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"Strategies in Tissue Engineering and Regenerative Medicine"

Abstract: Regenerative medicine offers unique opportunities for developing new therapeutic approaches to treat and ultimately prevent life-threatening diseases. This includes strategies for the replacement, repair, and regeneration of tissues and organs damaged by disease and/or traumatic injury. It is the fabrication of replacement tissues and organs that here is called tissue engineering. This represents a rapidly growing interdisciplinary field within regenerative medicine involving biology, chemistry, physics, engineering and medical sciences. A major focus of tissue engineering is the creation of ex vivo manufactured tissues and organs, even multi-organ systems, in order to explore fundamental questions of (stem) cell, matrix and developmental biology. These in vitro manufactured systems can also be used as sophisticated tissue and organ test systems.

The monitoring of tissue-engineered constructs during their in vitro maturation or post-implantation in vivo is highly relevant for test system or graft evaluation. While traditional methods for studying cell and matrix components in engineered tissues and organs such as histology, immunohistochemistry or biochemistry require invasive tissue processing, resulting in the need to sacrifice the in vitro-engineered structures, multiphoton imaging and Raman spectroscopy allow the non-invasive, marker-free monitoring.

Brief Bio: Prof. Katja Schenke-Layland currently holds a dual appointment as a full professor (W3) at the Eberhard Karls Universität Tübingen (UKT) and deputy department head/group leader at the Fraunhofer (IGB) Stuttgart. She is also a visiting scholar at the University of California in Los Angeles (UCLA) and an executive editor for Advanced Drug Delivery Reviews (ADDR). The focus of her work is to decipher cellular and extracellular cues that allow normal human development in order to apply this knowledge in the design of regenerative therapeutic strategies. Katja also focuses on optical non-invasive cell and tissue monitoring technologies for the pre-implantation screening of tissue engineered constructs.