

HIGHLIGHT

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Figure 1: Tubes manufactured by stereolithography (Fraunhofer ILT)

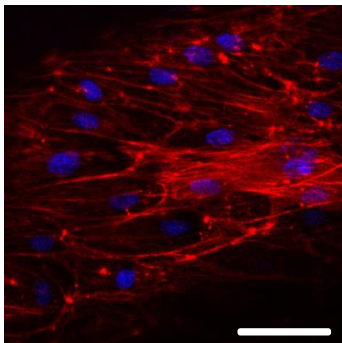


Figure 1: Actin cytoskeleton of endothelial cells is arranged along the media flow; nucleus, actin; scale bar: 50 μm (Fraunhofer IGB)

Endothelialisation and dynamic culture of synthetic biocompatible scaffolds for vascularised tissue constructs

Large tissue constructs are needed as *in vitro* test systems and for tissue replacement, e. g. after tumor resection. For oxygen and nutrient supply of these tissues, vascular structures need to be integrated since oxygen is used by surrounding cells in a distance of 200 μm . Our strategy to achieve vascularisation of artificial tissues is the endothelial lining of small synthetic tubes with 2 mm inner diameter and subsequent culture in a fluid flow bioreactor.

Synthetic tubes are manufactured from biocompatible polyacrylates by stereolithography (Fig.1). We established a biofunctionalisation procedure with chemically modified heparin and arginine-glycine-aspartic acid (RGD) peptides to improve cell adhesion and viability. The tubes can completely be seeded with endothelial cells using a rotating seeding procedure (Fig.2). Within this project, a bioreactor will be designed that covers all the needs for a dynamic endothelial cell culture and can subsequently be used for the supply of large tissue constructs due to a vascularisation system.

Endothelialised tubes cultured in a fluid flow bioreactor are excellent to be used as an *in vitro* vascularisation system for large tissue constructs.



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