materials-driven regeneration

- Wednesday October 13th, 2021 -
- 4:00pm (CET) -

MDR colloquium October 2021

Online – Teams meeting

The Research Center for Materials-Driven Regeneration (MDR) is proud to present a series of lectures (monthly). The MDR Gravitation program is a partnership between Eindhoven University of Technology, Maastricht University and Utrecht University, University Medical Center Utrecht and the Hubrecht Institute. MDR brings together materials scientists, cell biologists, tissue engineers and medical scientists to jointly work on the regeneration of tissue and organ function with intelligent, life-like materials.

Mechanisms of Cell Extrusion controlling Tissue Homeostasis in the Intestine

Dr. Daniel Krueger

Hubrecht Institute

The intestinal epithelium undergoes continuous self-renewal through coordination of cell proliferation in the crypt and cell removal in the villus region. I am studying the mechanisms controlling the removal of differentiated cells from the villus making use of latest advancement of organoid technology and engineered substrates mimicking an in vivo-like environment. Preliminary data indicate that most extruding cells are non-apoptotic suggesting alternative mechanisms regulating this key homeostatic event. Cells might either commit to extrusion through specific differentiation programs or local tissue mechanical constraints might force the extrusion of otherwise indistinguishable cells. Using CRISPR-Cas9-based protein labelling I am characterizing key cytoskeletal components and their morphological dynamics during cell extrusion. Investigating a potential role of tissue-scale mechanical forces in cell extrusion, I've set out to establish optogenetics for the precise manipulation of cortical tension and cell contractility. Collectively, my project aims at understanding how tissue homeostasis in the intestinal epithelium is maintained and at dissecting the relative contribution of genetic signaling circuits and tissue mechanics in regulating cell extrusion.

Volumetric biofabrication of complex 3D tissue models

Dr. Riccardo Levato

Regenerative Medicine Center Utrecht

The function of living tissues is intimately linked to their complex architectures. Biofabrication technologies offer unprecedented opportunities to capture salient features of tissue composition and thus guide the maturation of engineered constructs into mimicking functionalities of native organs. In this talk, the design of novel biofabrication strategies and printable biomaterials to enable the reconstitution of complex 3D structures with precise heterocellular, multi-material and hierarchical composition is discussed, together with the development of new volumetric bioprinting technologies, which enable ultra-fast bioprinting of centimetre scale biological constructs.

TU/e Maastricht University UMC Utrecht Hubrecht Institute Utrecht University