by an in vitro co-culture system or addition of OEC conditioned medium. We observed: 1) change of OEC usual morphology, reduction of both cell viability and marker expression in serum-free medium; 2) positive influence of GFs on both viability and marker expression; 3) no increased apoptosis after a prolonged exposition to 6-OHDA; 4) OEC neuroprotective effect, albeit non statistically significant, on 6-OHDA treated SH-SY5Y cells. These peculiar properties of OECs might render them as useful potential clinical agents being able to support injured CNS.

Keywords

Olfactory glia, growth factors, immunocytochemistry, flow cytometry, neuroprotection, neurotoxin.