FATE OF AUTOLOGOUS DERMAL STEM CELLS TRANSPLANTED INTO THE SPINAL CORD AFTER TRAUMATIC INJURY (TSCI). EVALUATION OF THE RECOVERY FROM HINDLIMB DISABILITY

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Rat dermis is a source of cells capable of growing in vitro and, in appropriate conditions, forming floating spheres constituted by nestin-positive cells. We have clonally grown these spheres up to the 15th generation. These spheres can be dissociated into cells that differentiate in vitro under appropriate conditions, these cells are labelled by antibodies to immature neuron markers such as nestin and β-tubulin III and, later, to mature neuron markers such as MAP2 and neurofilaments. However, most cells are positive to the astroglial marker GFAP.

Dissociated sphere-derived cells are transplanted into the spinal cord after traumatic injury at 3 mm from injury, that is caused in 250 g rats by means of the UTS-Impactor see (Gorio et al.) set for force of 1Newton and 1 s duration. Behavioural recovery is monitored by free locomotion and swim tests.

Dermis-derived stem cells migrate into the lesion cavity rather easily, but their differentiation is dependent upon the time interval between lesioning and cell transplantation. Injection of skin-derived stem cell within 30’ from injury yields mainly MAC-1, CD-4 and CD-8 positive cells, that 60-90 days later undergo apoptosis. However, when transplantation is performed 7 days after injury, most cells (65% of total) are positive to staining with antibodies to GFAP, others (16%) to neurofilaments, and a smaller amount (2%) to PECAM (endothelial marker).

The concomitant treatment with erythropoietin enhances greatly the behavioural recovery and the amount of PECAM-positive cells located in the surviving white matter at the site of lesion. Thus our study shows that delayed transplantations of dermis-derived staminal cells yields healthy cells that do not die and differentiate mainly in glia and neurons. Such a result is markedly potentiated by erythropoietin treatment, that promotes greater behavioural recovery and revascularization of the surviving white matter.