Exploring progenitor cell therapies for the intervertebral disc
Keynote Presentation

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Abstract
Stem cell therapy of the intervertebral disc (IVD) is one of the most warranted but also highly disputed procedures to be applied for treatment of degenerated discs that in many cases cause high low back pain. From previous studies it is known that for instance notochordal cells, a relatively large cell type containing a high number of vesicles, are highly regenerative [1] and may stimulate other differentiated cells, such as nucleus pulposus cells (NPC) to produce more matrix.
Lately, a particular tissue-specific progenitor cell population has been identified in the center of the intervertebral disc (IVD), so-called nucleus pulposus progenitor cells (NPPC) [2]. The current hope is that these NPPC could play a particular role for IVD regeneration and/or delay of it.
The current knowledge on these cells is obscured and their specific requirements for *ex vivo* culture are not very clear. Current evidence confirms the presence of these cells in murine, canine, bovine and in the human fetal/surgical samples [3]. Interestingly, Tie2 is a marker for endothelial cells and it is not very clear what their origin and their role might be. Current data using a combination of molecular assays could identify these with about 2-5% in bovine coccygeal IVD samples of one-year age. In human surgical specimens their presence is more obscured depending on the donor's age and the particular condition of the IVD (e.g. based on Pfirrmann grade) [2, 3].
Here, I revisit the recent literature on regenerative cells identified for the IVD in the past decades. Current evidence how these NPPC can be isolated and detected in various species and tissues will be recapitulated. These NPPC are interesting to elaborate more closely from a developmental biology but also from an evolutionary point of you. Future directions will be provided how these progenitor cells could be used for regenerative medicine and tissue engineering.

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REFERENCES
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