Regenerative Pharmacology (session 2/4)

Date: Tuesday, September 29th
Time: 04:00 pm – 05:00 pm (CEST)
Location: Zoom Video Conferencing
Registration: Required
Organizing partners: NVF & UIPS

Program:

04:00 pm – 04:30 pm **Biomaterials for soft tissue regeneration**
Dr. Wileke Daamen, Principal investigator within the theme Reconstructive & Regenerative Medicine of Radboud university medical center, RIMLS, Dept. of Biochemistry

Abstract
The research of Dr.ir. Daamen focuses on molecular tissue engineering & regenerative medicine, especially concentrating on extracellular matrix components. The main objective is to engineer defined cellular micro-environments with specified composition, 3-dimensional architecture and biomechanical properties that signal to the cell what tissue/organ should be made. Using an in vivo tissue engineering strategy, cells from the local environment are attracted to infiltrate porous biomaterials using cues like biomaterial-bound effector molecules.
This presentation will touch on the design and fabrication of bioactive biomaterials, and then focuses on how biomaterials can guide cells in vivo to steer their biological response, and in this way generate a desired result. Examples of biomaterials in soft tissue regeneration are given, including the potential application for patients with spina bifida and congenital diaphragmatic hernia.

04:30 pm – 04:55 pm **Regenerative Pharmacology for COPD**

Xinhui Wu, PhD Researcher, University of Groningen

Xinhui Wu [1,2], I. Sophie T. Bos[1,2], Lars A. Verkleij [1,2], Angela D'Ambrosi [1,2], Martina Schmidt [1,2], Loes E. M. Kistemaker [1,2,3], Reinoud Gosens[1,2*]

[1]Department of Molecular Pharmacology, Faculty of Science and Engineering, University of Groningen, Antonius Deusinglaan 1, 9713AV, Groningen, Netherlands, [2]Groningen Research Institute for Asthma and COPD, University Medical Center Groningen, University of Groningen, Groningen, Netherlands, [3]Aquilo BV, Groningen, The Netherlands

Abstract:

Background: COPD is characterized by irreversible airflow limitation and emphysema development associated with defective lung repair. Currently, there is no pharmacological treatment targeting lung repair in COPD.

Methods: 2 microarray datasets of lung tissue from CS exposed mice and COPD patients were analyzed to select potential novel drug targets for lung repair. Murine lung organoids were set up by co-culturing epithelial cells ($EpCAM^+/CD45^-/CD31^-$) with CCL206 fibroblasts in Matrigel.

Results: Several common genes and pathways were identified in the experimental CS model and COPD patients. 38 upregulated and 30 downregulated genes were identified that showed concordant regulation in CS exposed mice and in COPD patients. We further filtered these genes for expression in alveolar epithelial type II cells and fibroblasts and for their potential as drug targets, yielding 19 targets which we screened in CSE-exposed lung organoids. 6 targets showed potential as drug targets for repair including PGE2 (target gene PTGES) and PGI2 (target gene PGIR), both of which completely restored the reduced alveolar epithelial organoid number in response to CSE. Progenitors isolated from CS exposed murine lungs had significantly repressed organoid formation; however, both *in vivo* and *in vitro* treatment with PGE2 (misoprostol)/PGI2 (iloprost) agonists restored organoid numbers. For PGE2, the effects were mimicked by an EP4 agonist but not by an EP2 agonist.

Conclusion: A transcriptomics-guided drug discovery strategy yielded 6 potential targets that potentially restore lung repair. Of these, PGE2 and PGI2 had the most significant therapeutic potential in correcting the response to CS both *in vitro* and *in vivo*.

Organizing Partners:

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