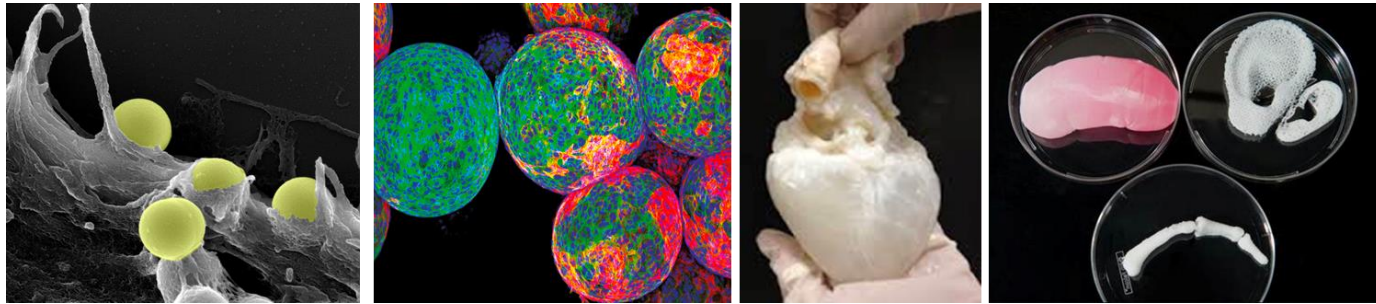


# Master Biomedical Science – track Regenerative Medicine



Dr. Stefan Giselbrecht  
*Assistant professor at MERLN*

## Outline talk:

What is RM

Track content

Why choose RM

Who are we

## After talk:

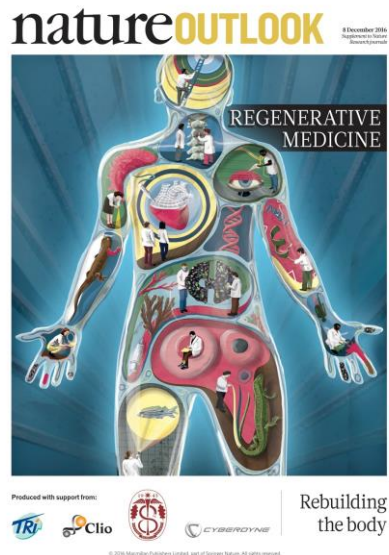
Meet the teachers

Meet researchers

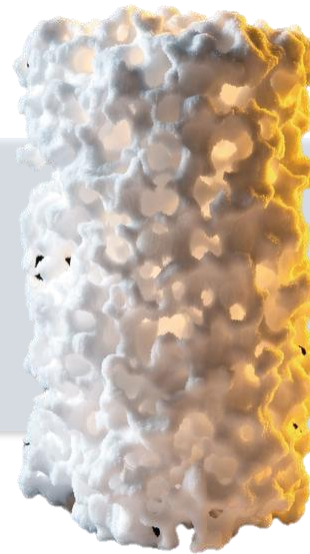
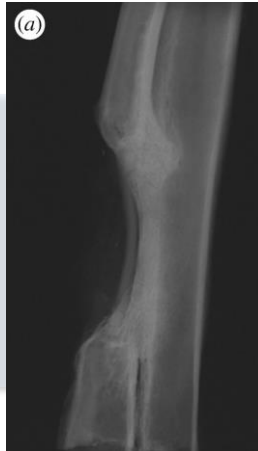
Lab tour (please sign up)

## What is Regenerative medicine?

**Regenerative medicine** trigger and instruct the healing powers of our own bodies to restore diseased tissue and organs and/or prevent degeneration

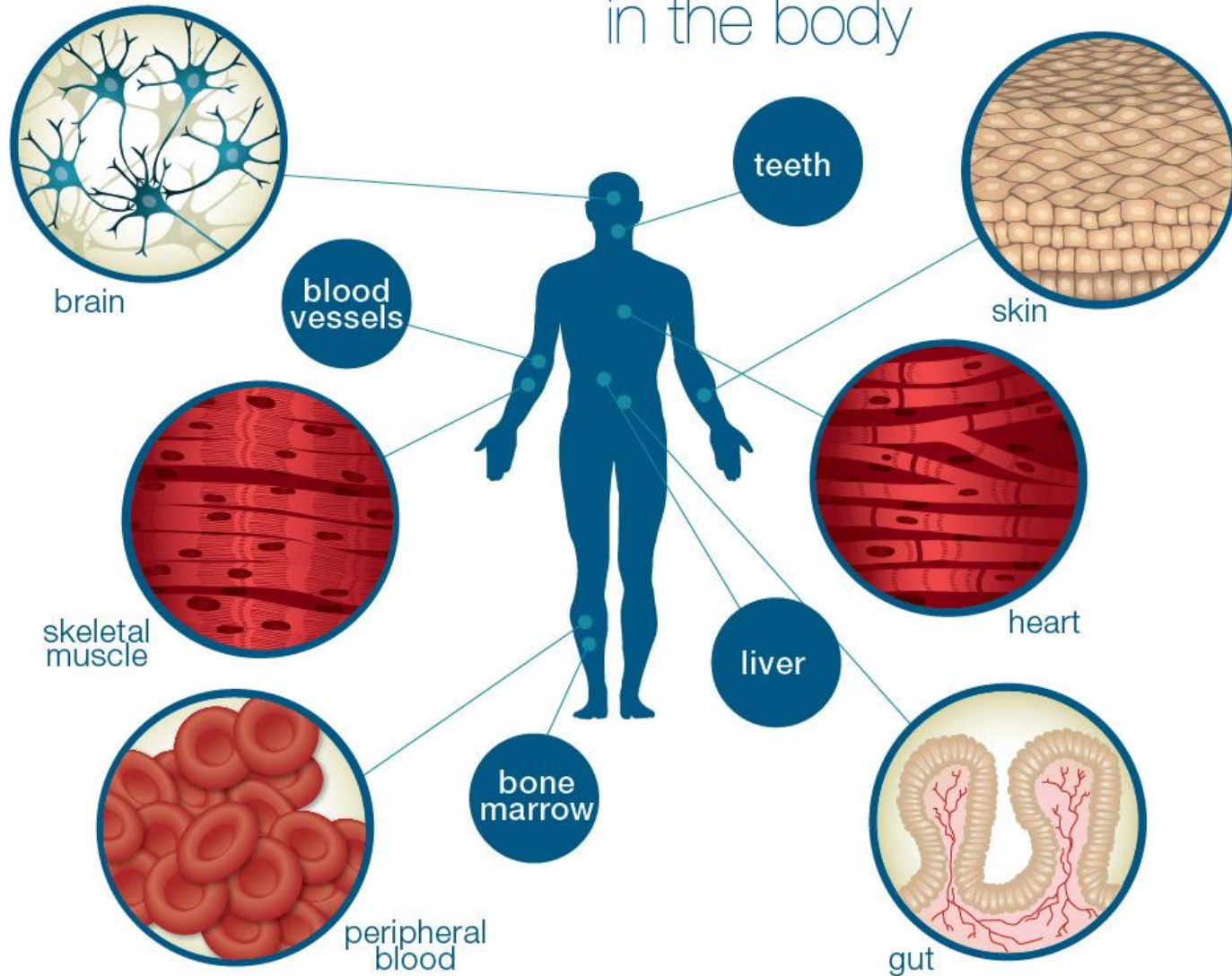


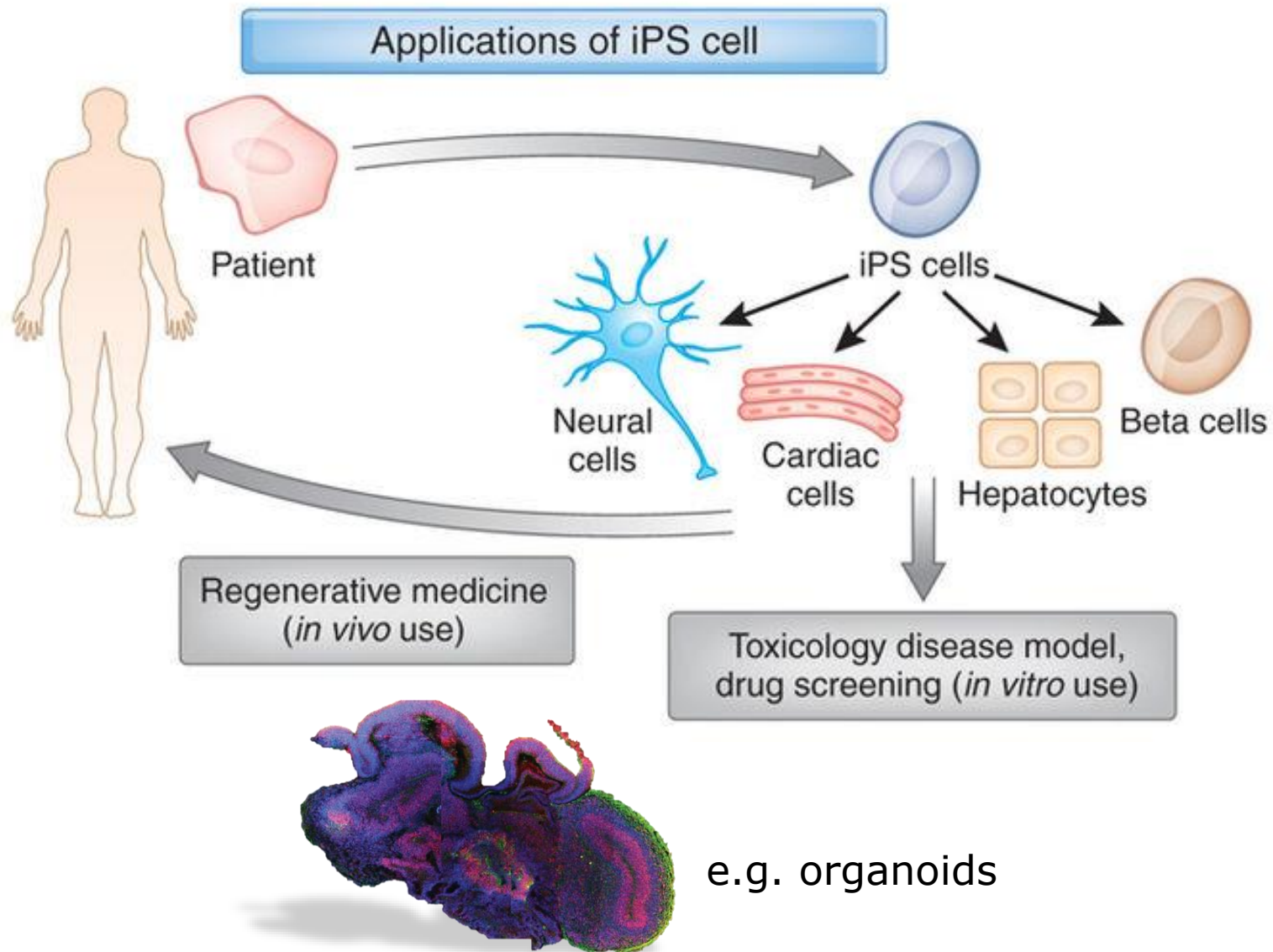
## Trauma



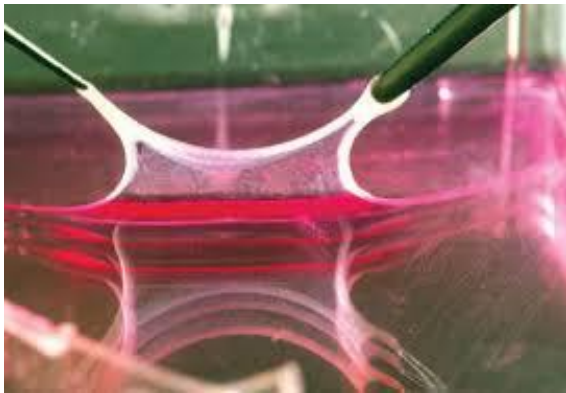
## Chronic

# Locations of **Somatic Stem Cells** in the body





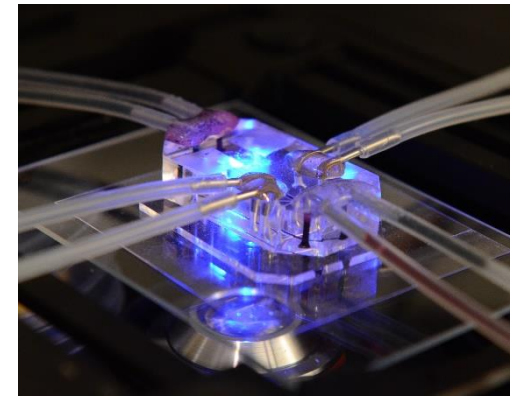
## Cells



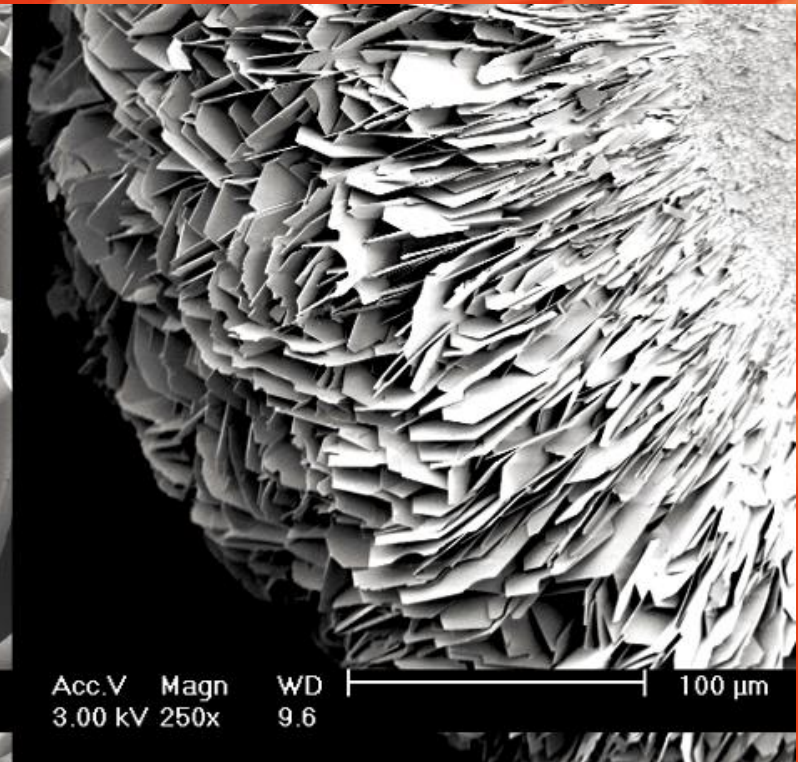
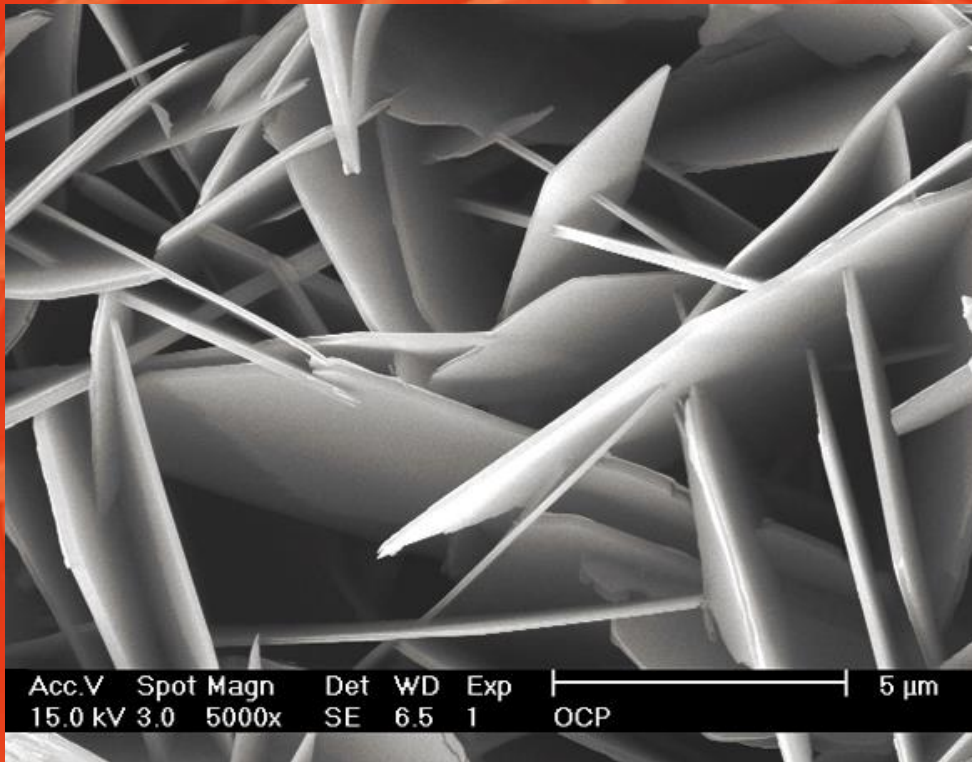
## Biomaterials



## Technology

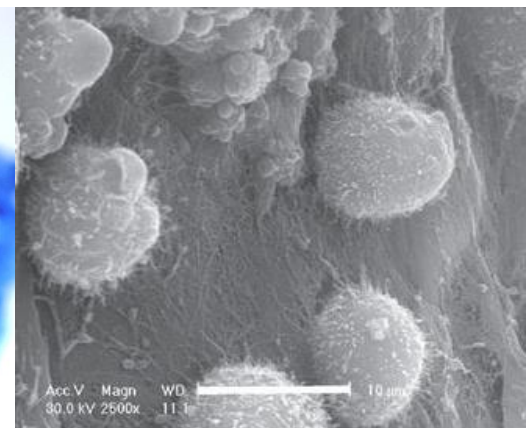
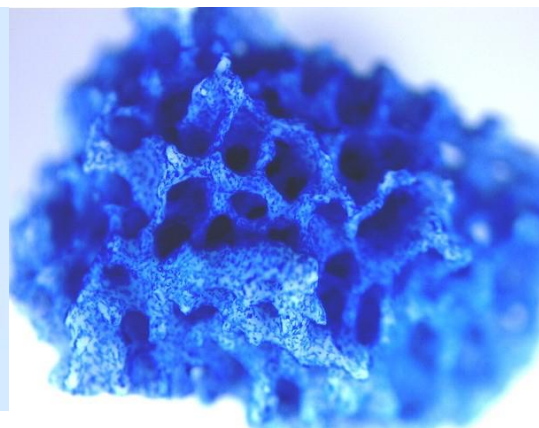
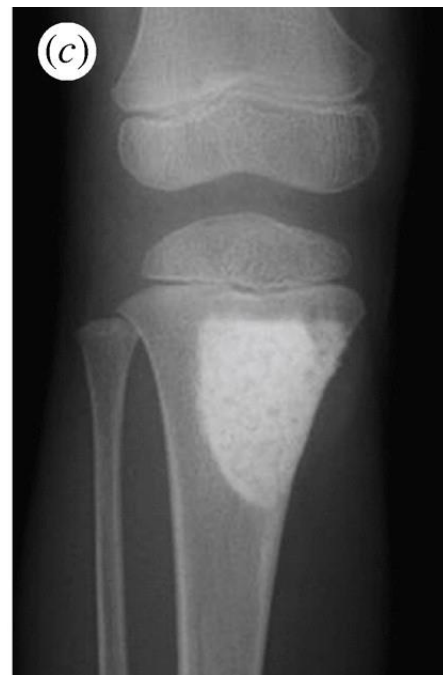


# IBE

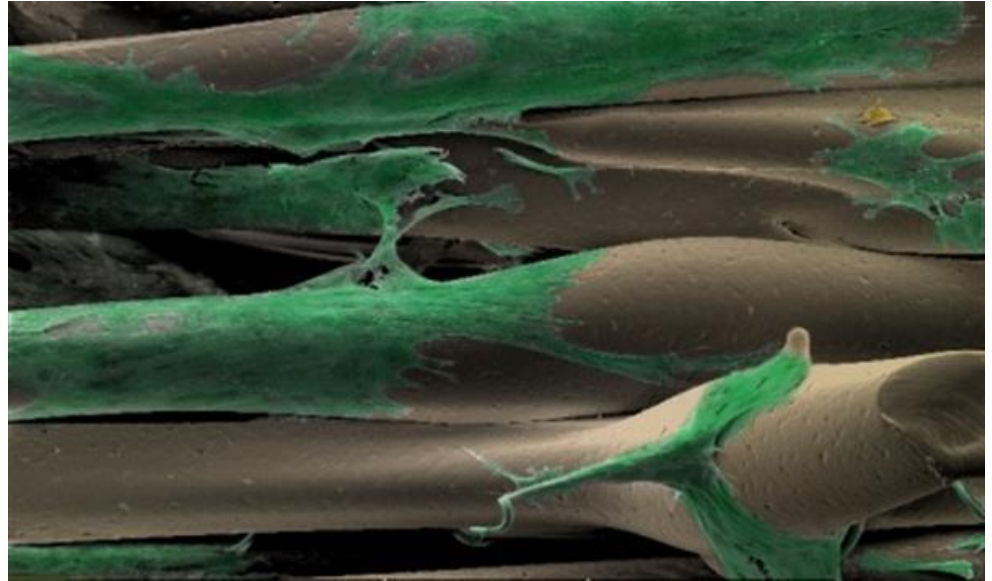


## Instructive Biomaterials Engineering





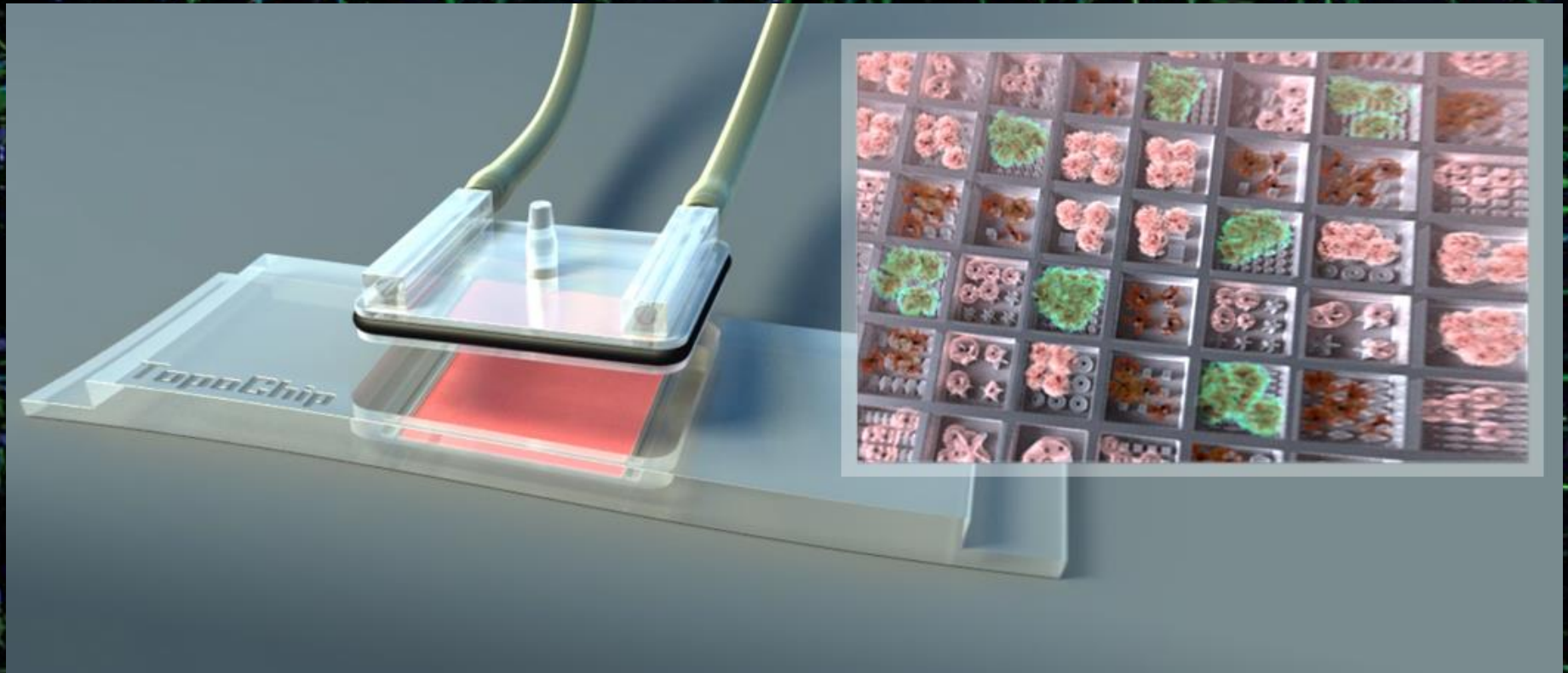
## ➤ Correct surface properties



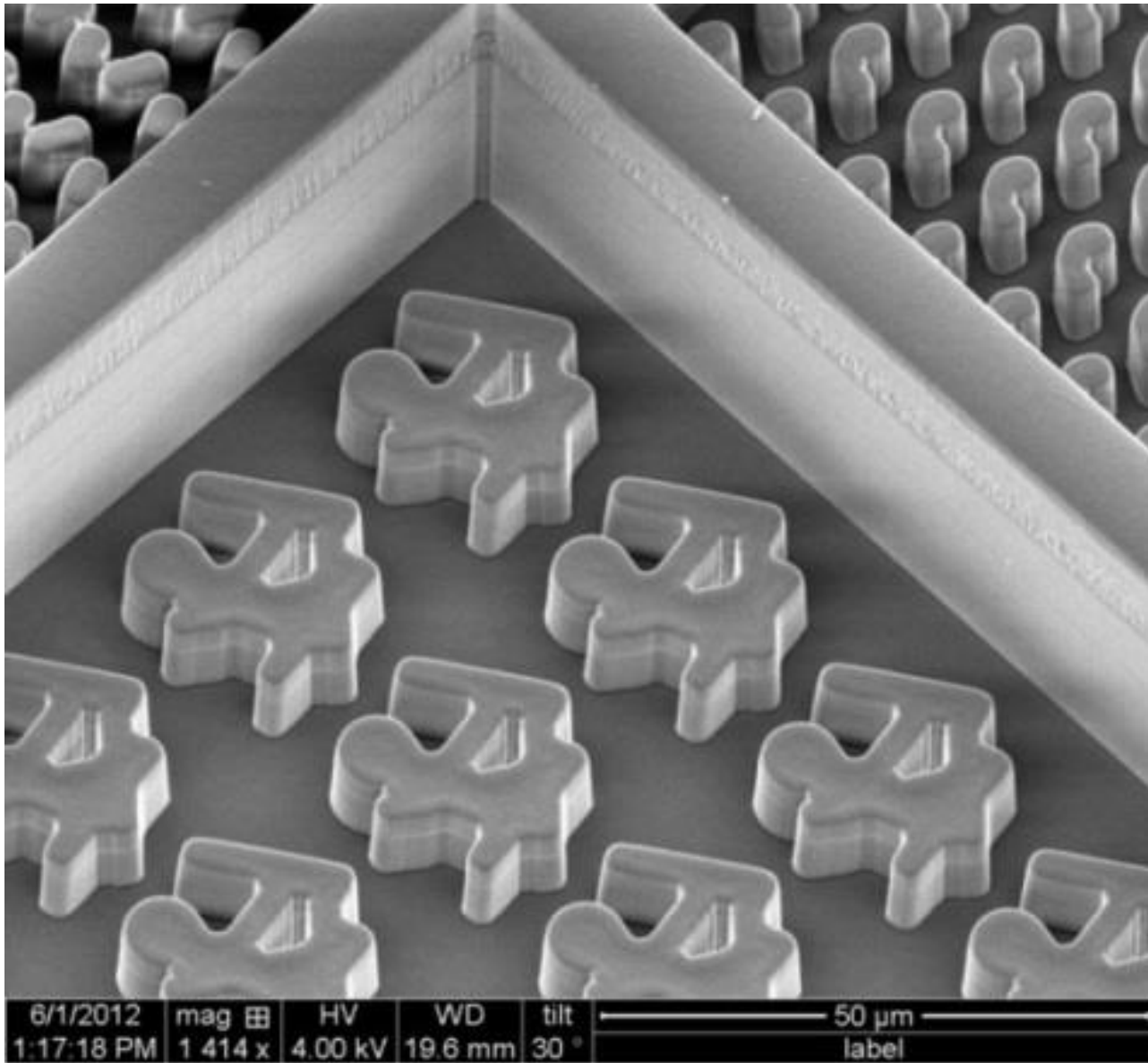
Cell-material interactions

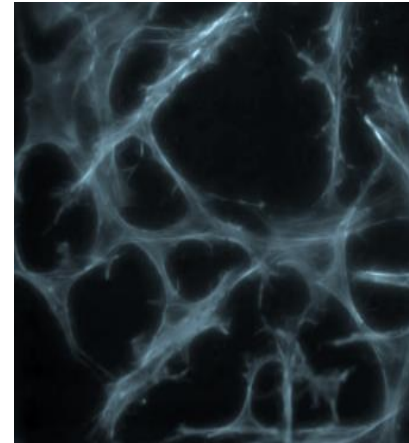
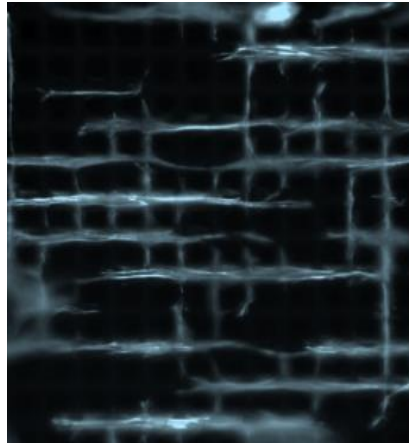
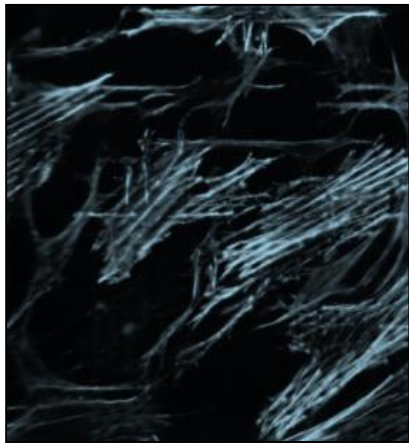
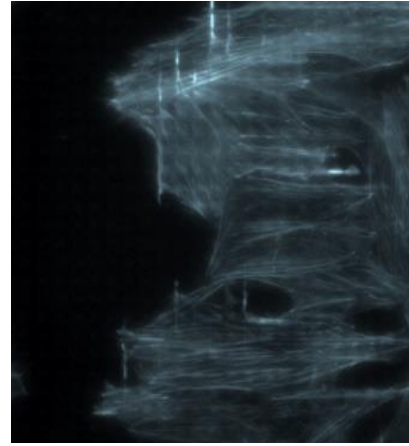
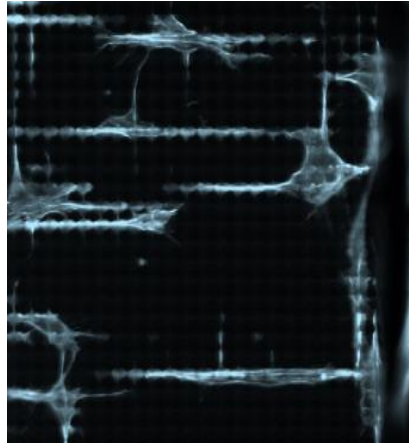
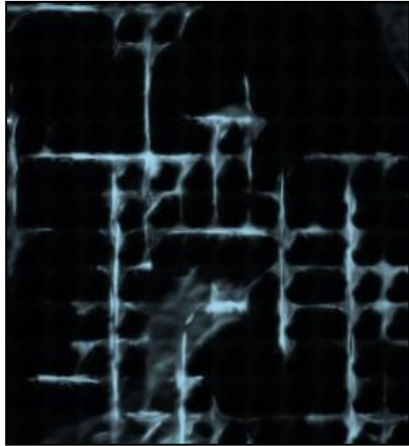
➤ Intelligent design

# CBITE

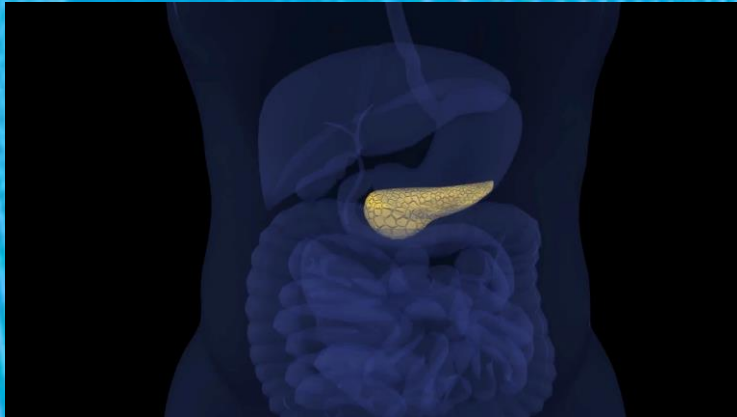
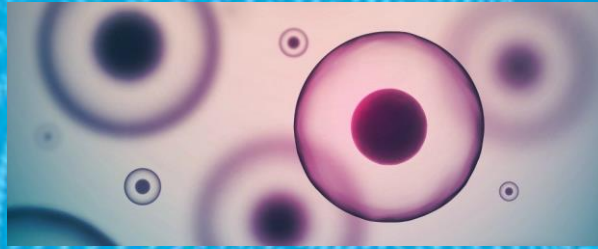
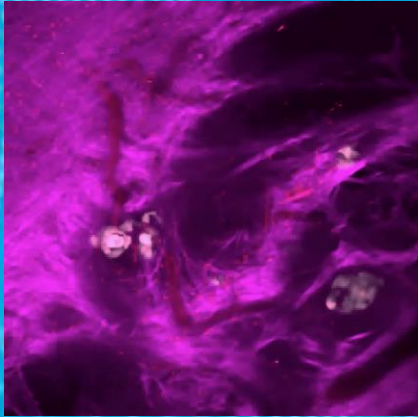


Cell biology inspired tissue engineering

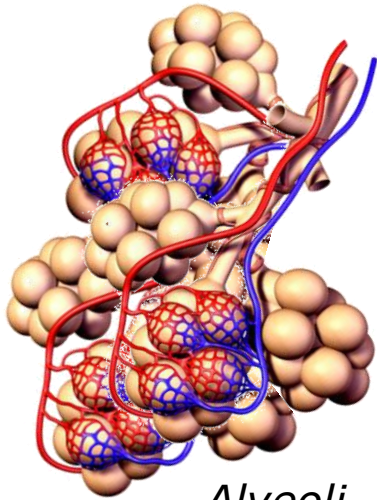
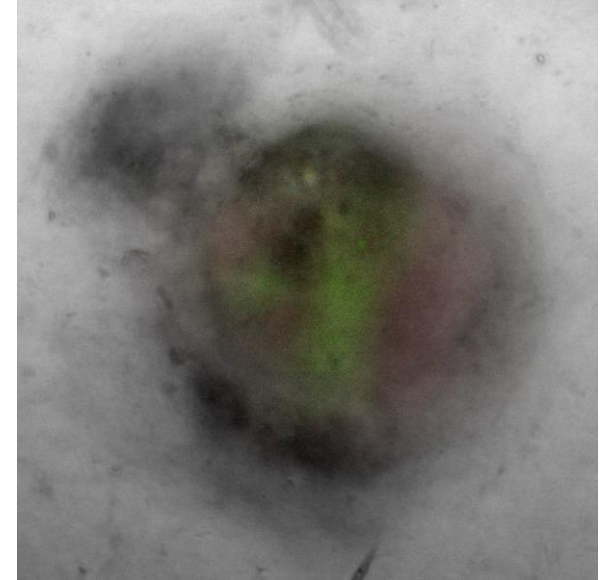
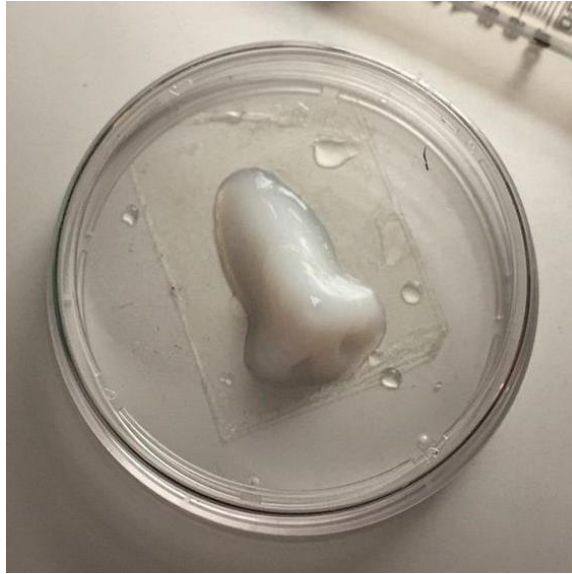
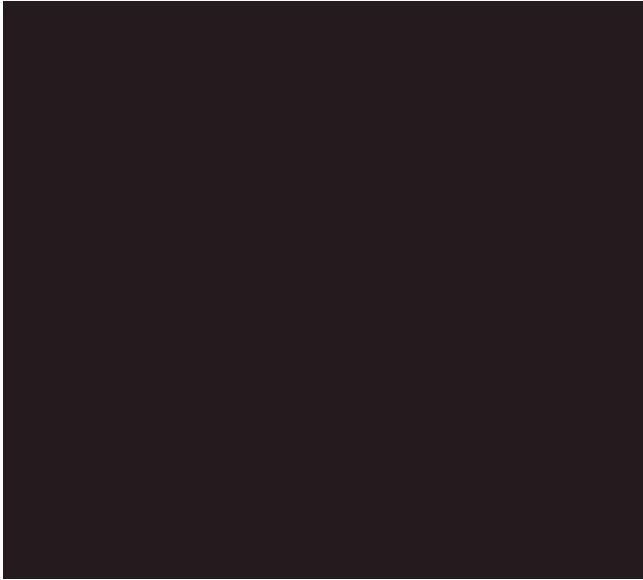




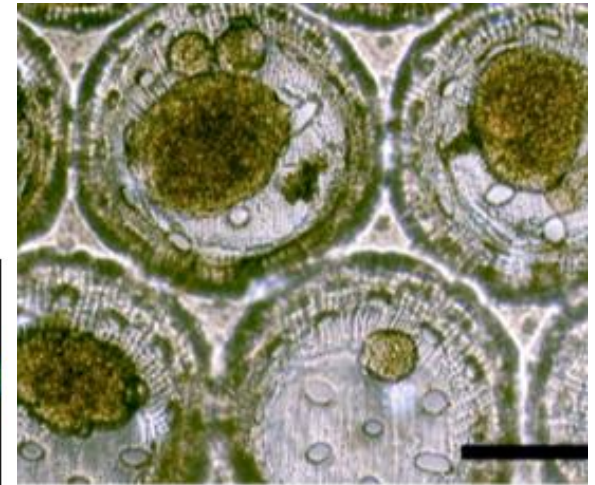
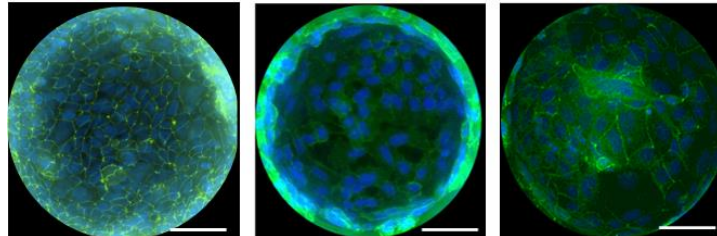
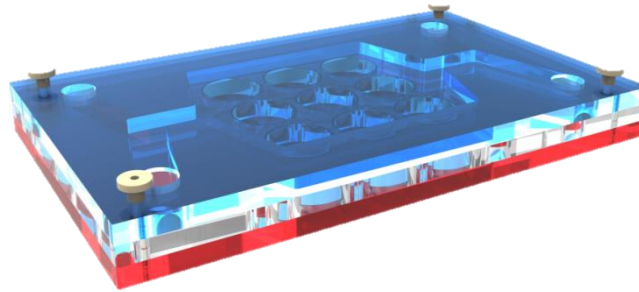
# CTR



## Complex Tissue Regeneration



*Alveoli*



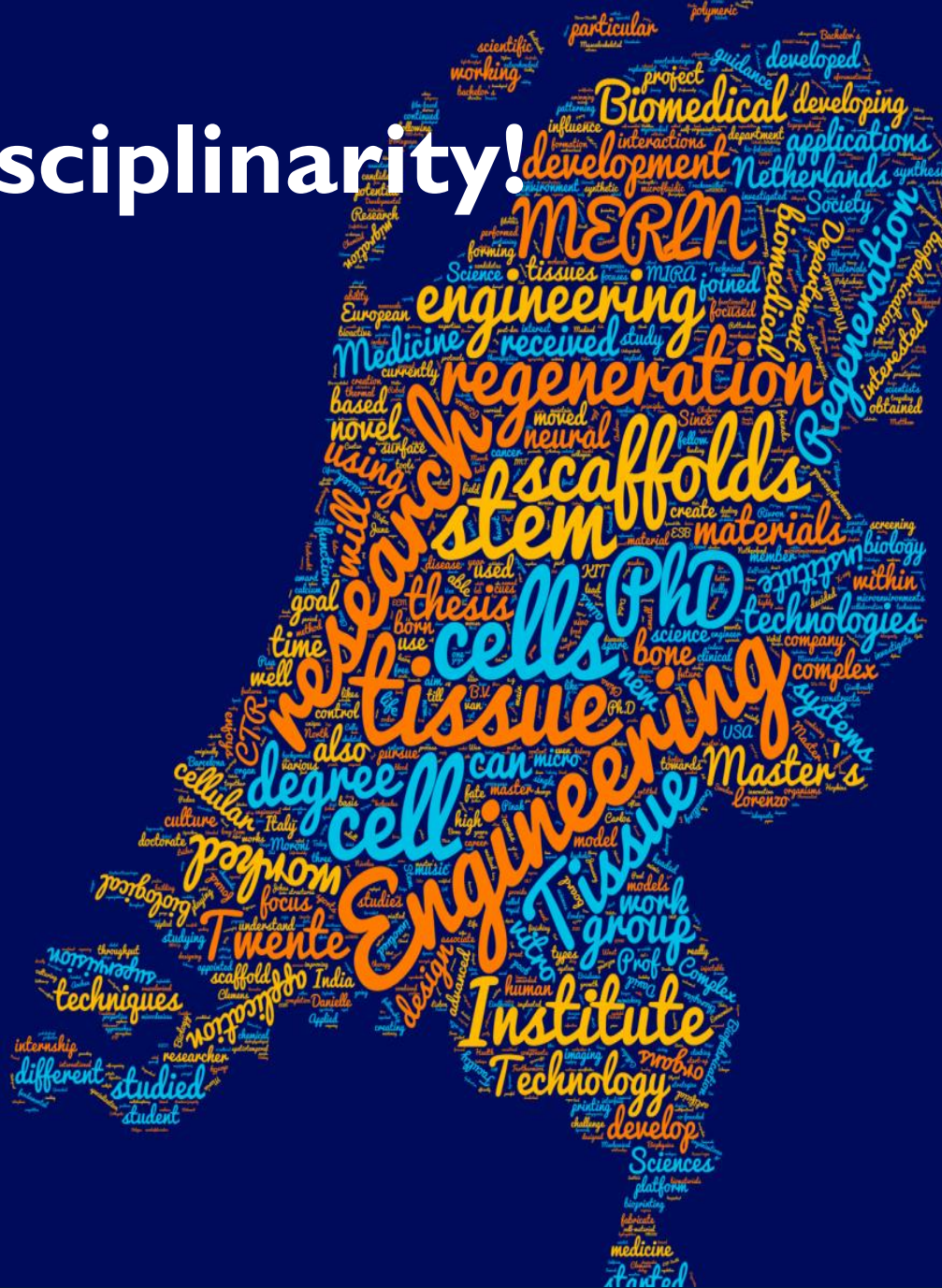
# Multidisciplinary!

Engineers

Biologists

Chemists

Clinicians



- Belgium
- Netherlands
- Germany
- Italy
- France
- USA
- Canada
- Spain
- Portugal
- China
- Malaysia
- India
- Pakistan
- Mongolia
- Iran
- Sweden
- ...



## MERLN - spin-off companies and valorization



and many more...

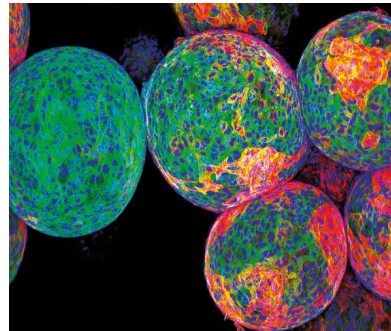
Knowledge crossing borders

# Track content

# Block 1: The science and technology of regenerative medicine

Coordinators: Sabine van Rijt/ Aurelie Carlier

s.vanrijt@maastrichtuniversity.nl  
a.carlier@maastrichtuniversity.nl



## Block 1: The science and technology of regenerative medicine

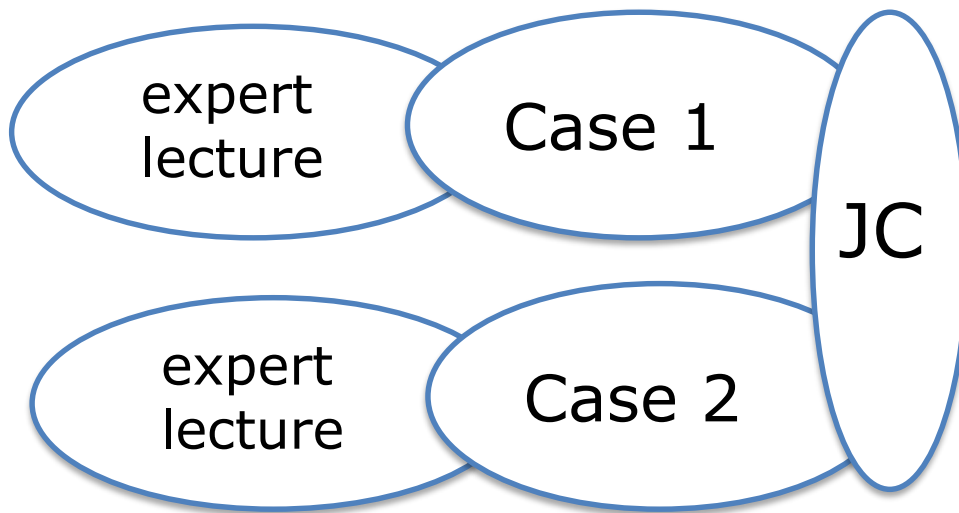


Helicopter view on RM  
Laying foundations for later studies

1 topic per week:  
*Wound healing*  
*Stem cells*  
*Organoids*  
*Biomaterials*  
*Scaffold design and manufacturing*  
*Organ-on-a-chip*

**Educational formats:** *lectures, problem based learning, journal clubs, debating, assignments.*

**Assessment:** *exam, presentation, writing*



Example:  
How to make a synthetic nephron?  
? Cell source  
? Material  
? Technique

## **Block 2:** Translating therapies into the clinic and onto the market

Coordinators: Aart van Apeldoorn/Marjolein Caron

a.vanapeldoorn@maastrichtuniversity.nl  
marjolein.caron@maastrichtuniversity.nl

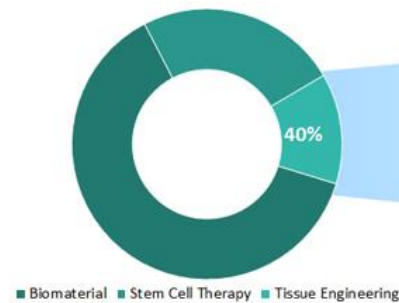


# How to translate your regenerative medicine ideas into clinical reality?



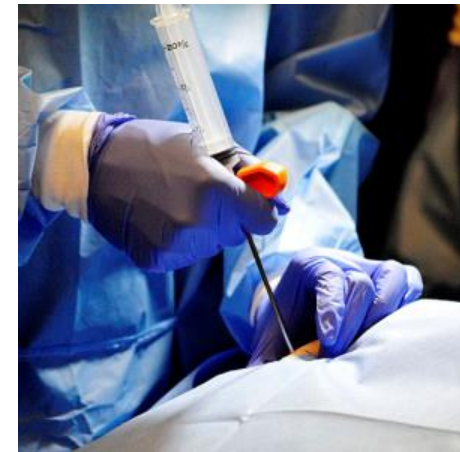
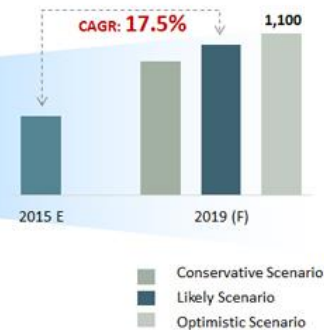
## GLOBAL REGENERATIVE MEDICINE MARKET

Global Regenerative Medicine Market  
By Technology (Value) (2015)



Source: FMI Analysis, 2016

Tissue Engineering Market  
By Value (US\$ Mn) (2015)



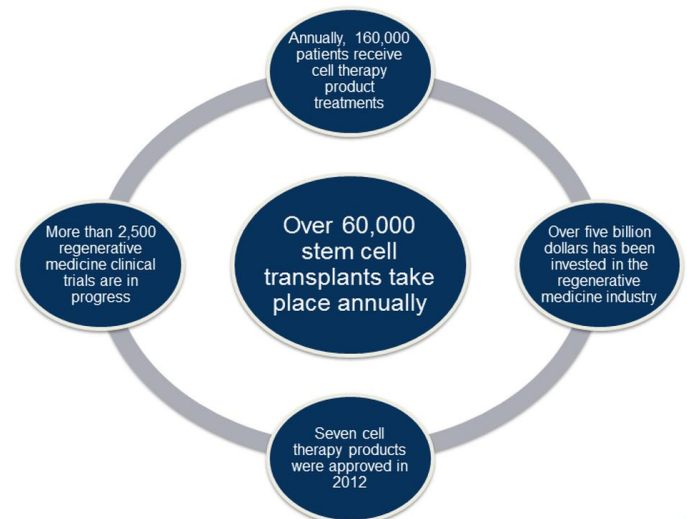
# What is the course about?

It's about you and your project team members

It's about finding a new regenerative medicine solution for a current clinical problem

It's about writing and presenting your research strategy in a proposal and learning everything about using and translating RM knowledge into a clinical solution

This is your unique RM project!





# Clinical cases

1. Cranio-Maxillofacial Surgery

David Koper

2. Ophthalmology

Mor Dickman

3. Orthopedics

Pieter Emans

4. Experimental Surgery

Nicole Bouvy

5. Type 1 diabetes

Aart van Apeldoorn



Each group will work on one clinical case to develop a new regenerative medicine strategy

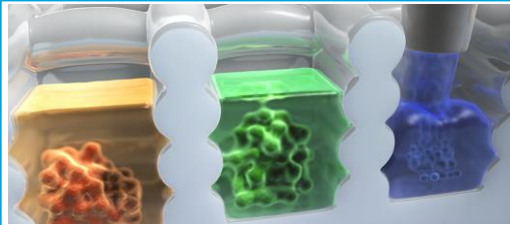
We'll invite companies and valorisation experts to share first hand knowledge on how to bring a regenerative medicine product to the market

 KELITIS

 300MICRONS  
Flexible 3D Cell Culture Solutions

## year 2: 1 year research project

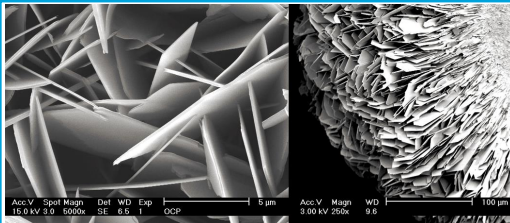
### MERLN - Who are we?



#### Complex Tissue Regeneration (CTR)

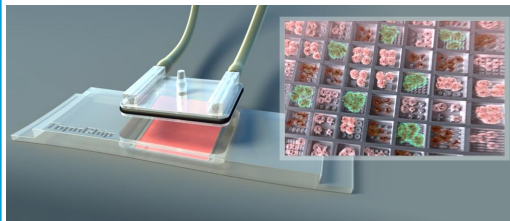
Lorenzo Moroni  
Clemens van Blitterswijk  
Stefan Giselbrecht  
Matthew Baker

Nicolas Rivron  
Aart van Apeldoorn  
Carlos Mota  
Paul Wieringa



#### Instructive Biomaterials Engineering (IBE)

Pamela Habibovic  
Sabine van Rijt  
Vanessa LaPointe  
Roman Truckenmüller



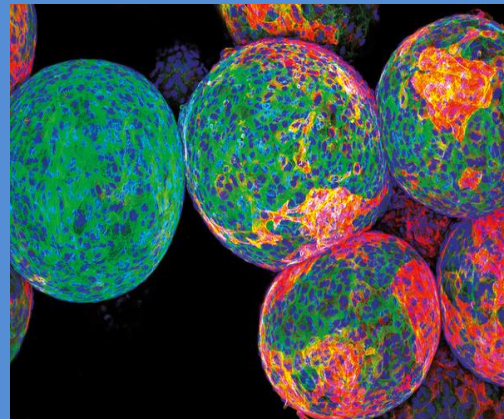
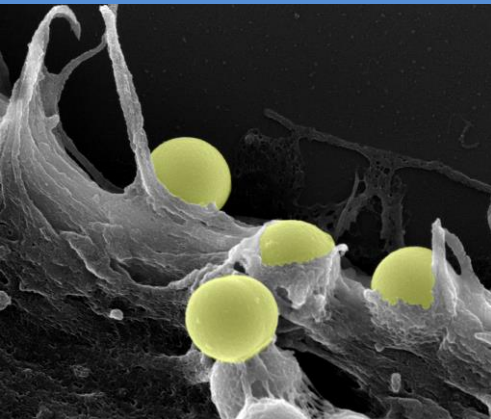
#### New chair/department

TBD  
Aurèle Carlier

# Why choose this specialization?

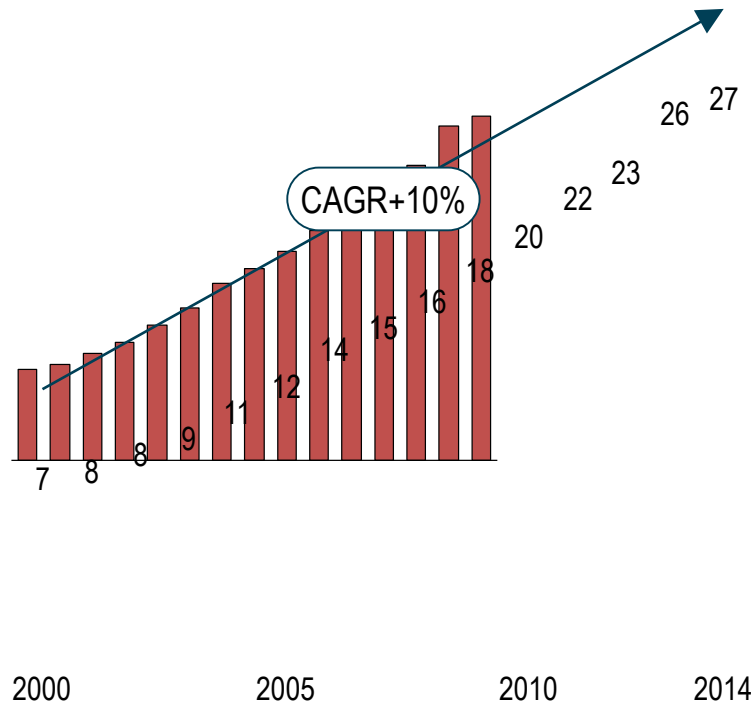
Become a **pioneer** in the field by receiving an interdisciplinary training combining **cell biology**, **biomaterial sciences** and **engineering** at Maastricht University

- ✓ Focus on problem solving and hands-on training
- ✓ Get translational insights
- ✓ close collaboration with the hospital and SMEs
- ✓ Professional training in product development
- ✓ Become prepared to work in an interdisciplinary team



## Regenerative medicine is a booming scientific field

Number of regenerative medicine publications worldwide ['000]



### Stem Cell Scientists Awarded Nobel Prize in Physiology and Medicine

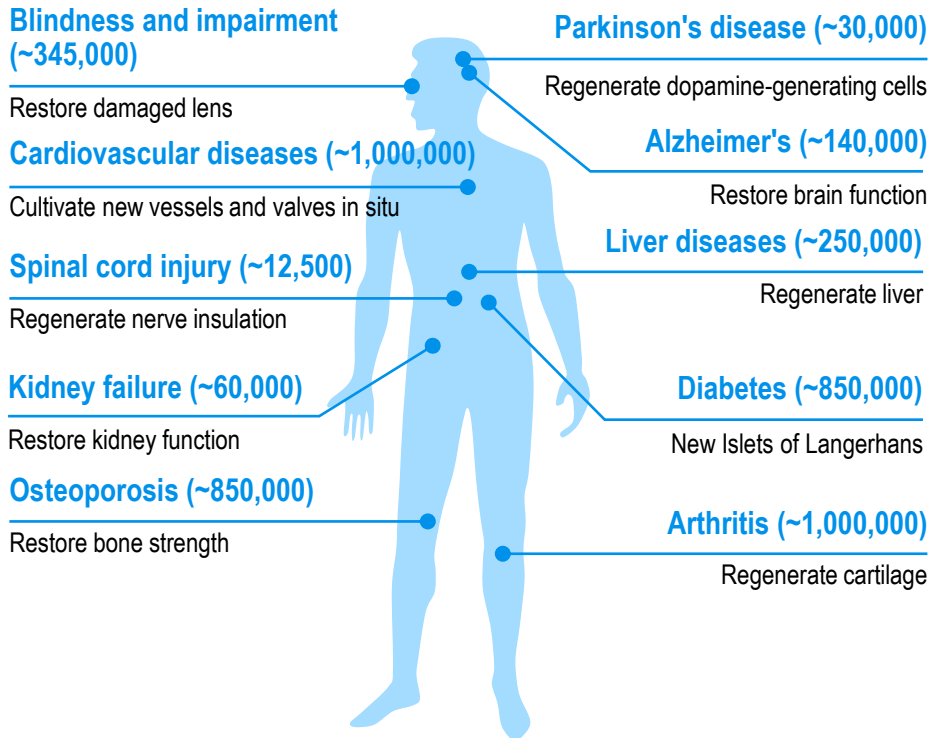
In what researchers view as validation of the field, the Nobel committee on Monday recognized pioneering contributions to stem cell science by John Gurdon and Shinya Yamanaka



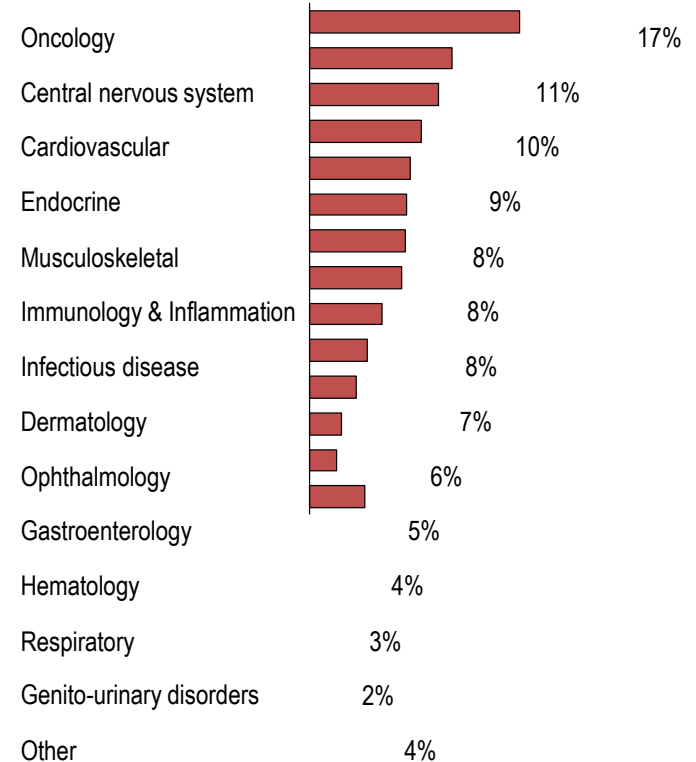
Source: Scopus (keywords: "regenerative medicin\*", "stem cell\*", "tissue engineering"; articles); Science; Nature; Time

# Regenerative medicine has the potential to cure many patients

## Promise of regenerative medicine solutions for patients (# of patients in NL)



## Application area of regenerative medicine companies [% of total, world]



Source: Alliance Regenerative Medicine (2015); Diabetes Fonds; Cijfers over Kanker; Dwarslaesie Fonds; Nierstichting; Hartstichting; Osteoporose Stichting; Reumafonds; Retina Nederland