



**Project:** TexPatch – **Textile-based myocardial patch**

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**Description:**

The transplantation of different cell types after myocardial infarction has proven to be a novel and promising method in many small animal models to partially regenerate infarcted myocardium and improve cardiac function. However, the results of initial clinical studies in patients do not show a clear advantage, so that a better understanding of the underlying mechanisms and further development of the therapeutic methods are indispensable for clinical application. In the preliminary work of our own research group, differences in the migration of leukocyte subpopulations as endogenously active cells could be detected in various infarct and transplantation models of the rat and mouse. These affect angiogenesis activation, apoptosis and proliferation and change the myocardial texture, especially the different collagen contents of myocardial infarct and scar tissue. In the long term, cell transplantation indirectly improves cardiac function, but has no immediate effect on heart regeneration.

The aim of this project is the development and validation of a functional, contracting myocardial patch in the rat model. Thus, an immediate improvement of cardiac function after myocardial infarction should be ensured. The myocardial patch (TexPatch) consists of a three-dimensional textile cell carrier and different cell layers. The multilayer spacer textile enables colonization of these cell types for optimal embedding in the infarcted myocardium (e.g. outer coating with fibroblasts and inner colonization with vascularizing endothelial progenitor cells (EPC) and contractile pluripotent stem cells). Together, the entire biohybrid system forms a functional myocardial replacement tissue based on biomimetics. After implantation of the myocardial patches, the effect of the patch on the entire cardiac function is evaluated by two-photon microscopy and echocardiography: the differences of the extracellular matrix, especially the collagen phenotypes in the infarct scar, angiogenesis and functional changes of the myocardium as well as deposition of the extracellular matrix and cell distribution in the infarct zone.

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