BI International PhD student recruitment 2016

Research Group Details

Lab Name	Kidney differentiation
Group Leader	Satu Kuure
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Short Introduction to the lab

Our research team of four people works on projects aiming to reveal how receptor tyrosine kinase signaling regulates development of kidney and lower urinary tract system. The goals of our projects are to link intracellular signaling cascades to the cellular behaviors in order to understand the causes of congenital renal and related lower urinary tract defects. Such knowledge is the basis for generation of novel diagnostics and future therapeutic tools for various renal diseases.

Project Outline

Title

Progenitor cell biology during murine kidney development

Short introduction to the research problem

Congenital renal defects ranging from dysplasia to cancer are among the most common birth disorders. The genetic and developmental bases of various defects are poorly understood, and available treatments are limited to dialysis and organ transplantation. Thus, understanding renal development, which is a multistage process guided by the reciprocal inductive intercellular signaling between tissues, is pivotal for generation of novel therapy strategies in the future. This has become more attainable than ever before due to recent advances in understanding the genetic code regulating renal differentiation, which has enabled directing embryonic stem cells and induced pluripotent cells into kidney organoid-like structures.

Statement of experimental aims and methods

We study renal differentiation with the help of different genetically modified mouse models and our specific interests lie in understanding the regulation of cellular events driving ureteric bud branching morphogenesis and differentiation of the functional units of the kidneys, the nephrons. In vitro culture approaches are utilized to complement in vivo studies especially in the projects aiming to understand the role of stem/progenitor cells in formation of distinct functional units of mature organs. The goal of my research is to produce novel knowledge on critical cellular and molecular mechanisms guiding renal and lower urinary tract (LUT) development with the intention that our data will facilitate further development of stem cell based therapies.

Project time table

Start: 1.6.2016 or any time suitable, duration 4 years.

Collaborators or external secondments relevant to the project

Frank Costantini, Columbia University, New York, USA
Ramaswamy Krishnan, Harvard Medical School, Boston, USA

Max 5 references relevant to the project

- Kumar, A., Kopra, J., Varendi, K., Porokuokka, L.L., Panhelainen, A., Kuure, S., Marshall, P., Nevalainen, N., Härma, M-A., Vilenius, C., Lilleväli, K., Tekko, T., Mijatovic, J., Pulkkinen, N., Jakobson, M., Jakobson, M., Ola, R., Palm, E., Lindahl, M., Strömberg, I., Võikar, V., Piepponen, P.T., Saarma, M., Andressoo, JO. 2015. GDNF overexpression from the native locus reveals its role in the nigrostriatal dopaminergic system function. PLoS Genet. Accepted.
- Akagi, T., Kuure, S., Koide, H., Costantini, F & Yokota. 2015. ETS-related Transcription Factors ETV4 and ETV5 are Involved in Proliferation and Induction of Differentiation-associated Genes in ES cells. J Biol Chem. 290:22460-73.
- Ihermann-Hella, A., Lume, M., Miinalainen, I.J., Pirttiniemi, A., Gui, Y., Peränen, J., Charron, J., Saarma, M., Costantini, F., Kuure S. 2014. Mitogen-activated protein kinase (MAPK) pathway regulates branching by remodeling epithelial cell adhesion. PLoS Genet. 10:e1004193.
- Kuure, S. 2012. Analysis of migration in primary ureteric bud epithelial cells. Book chapter in Methods in molecular biology, Kidney Development: Methods and Protocols. vol. 886: 147-55. Ed. Jon Walker & Odysse Michos.