

Fibrin conduit supplemented with human mesenchymal stem cells and immunosuppressive treatment enhances regeneration after peripheral nerve injury.

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Publication Date: 2012

Abstract:

To address the need for the development of bioengineered replacement of a nerve graft, a novel two component fibrin glue conduit was combined with human mesenchymal stem cells (MSC) and immunosuppressive treatment with cyclosporine A. The effects of MSC on axonal regeneration in the conduit and reaction of activated macrophages were investigated using sciatic nerve injury model. A 10mm gap in the sciatic nerve of a rat was created and repaired either with fibrin glue conduit containing diluted fibrin matrix or fibrin glue conduit containing fibrin matrix with MSC at concentration of 80×10^6 cells/ml. Cells were labeled with PKH26 prior to transplantation. The animals received daily injections of cyclosporine A. After 3 weeks the distance of regeneration and area occupied by regenerating axons and ED1 positives macrophages was measured. MSC survived in the conduit and enhanced axonal regeneration only when transplantation was combined with cyclosporine A treatment. Moreover, addition of cyclosporine A to the conduits with transplanted MSC significantly reduced the ED1 macrophage reaction.

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