

Schwann cell co-culture improves the therapeutic effect of bone marrow stromal cells on recovery in spinal cord-injured mice

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Studies of bone marrow stromal cells (MSC) transplanted into the spinal cord-injured rat give mixed results: some groups report improved locomotor recovery while others only demonstrate improved histological appearance of the lesion. These studies show no clear correlation between neurological improvements and MSC survival. We examined whether MSC survival in the injured spinal cord could be enhanced by closely matching donor and recipient mice for genetic background and marker gene expression. We also examined whether exposure of MSC to a neural environment (Schwann cells) prior to transplantation would improve their survival or therapeutic effects *in vivo*. Despite genetic matching of donors and recipients MSC survival in the injured spinal cord was very poor (~1%). However we noted improved locomotor recovery accompanied by improved histopathological appearance of the lesion in transplanted mice. These mice had more white and gray matter sparing, more laminin, Schwann cell infiltration and preservation of neurofilament and 5HT-positive fibers at and below the lesion in transplanted mice. There was also decreased scarring, chondroitin sulphate proteoglycan deposition and macrophage activation in transplanted mice. The Schwann cell co-cultured MSC had greater effects on all these measures than untreated MSC. Thus Schwann cell co-culturing MSC improves their therapeutic effects in spinal cord-injured mice and these effects do not require long-term survival. These results indicate that the temporary presence of MSC in the injured cord is sufficient to alter the cascade of events that normally occurs after SCI generating a microenvironment that favours recovery.