materials-driven regeneration

- Wednesday March 16th, 2022 -

- 4:00pm (CET) -

MDR colloquium March 2022

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.

Cell Population Characterization of Enzymatically Isolated Articular Chondrons and Chondrocytes

Damage to articular cartilage remains a challenging problem within orthopedics due to the tissue's poor intrinsic healing ability. When not treated, cartilage damage will lead to deterioration of the affected joint and the development of osteoarthritis. Current treatment strategies generally do not lead to long-term satisfying results, since the repair tissue had inferior structural, biomechanical, and biochemical properties compared to the native cartilage tissue. It is hypothesized that the absence of the native cell microenvironment plays a detrimental role in the loss of the chondrogenic phenotype during cartilage regeneration. Therefore, in this project we aim to investigate the effect of cell microenvironment properties on the phenotype of chondrocytes.

In articular cartilage, chondrocytes are surrounded by a pericellular matrix (PCM), together referred to as a chondron. Chondrons can be isolated from articular cartilage using enzymatic digestion. However, this method results in a heterogeneous mixture of chondrocytes and chondrons. Therefore, we aimed to characterize the cell populations after enzymatic digestion of articular cartilage.

Marloes van Mourik

Eindhoven University of Technology

From Experimental Pharmacology to Future Regenerative Therapies

Research within the Experimental Pharmacology group is focused on understanding the pathways that can be pharmacologically triggered to enhance repair after organ injury and on developing novel regenerative therapies to replace organ function. For this, humanized in vitro systems are being applied that functionally mimic (patients) organs, which includes the use of innovative technologies for 3-dimensional advanced tissue cultures such as microfluidics (organs-on-chip technology) and biofabrication. These experimental tools should aid in translating molecular interactions into therapeutic effects. Target organs currently involve (but are not restricted to) the kidney, the liver and the intestine, individually and combined, allowing to study the interaction between two organs when one of them fails. Further, unique, patented, human renal cell lines have been developed with a high predictive value for drug and waste product transport and metabolism. These cell lines are currently applied in the development of a bioartificial kidney, a kidney-on-a-chip device suitable for in vitro toxicity testing of chemical entities and drugs in development, and for studying the renal tubular secretion and reabsorption machinery. With respect to the latter, novel renal tubular excretion pathways have been identified, as well as regulatory pathways towards the transporters involved that can be pharmacologically triggered to improve transporter function during kidney failure.

Prof. Roos Masereeuw

Utrecht University

TU/e Maastricht University UMC Utrecht Hubrecht Institute Utrecht University