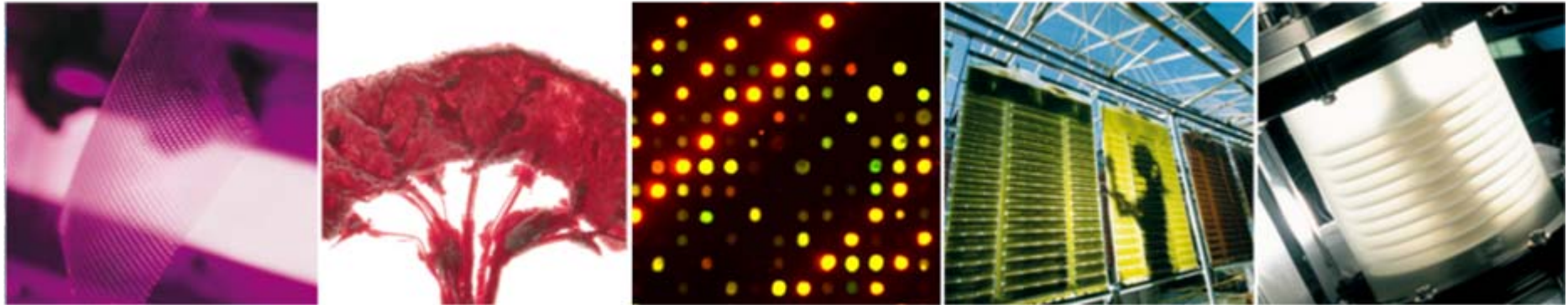

In vitro optimization of medicinal products and medical devices using engineered 3-D Tissues

Esther Novosel, Dipl. Biol. t.o.
Departement Cell and Tissue Engineering

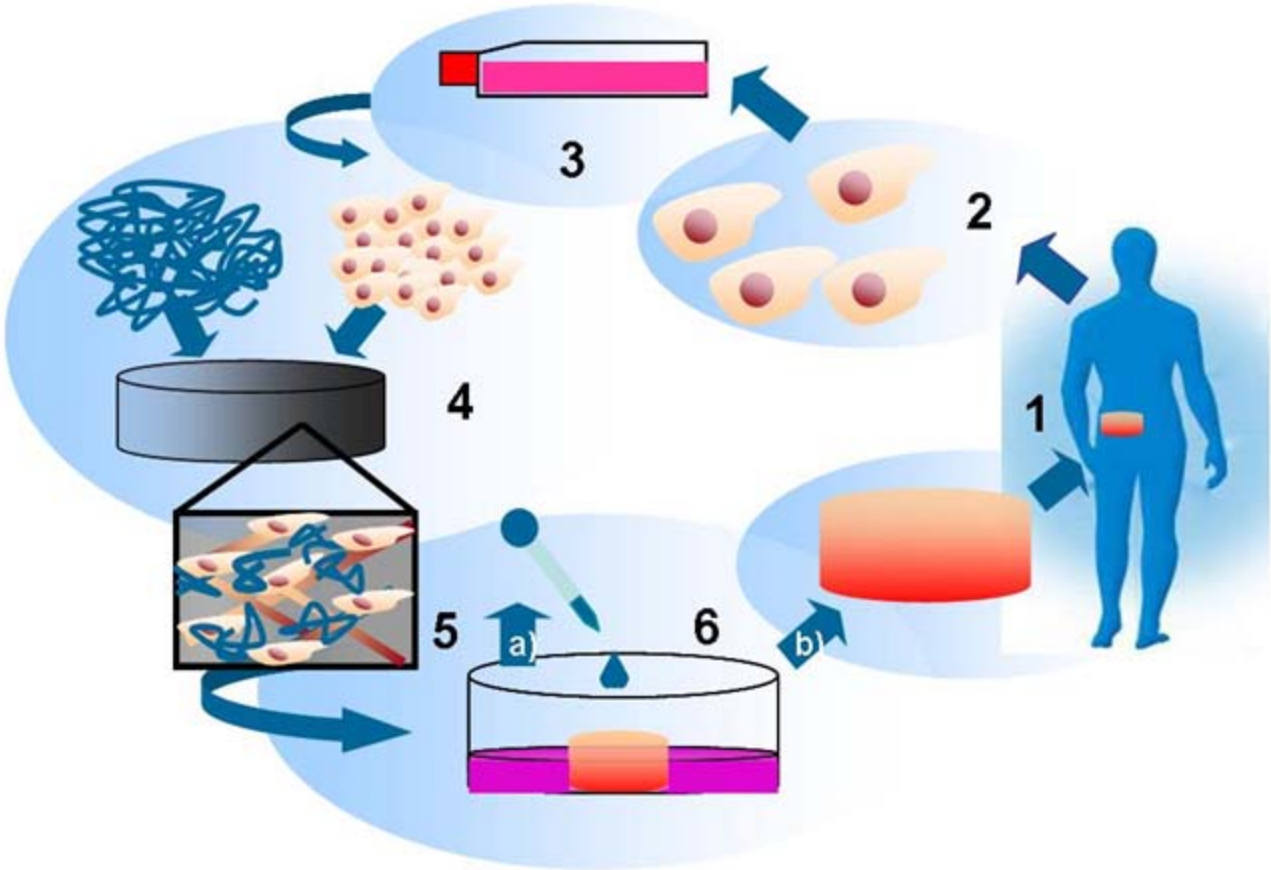
Medical Technology iNNOVATION FORUM
Tuttlingen, 23.06.2009

Archivierungsangaben



Seite 1

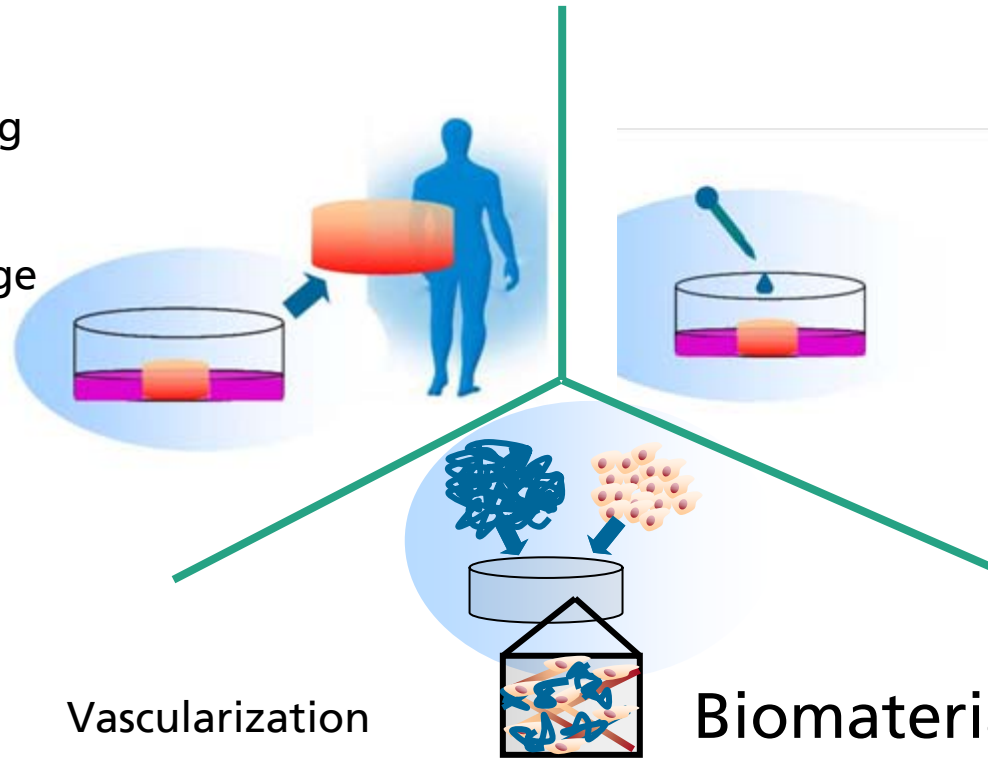
Principles of Tissue Engineering



FhG IGB Cell and Tissue Engineering – our Competencies

Transplants

GMP manufacturing
Cell therapy
Autologous cartilage
transplants



3-D Test systems

Drug & Substance testing
Biocompatibility testing
Metabolism studies

Vascularization

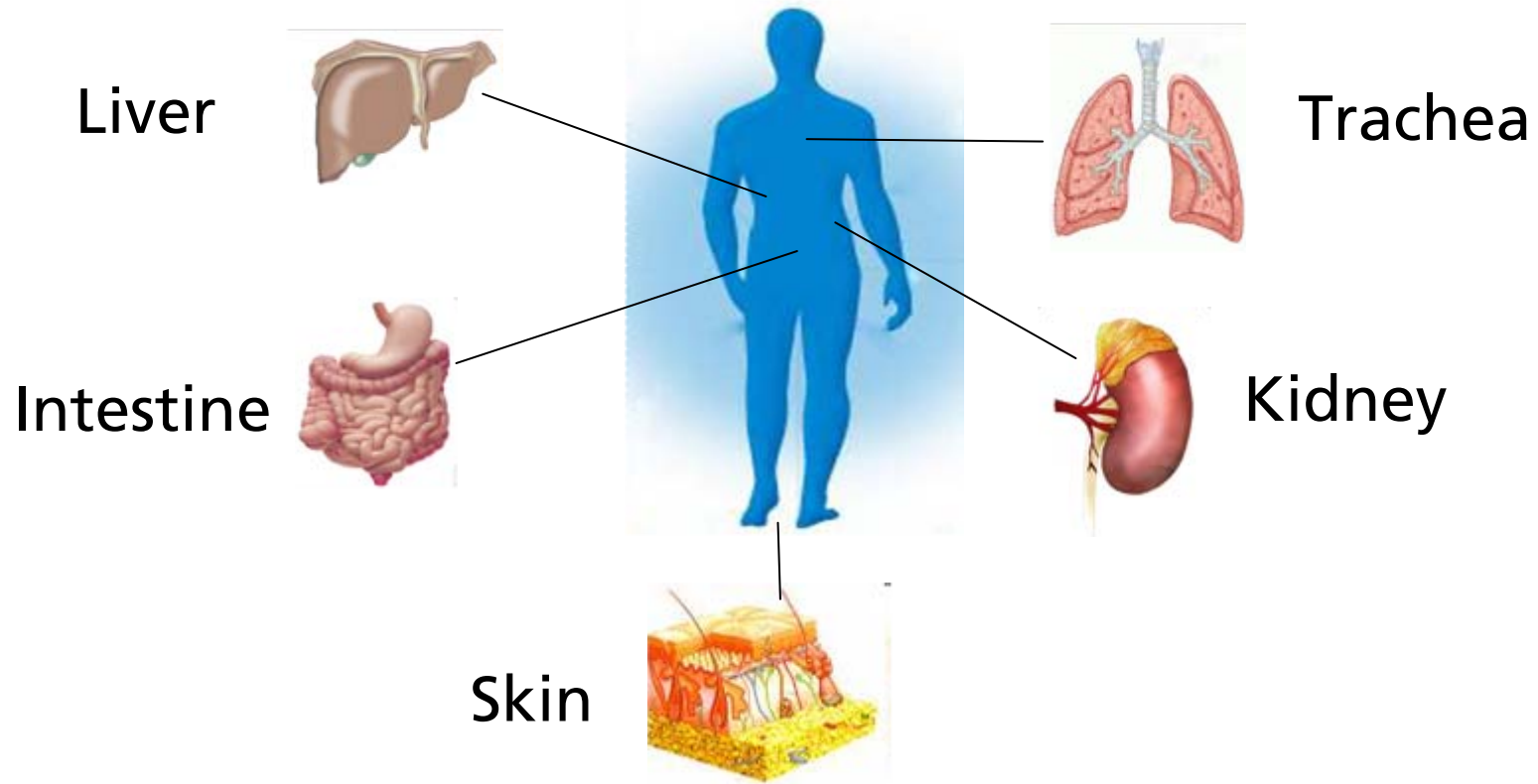
Surface optimization

Improved compatibility of implants

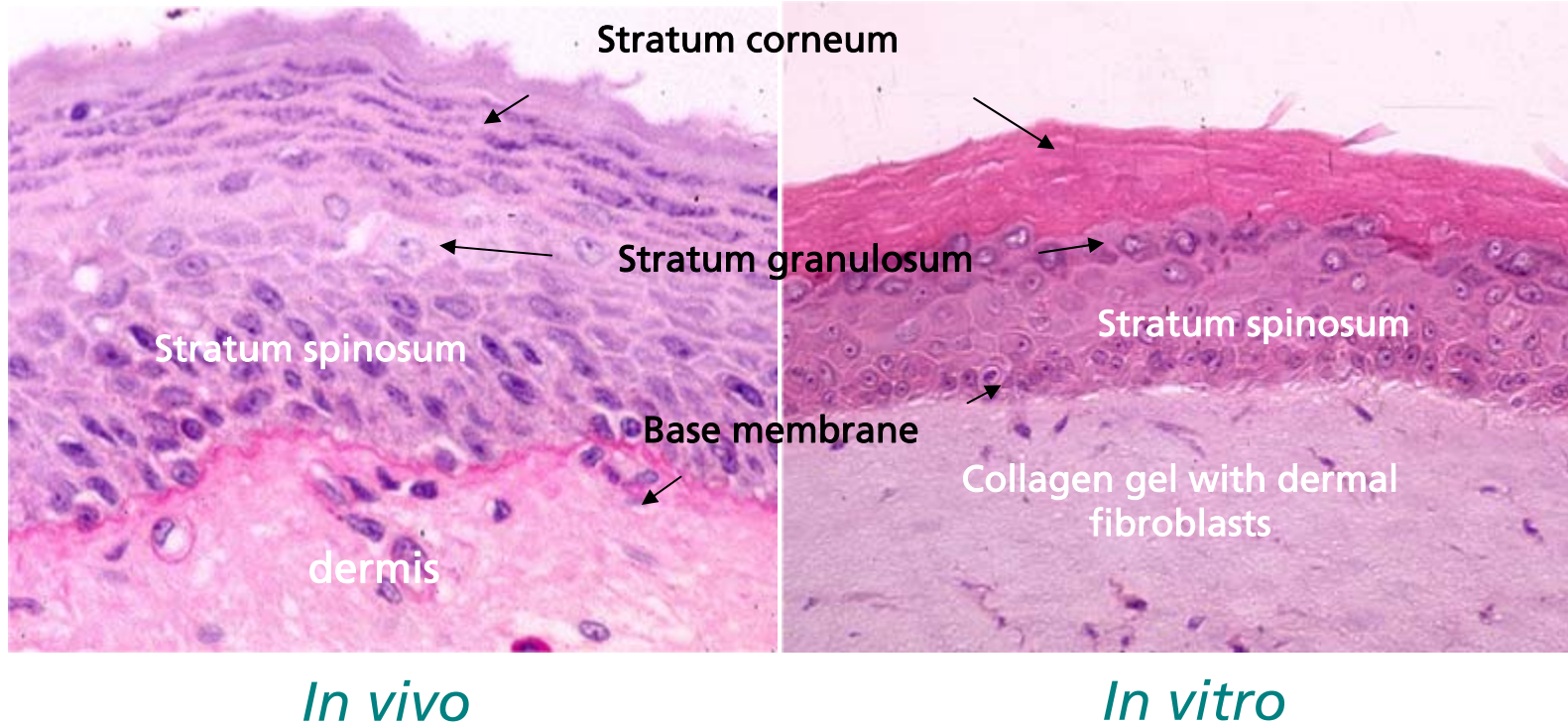
Biomaterials

3 D Test Systems

ADMET = Absorption, Distribution, Metabolism, Excretion and Toxicology



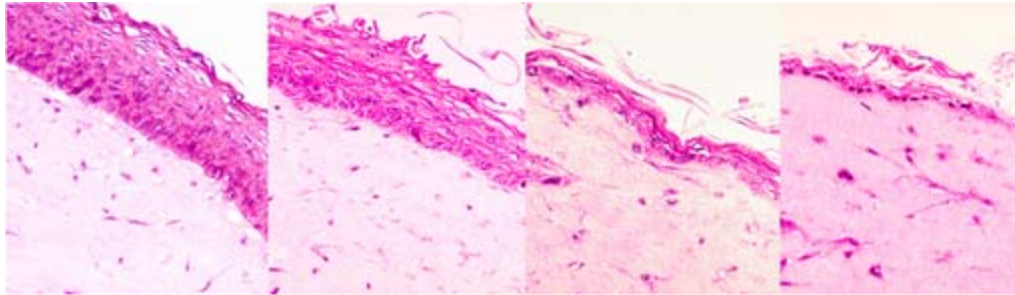
3 D-human skin equivalent



Certified for examination of the biocompatibility of medical devices
(DIN ISO 10993-5)

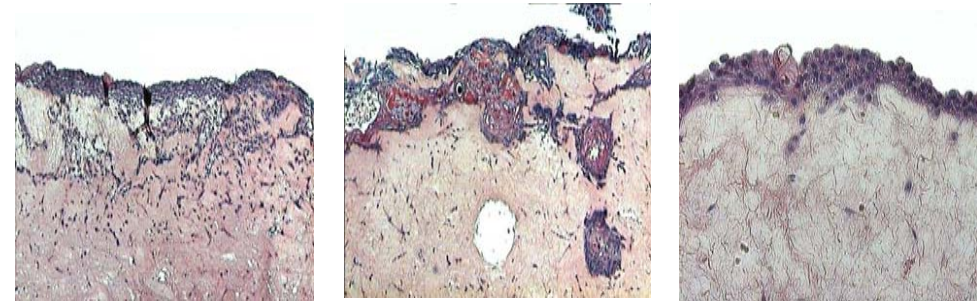
3D human skin equivalent - applications

corrosivity and toxicity testing



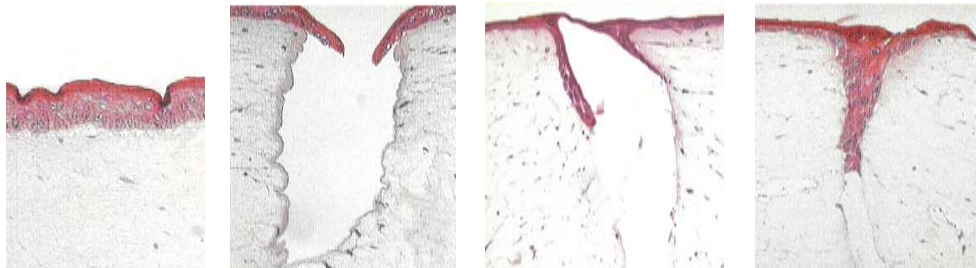
A B C D
 Histological Crosssection:
 Control (A), after 20% SDS-application for 2 sec (B), 30 sec (C) and 90 sec (D)

tumor invasion model



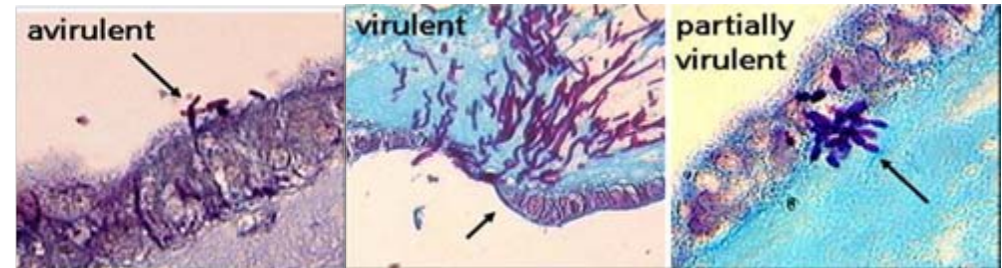
BLM-cell line infiltrate the dermis
 M13 cell line build tumour nests
 SK Mel 28 cell line

wound healing model



Control 3h after injury 24h after injury 72h after injury
 Archivierung

Infection model

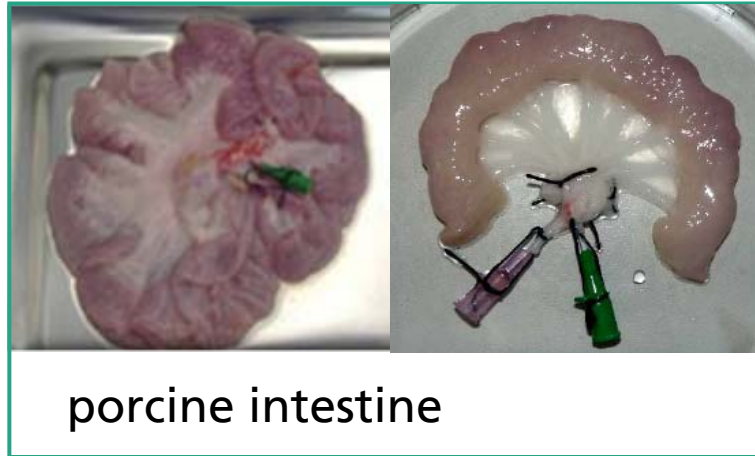


Infection model of candida albicans

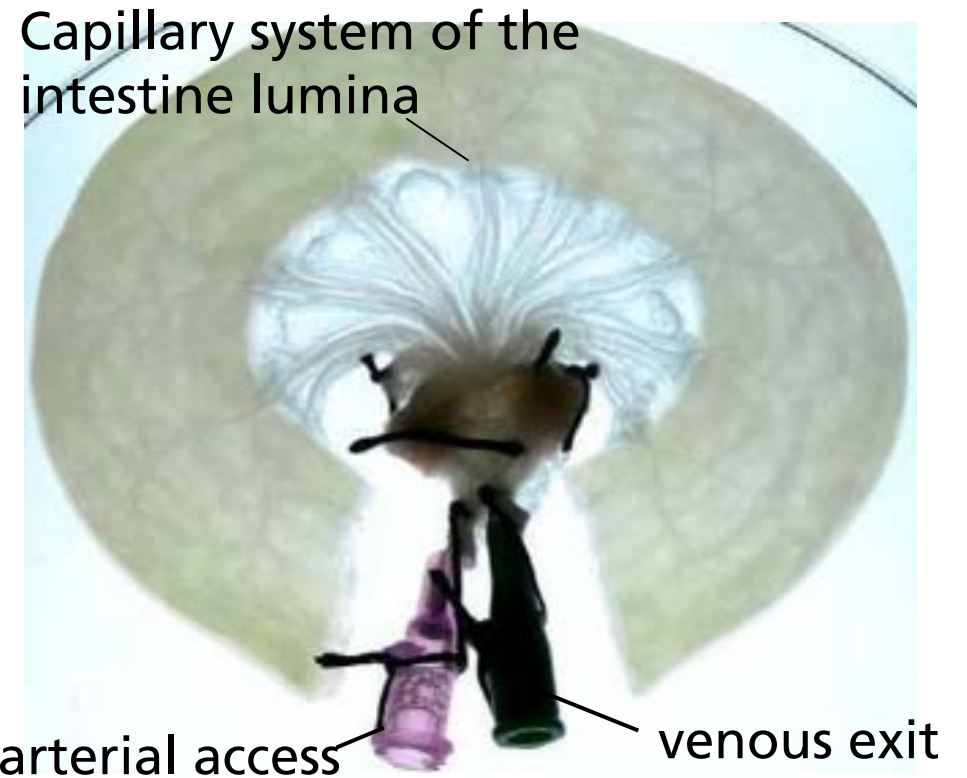
Vascularized 3D-Testsystems

Based on the **BioVaSc** = **B**iological **V**ascularized **S**ccaffold

Patent vascularized Collagen I/III Matrix



Step I
acellularization



Vascularized 3D-Testsystems

Based on the **BioVaSc** = **B**iological **V**ascularized **S**caffold

Patent vascularized Collagen I/III Matrix

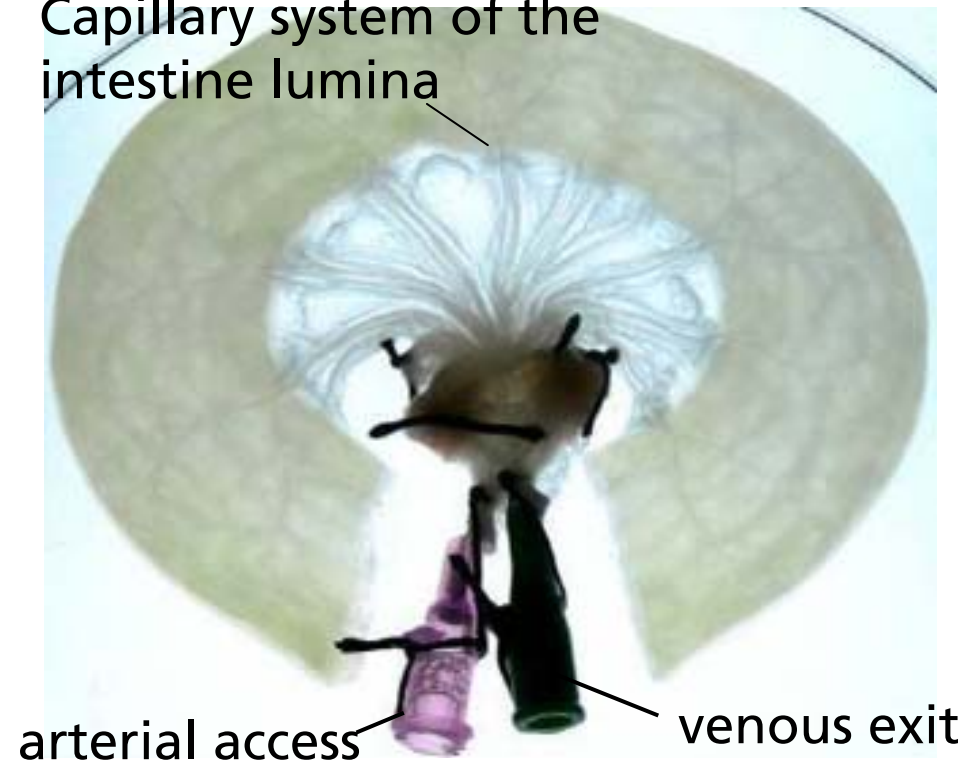


Step II

Re-Endothelialisation



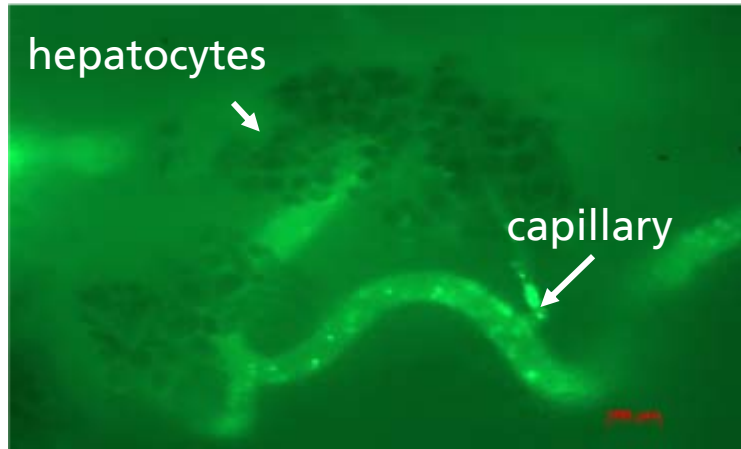
Capillary system of the intestine lumina



Vascularized 3D-Testsystems

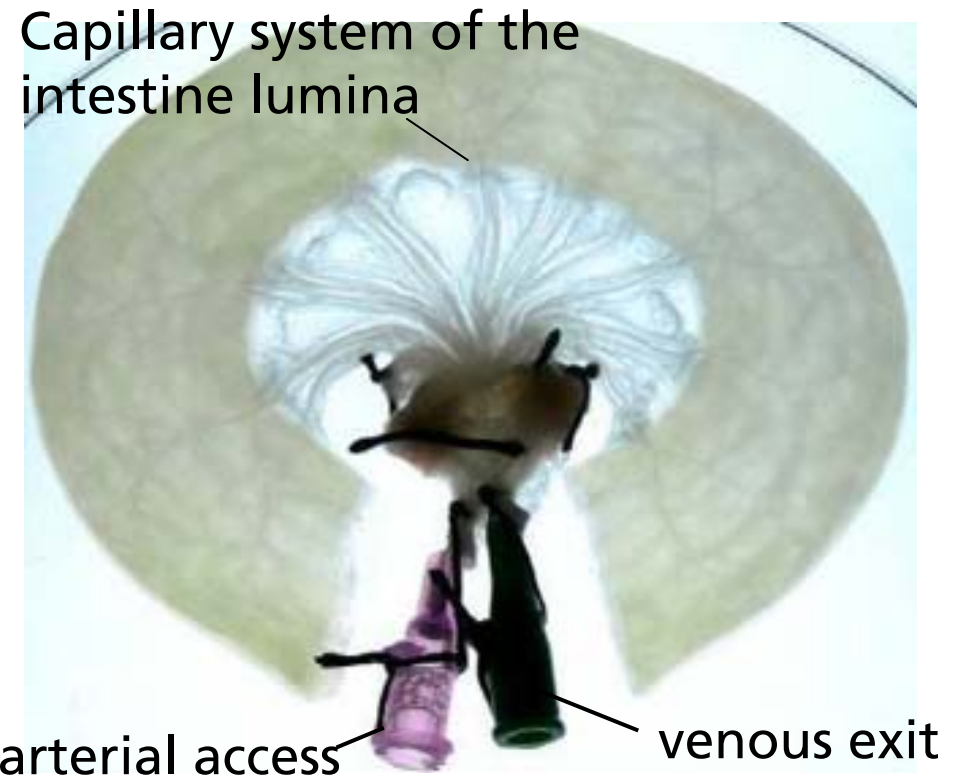
Based on the **BioVaSc** = **B**iological **V**ascularized **S**caffold

Patent vascularized Collagen I/III Matrix



Step III

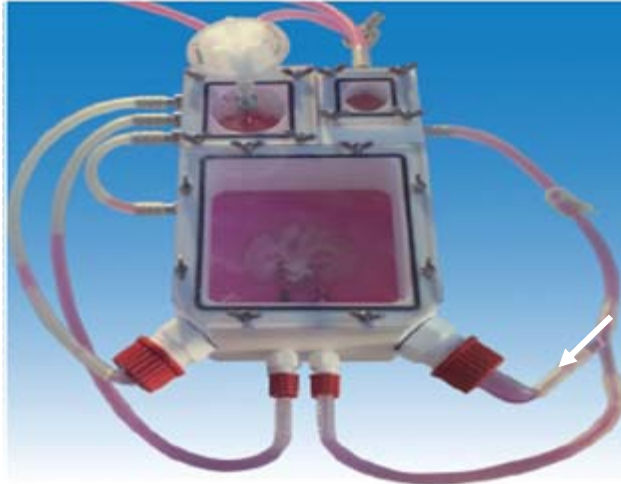
Inserting of human organospecific cells into the lumina



Vascularized 3D-Testsystems

Based on the **BioVaSc** = **B**iological **V**ascularized **S**caffold

Patent vascularized Collagen I/III Matrix

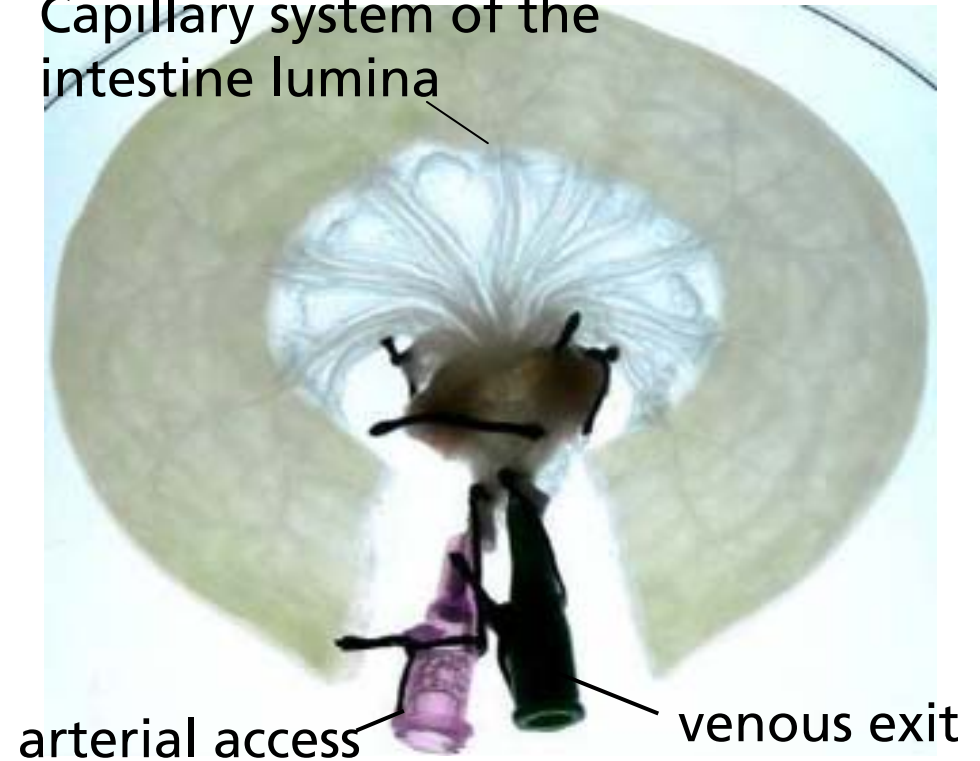


Step IV

Dynamic cultivation
in a bioreactor-
system

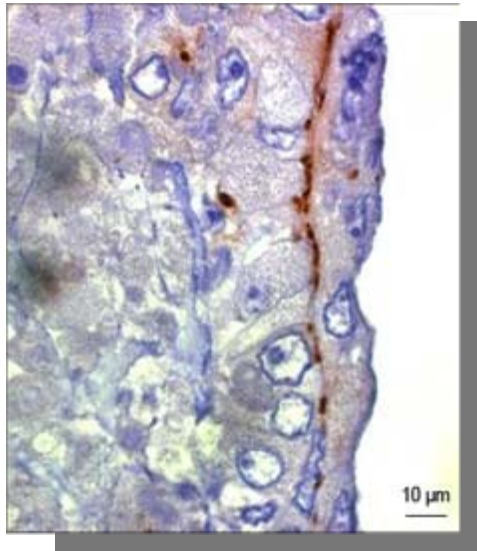


Capillary system of the
intestine lumina



Vascularized 3D Testsystems - Applications

Liver test system

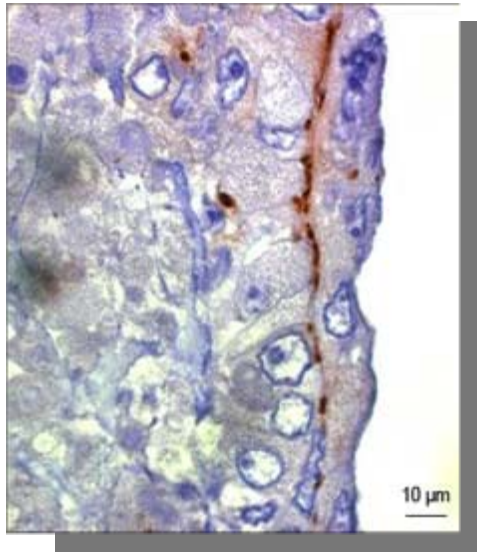


Toxicity, Metabolism and
Infection studies

- albumin / urea synthesis
- galactose conversion
- phase I & II metabolism

Vascularized 3D Testsystems - Applications

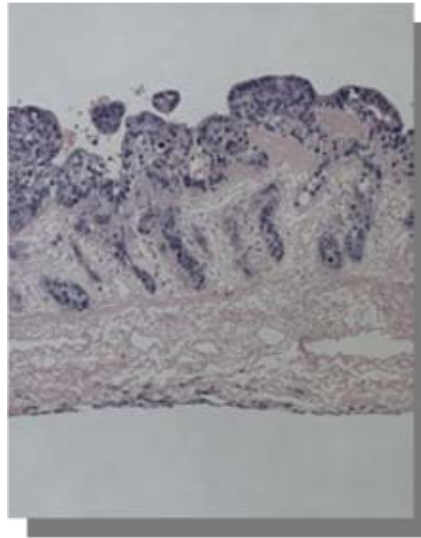
Liver test system



Toxicity, Metabolism and Infection studies

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- galactose conversion
- phase I & II metabolism

Intestine test system

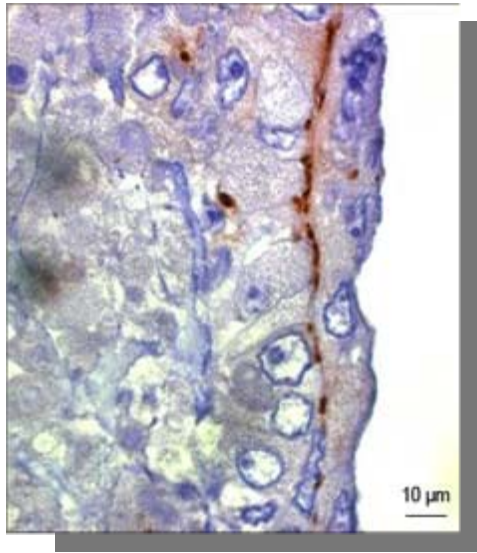


Resorption, Toxicity

- transport studies
- metabolic enzymes

Vascularized 3D Testsystems - Applications

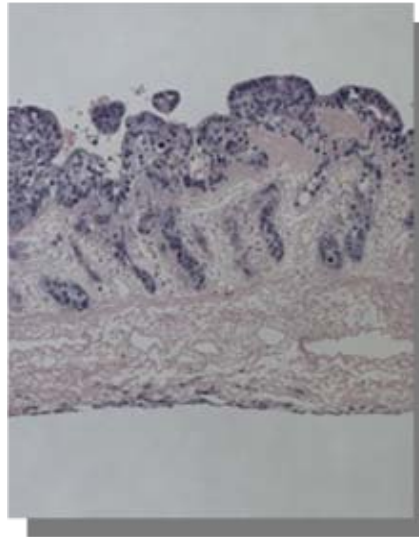
Liver test system



Toxicity, Metabolism and Infection studies

- albumin / urea synthesis
- galactose conversion
- phase I & II metabolism

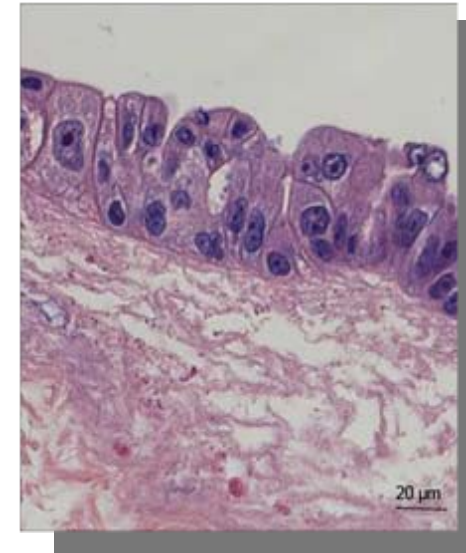
Intestine test system



Resorption, Toxicity

- transport studies
- metabolic enzymes

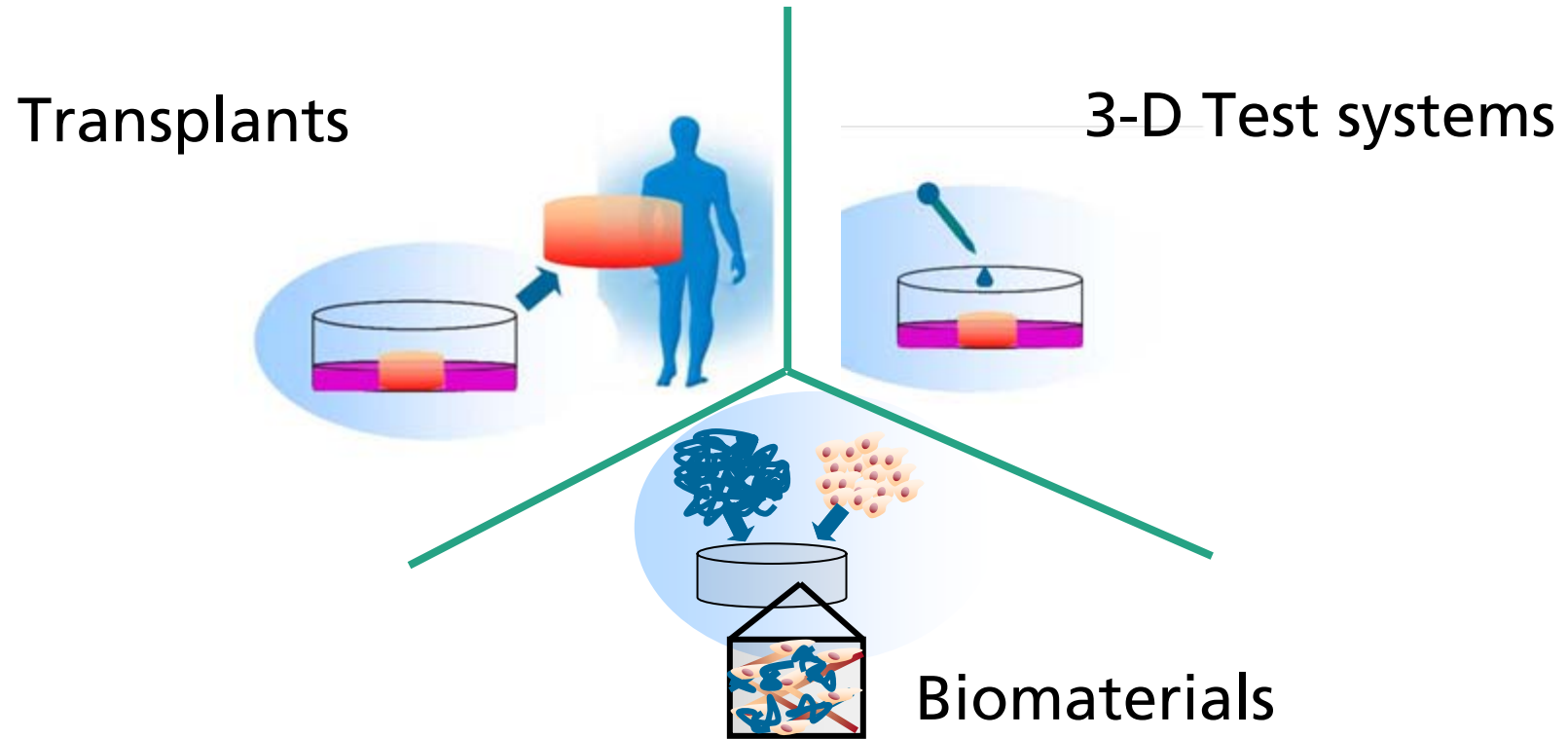
Trachea test system



Absorption, Nanotoxicity, Biocompatibility / Toxicity of aerosols and solids

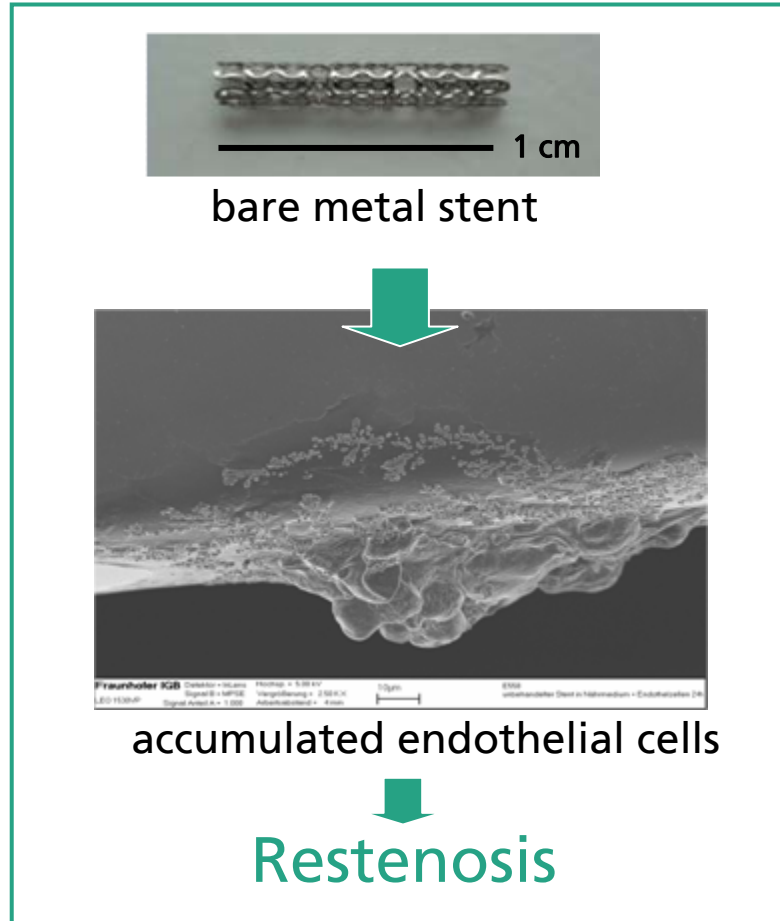
- inflammation markers
- metabolic enzymes

FhG IGB Cell and Tissue Engineering – our Competencies



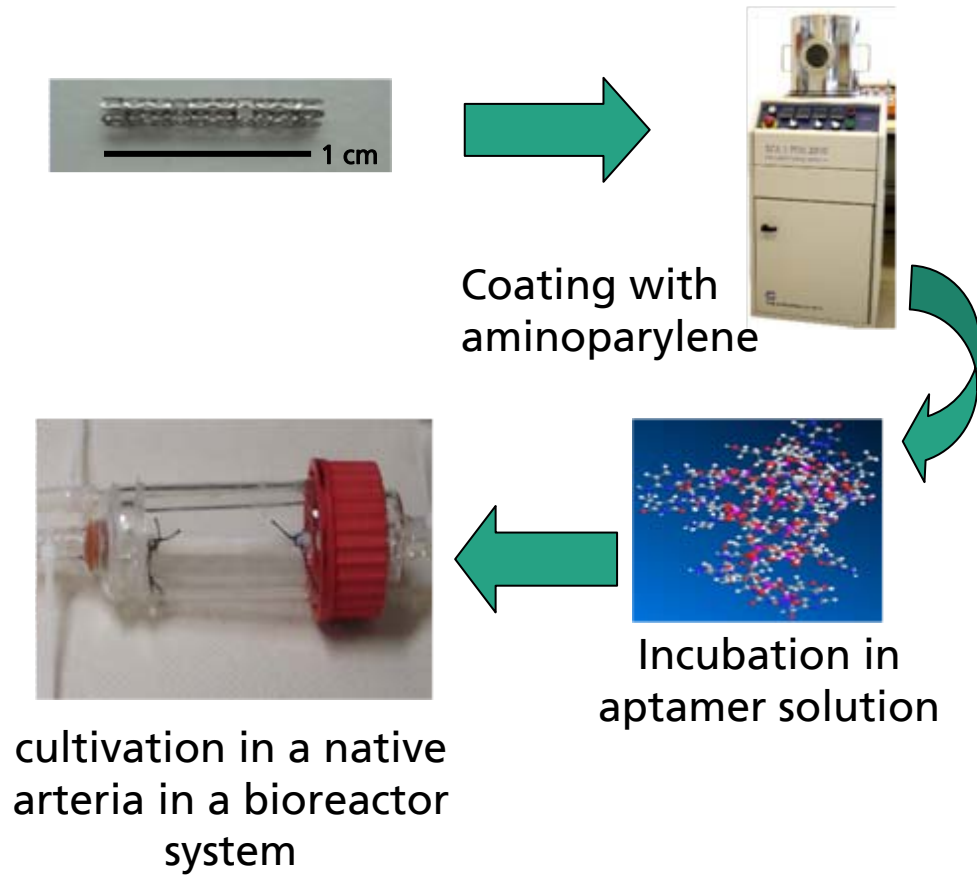
Surface optimization of biomaterials

Surface functionalization



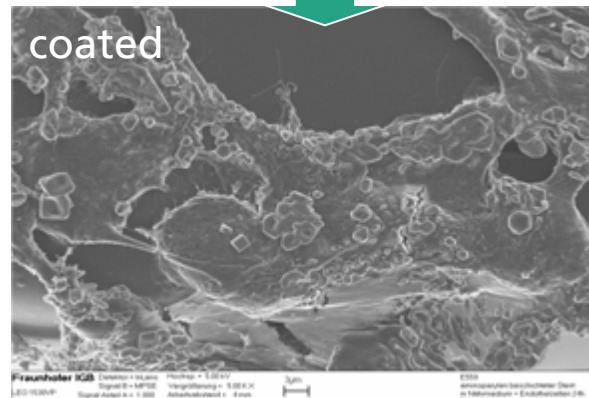
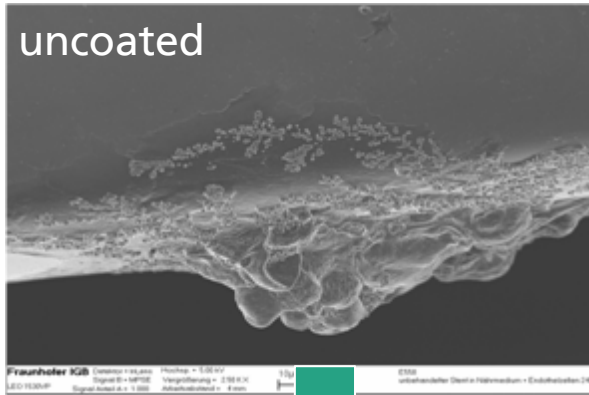
Surface optimization of biomaterials

Surface functionalization



Surface optimization of biomaterials

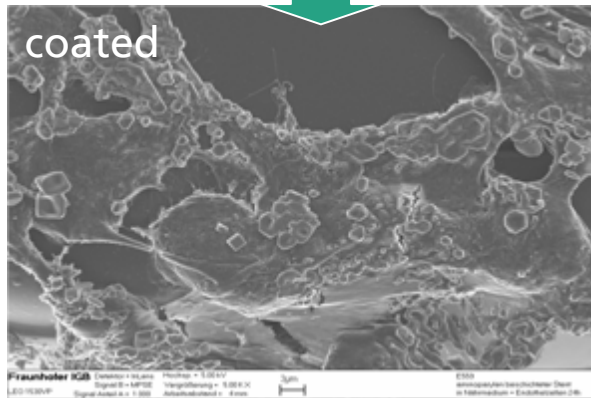
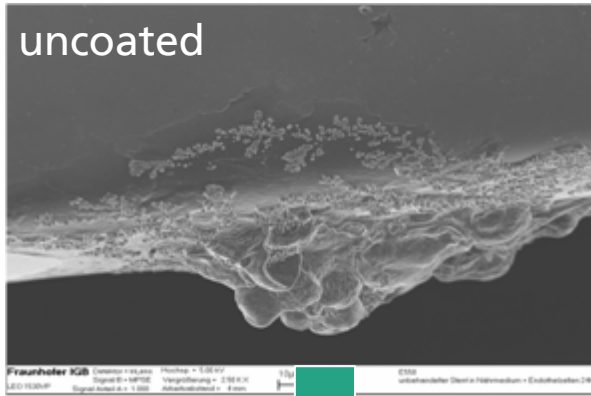
Surface functionalization



Improved adhesion
of endothelial cells

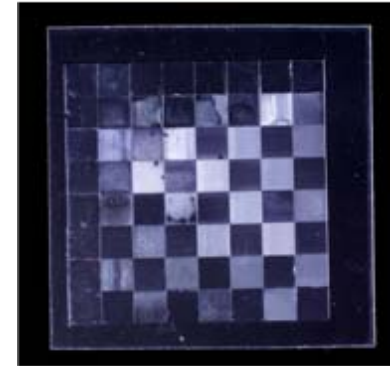
Surface optimization of biomaterials

Surface functionalization



Improved adhesion
of endothelial cells

Surface structuring

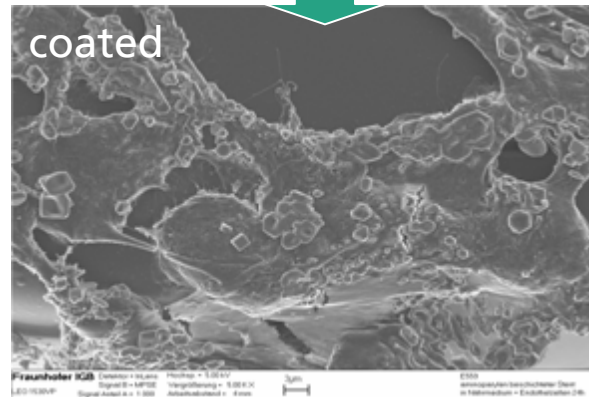
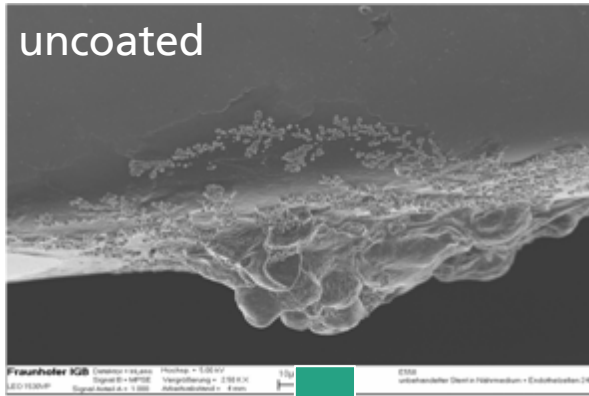


Nano & micro-
structured
polymerplate

Different topographies
influence cell behaviour

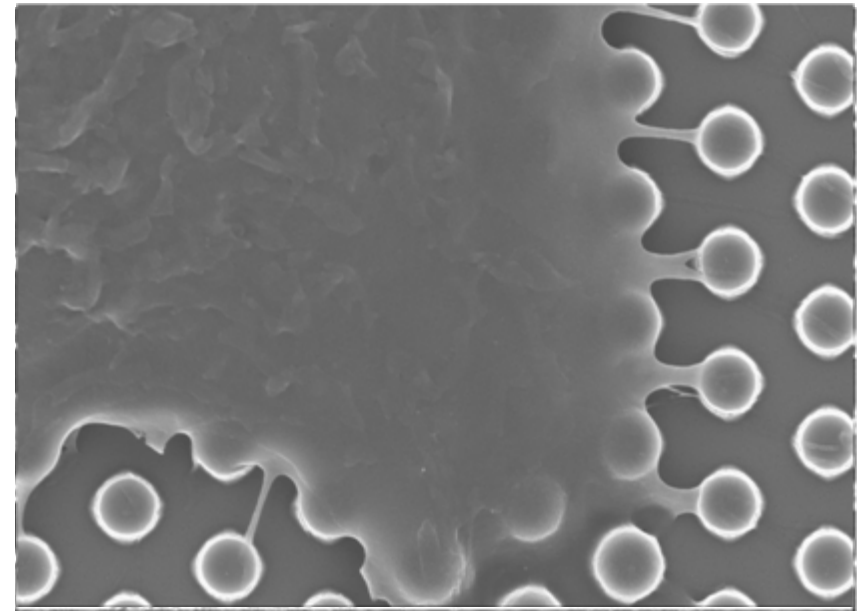
Surface optimization of biomaterials

Surface functionalization

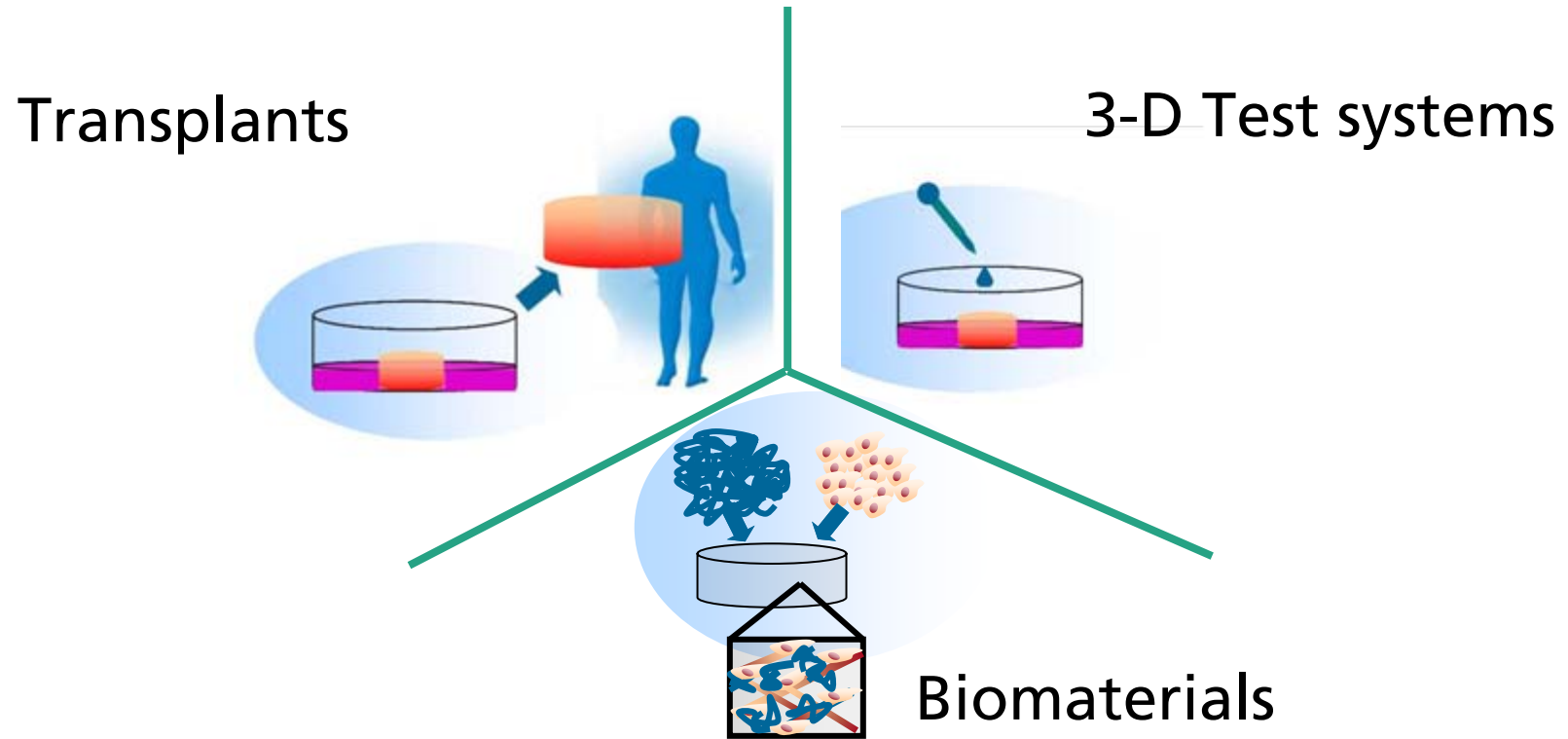


Improved adhesion
of endothelial cells

Surface structuring



FhG IGB Cell and Tissue Engineering – our Competencies



Regenerative Medicine – Manufacturing of Transplants

- GMP conform manufacturing
- autologous cartilage substitute (IGB spin off: Arthro Kinetics)

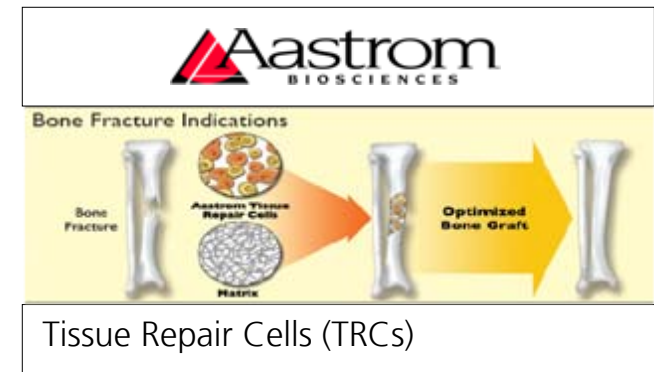


Regenerative Medicine – Manufacturing of Transplants

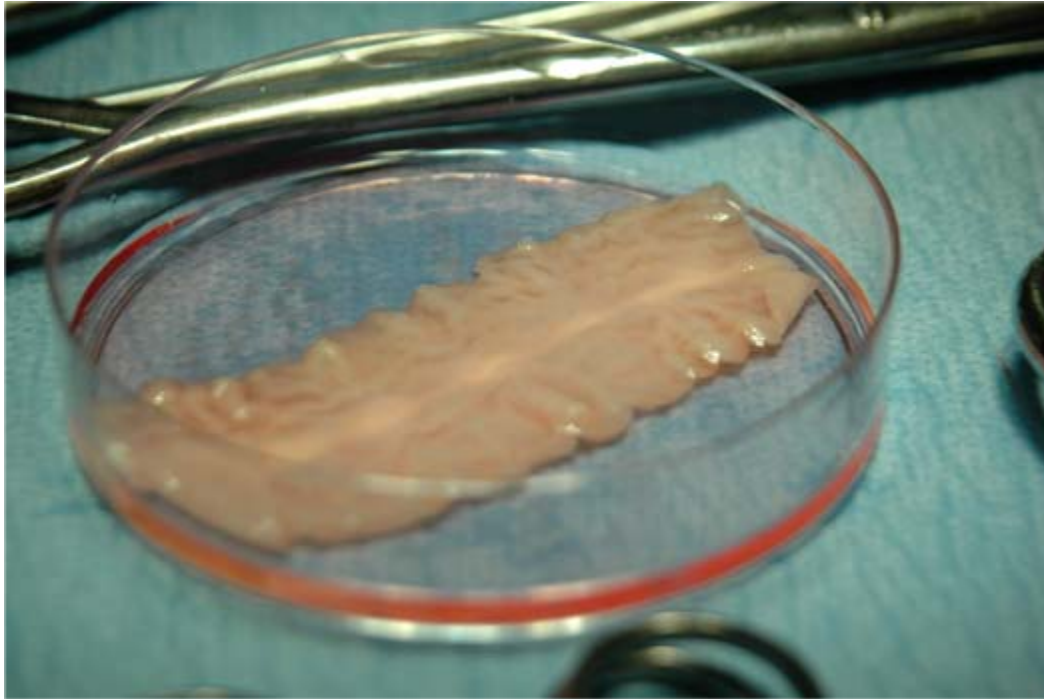
- GMP conform manufacturing
- autologous cartilage substitute (IGB spin off: Arthro Kinetics)
- Autologous stem cell- based bone product (partner company Aastrom Biosciences)

Submitted : patch for trachea and oesophagus surgery

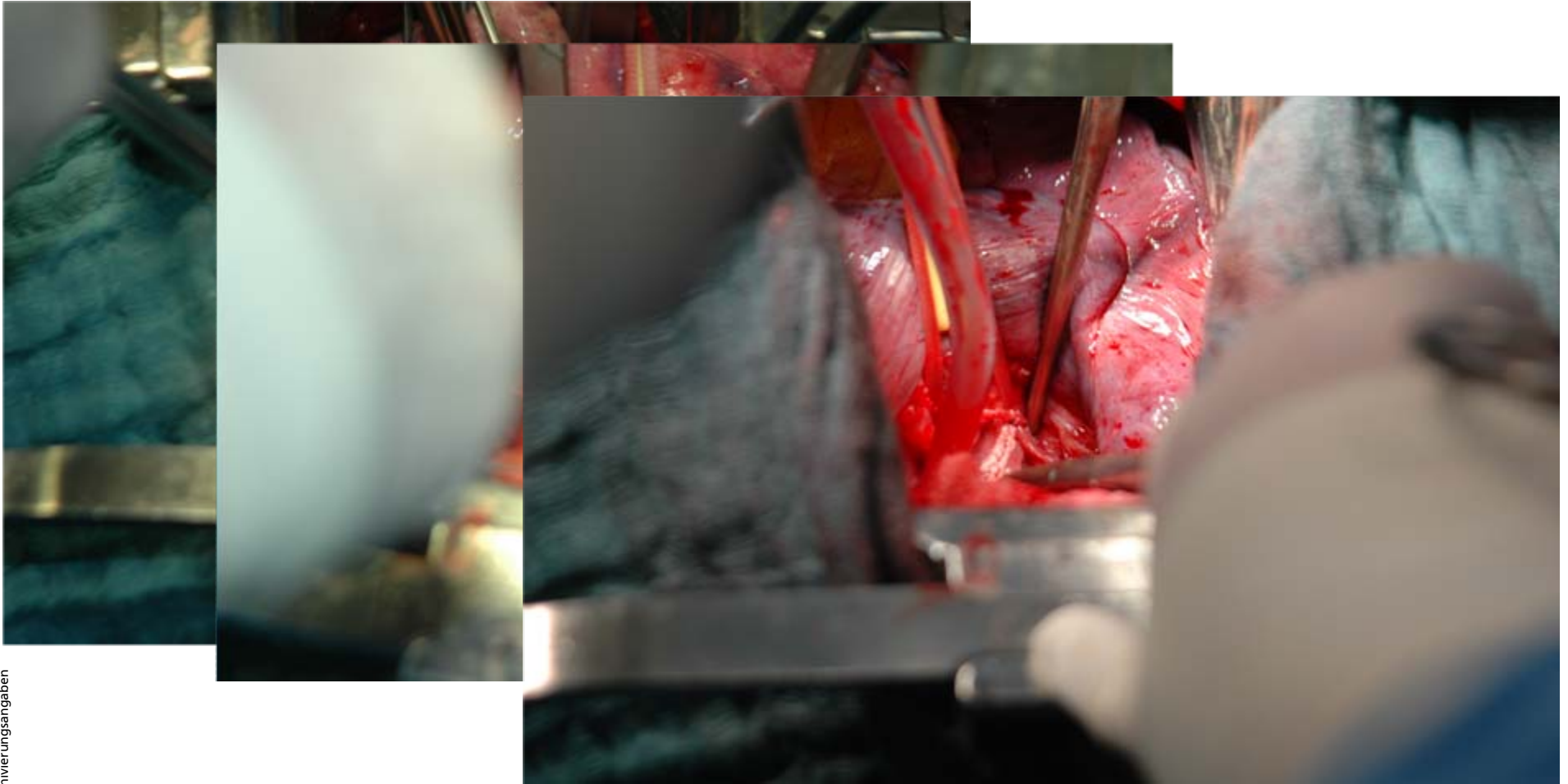
- clin. study for european ATMP accreditation



Clinical applications – avascular trachea patch



Clinical applications – avascular trachea patch



Archivierungsangaben

Clinical applications – avascular trachea patch

