

Olfactory Ensheathing Cell: a peculiar glial cell

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Olfactory Ensheathing Cells (OECs) are glial cells that ensheath the small nonmyelinated axons of the olfactory receptor neurons. Several studies reveal that OECs produce various growth factors and adhesion molecules that are involved in glia-axon adhesion. Immunocytochemical techniques have demonstrated that OECs express an high number of markers, such as GFAP, p75^{NTR}, S100, vimentin, nestin, neuropeptide Y and calponin. During the last years, OECs have drawn considerable interest for their exceptional ability to promote regeneration in the injured CNS and for their functional plasticity. These peculiarities suggest that OECs could be used as potential restoration agents and provide trophic support to CNS injury.

In this study we have evaluated: 1) the effect of rat OECs on the CNS neurons in culture; 2) the expression of different markers in OECs grown in different conditions.

1) We have focused our researches on hypothalamic and hippocampal neuronal survival and neurite outgrowth in the presence of OECs, compared to the action of some trophic factors, such as bFGF, NGF and GDNF in a co-culture model. Each individual population of cells was identified by immunocytochemical procedures. Our results have demonstrated that both in hypothalamic neurons/OECs co-cultures and in hippocampal neurons/OECs co-cultures, the number of neurons was significantly increased compared to controls exhibiting a dense axonal outgrowth. Moreover, we show that in both co-culture models, bFGF, NGF and GDNF support them differently.

In conclusion, our data report that OECs exert a positive effect on survival and growth of neurons *in vitro* suggesting that they might be considered a better approach for functional restoration and for neural plasticity.

2) In our studies, we examined the expression of different markers in rat OECs grown both in serum containing medium and in serum-free medium added with different growth factors (bFGF and GDNF). OECs cultures were immunostained for calponin, nestin, Protein Gene Product (PGP 9.5) and Microtubule Associate Protein-2 (MAP-2). Our results have shown a different expression of nestin and calponin, depending on the presence of bFGF or GDNF. Moreover, the expression of neuronal markers (PGP 9.5 and MAP-2) increased in OECs grown in serum-free medium both treated with growth factors and without them. This result suggests that the highest expression of neuronal markers in serum-free medium might be explained by serum containing molecules that inhibit the effect of growth factors on the PGP 9.5 and MAP-2 expression.

Key words

Olfactory Ensheathing Cells, growth factors, immunocytochemistry, neuronal cultures.