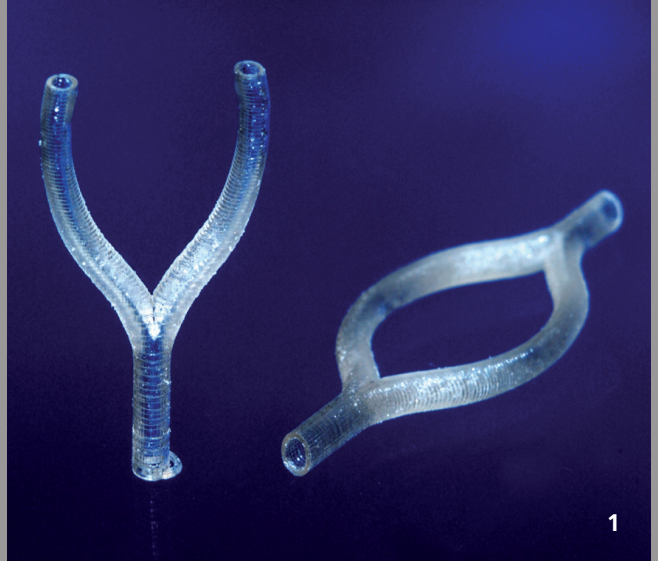

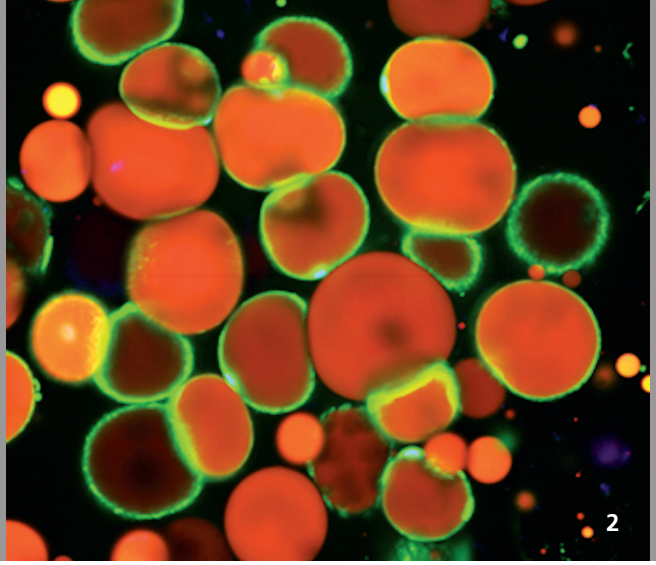

DEVELOPMENT OF ARTIFICIAL TISSUE

Task

To develop artificial soft tissue for medical tissue replacement or pharmaceutical testing, artificial scaffolds – which can be cultivated with tissue specific cells – have to be developed. Such scaffolds, which provide long-term stability and biological activity need a vascularization system for nutrition supply and waste removal within the several cell layers. Researchers in the multidisciplinary consortium of the EU project ArtiVasc 3D are developing such an artificial soft tissue replacement, which allows nutrition supply within a several millimeter thick tissue.

Method

For the development of such an artificial tissue, the combination of several disciplines is essential. Therefore, biological project partners are working on characterizing and isolating tissue specific cells like adipocytes, endothelial cells and pericytes so that they can cultivate them on the newly developed biopolymers. Adipocytes will be cultivated on electrospun fibers and hydrogels to mimic fatty tissue. For vascularization endothelial cells and pericytes will be cultivated on special branched vascular tubes produced by a combination of inkjet printing and laser based stereolithography and multiphoton polymerization.

Result

Currently, different cell cultures have been established. Adipocytes can be cultivated on electrospun fleeces and in hydrogels. By using laser based polymerization processes, researchers in ArtiVasc 3D have been able to produce branched vascular structures consisting of vessels and capillaries from flexible biopolymer. In future experiments cell cultivation will be tested.

Applications

The artificial tissue planned within the ArtiVasc 3D project will be employed in pharmaceutical research and will, therefore, help to reduce the amount of animal testing. Later on the scaffold will be used for the development of medical tissue such as skin and vessel replacement.

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1 Laser-structured branched vessel, inner diameter 5 mm.

2 Primary human subcutaneous adipocytes (source: Fraunhofer IGB).

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