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Biology and Regenerative Medicine Aspects of the Intervertebral Disc

As a major weight bearing structure with limited nutritional support, the intervertebral disc is prone to degenerative changes early in life and contributes to the development of low back pain. Disc degeneration and low back pain are amongst the most relevant musculoskeletal disorders, resulting in high direct and indirect costs for our health care systems. As current treatment options are not satisfactory, the field of intervertebral disc regeneration has gained increasing importance amongst researchers as well as in the view of the World Health Organization. This workshop will first provide a brief introduction to the biological processes occurring during intervertebral disc degeneration and will explain the molecular mechanisms that are hypothesized to contribute to pain development. Thereafter, various approaches to counteract degeneration and pain development will be explained. For each of the discussed novel treatments, the current state of the art as well as pitfalls that may hinder, limit and at least delay translation into clinical practice will be highlighted. Novel regenerative treatment examples to be demonstrated will include (1) tissue engineering of intervertebral disc (using a variety of modern techniques), (2) stem cell treatment (including an illustration on the use of fat-derived stem cells obtained directly in the OR) and (3) the use of biologics that have the potential to interfere with disc-typical pathological mechanisms.

Biography

Karin Wuertz-Kozak was born in 1978 in Germany. She received her degree in Pharmaceutical Sciences from the University of Regensburg, Germany in 2003 and her Ph.D. in Human Biology from the University of Ulm, Germany in 2006, based on her work in intervertebral disc cell mechanobiology. She was a Researcher at the University of Vermont, USA from 2006 to 2007 before joining and shortly thereafter taking over the Spine Research Unit at the University of Zurich, Switzerland. After having had a dual affiliation between xxx and xxx, she was promoted to a full-time research position at the ETH Zurich, Switzerland, one of the leading universities worldwide. In the subsequent years, she complemented her educational profile with an ETH habilitation as well as an MBA degree. Since July 2016, she is Assistant Professor for Immunoengineering & Regenerative Medicine at the ETH Zurich, with a focus on the pathophysiology and treatment of degenerative disc disease.

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