Matrix-assisted cell transfer for intervertebral disc cell therapy

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Cell therapy seems to be a promising way to reconstitute degenerated discs. We elucidate the basic aspects of intervertebral disc (IVD) cell therapy to estimate its potential in disc regeneration. Cell transfer efficiency and survival was quantified by luciferase expression after injection of recombinant cells into healthy, nucleotomized or mechanically degenerated rabbit IVDs in vitro, in situ or in vivo. A two-component fibrin matrix was adapted to allow injection of a fluid cell suspension that quickly polymerizes in IVDs. Thirty-five to fifty percent of matrix injected cells remained in the nucleus and transition zone in contrast to a rapid loss of medium-injected cells. Nucleotomy, which reduces intradiscal pressure, was crucial to the survival of the transferred cells over 3 days and nutritional enrichment of the fibrin matrix with potent biomolecules from serum significantly enhanced cell viability. In conclusion, advanced matrix substitutes are needed for efficient transfer and improved cell survival in the low-nutrient intradiscal environment to further improve disc cell therapy.

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