Intervertebral Disc Repair by Autologous Mesenchymal Bone Marrow Cells: A Pilot Study

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Abstract

Background. Degenerative disc disease may cause severe low-back pain, a large public health problem with significant economic and life quality impact. Chronic cases often require surgery, which may lead to biomechanical problems and accelerated degeneration of the adjacent segments. Cell-based therapies may circumvent these problems and have exhibited encouraging results in vitro and in animal studies. We designed a pilot study to assess feasibility and safety and to obtain early indications on efficacy of treatment with mesenchymal stem cells (MSC) in humans.

Methods.
Ten patients with chronic back pain diagnosed with lumbar disc degeneration with intact annulus fibrosus were treated with autologous expanded bone marrow MSC injected into the nucleus pulposus area. Clinical evolution was followed for 1 year and included evaluation of back pain, disability, and quality of life. Magnetic resonance imaging measurements of disc height and fluid content were also performed.

Results.
Feasibility and safety were confirmed and strong indications of clinical efficacy identified. Patients exhibited rapid improvement of pain and disability (85% of maximum in 3 months) that approached 71% of optimal efficacy. This outcome compares favorably with the results of other procedures such as spinal fusion or total disc replacement. Although disc height was not recovered, water content was significantly elevated at 12 months.

Conclusions.
MSC therapy may be a valid alternative treatment for chronic back pain caused by degenerative disc disease. Advantages over current gold standards include simpler and more conservative intervention without surgery, preservation of normal biomechanics, and same or better pain relief.