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### Stem cell biology and applications in preclinical experiments

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Regenerative medicine is a rapidly increasing research field worldwide. In this field, cell therapy applications involving mesenchymal stem cells (MSCs) are currently under investigation, some applications are already in clinical use. Cell sources for clinical treatments in clinical use are example bone marrow derived MSCs. Low back pain is common in the western world and intervertebral disc (IVD) degeneration is considered to be a major cause. Recently, stem cell therapy has been discussed as alternative treatment option for degenerated IVDs where the purpose would be to repair, maintain or enhance the function of particular cell types in the IVD. Further, normal cell proliferation and regeneration in the IVD are at present sparsely investigated. Cartilage is considered to lack/have a poor capacity of self-repair. However, studies have identified progenitor-/stem cells in cartilage (different mammalian species) and data point in direction that adult IVDs have a regeneration capacity, however slow. The possibility to stimulate local cells *in situ* would be an interesting biological treatment option. Preclinical experiments example xenotransplantation animal models are useful for evaluation of the local microenvironment effects that MSCs will encounter after transplantation. We have investigated cellular migration and tissue distribution of transplanted MSCs by non-toxic pre-labeling, iron compounds for tracing *in vivo* as well as monitoring effects of different biomaterials such as cellular motility on aligned collagen fiber coated surfaces (time-lapse methods). In conclusion, stem cell therapy using MSCs and/or to stimulate local stem-/progenitor cells hold a high promise for development of biological treatment options for degenerated cartilaginous tissues.

#### Biography

Helena Barreto Henriksson is active in the regenerative medicine research field since 10 years with main focus on molecular regenerative features of cartilage. Currently, she is working as a Researcher at the Department of Orthopaedics, Sahlgrenska University Hospital/Gothenburg University, Sweden in the translational medicine field; "from preclinical to new clinical approaches" like stem cell therapy for degenerated intervertebral discs as well as studying local tissue specific stem cell populations in the disc. She finished her PhD studies (Medical Science) at Gothenburg University, 2010 with the thesis "Intervertebral disc regeneration, studies on stem cell niches and cell transplantation".

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