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EUROPEAN PROJECT »ARTIVASC 3D«

CONSORTIUM

The Consortium consists of 16 partners from 7 different countries including research institutes, universities, medical hospitals, SMEs and industries.



PROJECT COORDINATOR

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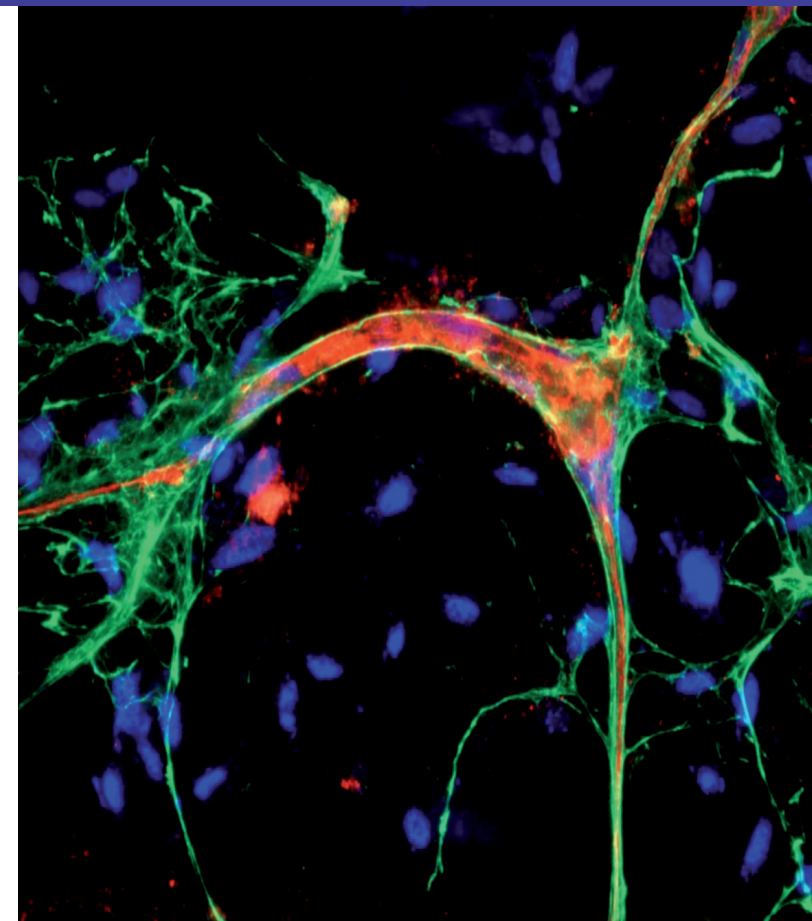
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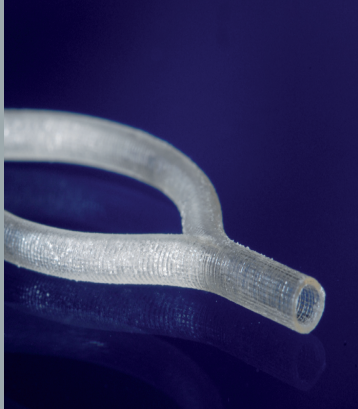
For further information please see
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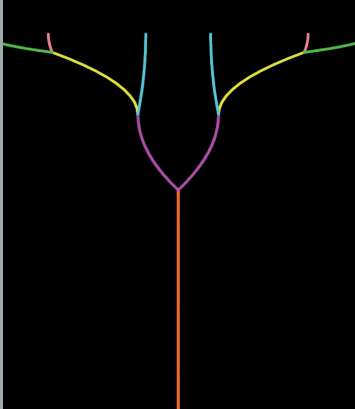
ARTIFICIAL VASCULARISED SCAFFOLDS FOR 3D-TISSUE REGENERATION



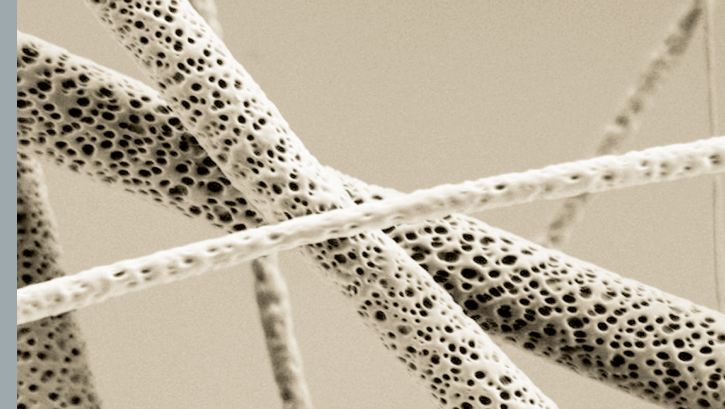
Cover photo: Isolated pericytes of vascular structures (Immunofluorescence).



Branched vessel made by stereolithography



Bifurcated blood vessel simulation.



Porous electrospun fibers.

PROJECT AIMS

ArtiVasc 3D will provide a micro- and nano-scale based manufacturing and functionalisation technology for the generation of fully vascularised bioartificial fatty tissue. The artificial vascularisation will, for the first time, allow a connection to the natural tissue enabling entire nutrition and metabolism. By combining the fatty tissue with a dermal and epidermal cell layer a 3-layered skin equivalent will be developed.

APPLICATIONS

For the newly developed tissue two main applications are in the focus of interest. First, new in vitro skin models with blood vessel systems are needed for pharmaceutical, cosmetic and chemical research allowing a reduction of animal experiments. In addition, this soft tissue will provide an in vivo skin model for skin replacement in burn and trauma treatment.

PROJECT ORGANISATION

The ArtiVasc 3D consortium is a multidisciplinary team consisting of scientists working in the fields of chemistry, biology, physics, medicine and engineering. Together they work in the following three domains to achieve the objectives of the Project.

Material, Design and Functionalization

- Development of processable, degradable and non-degradable materials to build up biocompatible blood vessels and surrounding tissue
- Modelling and design of the planned structures gives input for material and process development
- Biofunctionalization of artificial material allows proper cell cultivation

Process and Machine Development

- Branched vessel structures with dimensions from $> 100 \mu\text{m}$ will be generated by Inkjet printing technology
- High-resolution laser processes like stereolithography and multiphoton polymerisation are used for smaller vessels and pores
- The surrounding network for cell cultivation will be generated by electro spinning

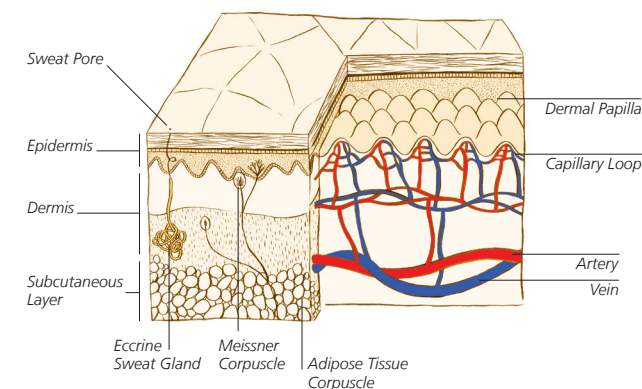
Tissue Generation and Validation

- Development of a bioreactor for cell cultivation with characteristic cell types and co-cultivation of endothelial cells, pericytes and adipocytes
- Fundamental understanding of matrix-tissue interaction will be generated to develop intact fatty tissue
- Evaluation of the newly developed tissue through in vitro and in vivo tests

PROJECT DETAILS

Acronym	ArtiVasc 3D
Start Date	November 1, 2011
End Date	October 31, 2015
Duration	48 months
Project Budget	10,5 million euro
EC Funding	7,8 million euro
Type	Large-scale integrating project
Call	FP7-NMP-2010-LARGE-4
	Development of standard scaffolds for the rational design of bioactive materials for tissue regeneration

SKIN MODEL



Scheme of three layered skin model with blood vessels.