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Branching morphogenesis- A critical determinant of final nephron count in adult kidneys

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Reduced nephron account is a risk factor for renal defects, hypertension and diabetic nephropathies in later life. The final nephron count is determined by ureteric bud (UB) branching during fetal life, the process that specifies also the actual size and shape of the kidneys. Such dual role of UB branching is due to the nature of renal differentiation regulation, which is guided through classic reciprocal inductive tissue interactions. Nephrons differentiate from an established nephron progenitor cell (NPC) pool, which surround each tip of UBs, and their renewal capacity greatly affects the extent of UB branching. The research focuses on understanding cellular events that promote kidney differentiation at the level of UB branching and NPC self-renewal/differentiation in order to fully cover their interplay. The author will discuss about the molecular regulation of renal differentiation on the basis of our fresh advances in receptor tyrosine kinase (RTK) signaling and intracellular pathways activated downstream of RTKs. Highlights of the recent advances in glial cell-line derived neurotrophic factor (GDNF) activated RET signaling and mitogen-activated protein kinase (MAPK) functions within UB epithelium will be presented to support the hypothesis that MAPK pathway activated in scattered UB cells is involved in epithelial progenitor cell (EPC) regulation, and mediates at least some if not all of the GDNF-RET induced cellular functions during branching. Preliminary results of MAPK activity functions regulating NPC biology and finally conclusive suggestions for clinical importance/implementations of our research for renal hypofunction patients are presented.

Biography

Satu Kuure completed her PhD in 2007 from Biomedical Institute at the University of Helsinki and continued her studies exploring the regulation of renal differentiation during the two-year Postdoc at Columbia University Medical Center where she focused on different imaging techniques and cellular events guiding renal branching morphogenesis downstream of receptor tyrosine kinase signaling. Currently, she is a team leader at the Institute of Biotechnology, University of Helsinki, and has published several critically important papers in top-end journal and serves as a board member of Finnish Society of Developmental Biology.

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