



Islet biology

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Dear Readers,

Loss or dysfunction of insulin-producing beta cells underlies the development and progression of diabetes. Thus, world-wide efforts are on the way to either trigger endogenous beta cell regeneration or replenish lost beta cell mass by exogenous sources, e.g. human islets or stem cell-derived islet cells. Although remarkable progress has been made, as of today functionally mature beta cells cannot be generated from pluripotent stem cells, and the routes to endogenous beta-cell regeneration remain illusive. Moreover, the pathomechanisms of type 1 and type 2 diabetes are ill defined mainly due to the lack of sophisticated intravital imaging technologies that would enable physicians and scientists to monitor beta cell mass and function during the development of the disease. However, to stop or revert disease progression, the causes of the various forms of diabetes as well as improved therapy options need to be discovered and explored.

In this special issue of *Molecular Metabolism* on Islet Biology, we have compiled a variety of review papers from expert laboratories around

the world within this exciting field of research. The overview review articles highlight some of the hottest topics and enabling technologies in islet biology. Specifically, we have focused on islet cell proliferation, maturation and plasticity, and what we can learn from single-cell omics technologies to regenerate functional beta cell mass in diabetic patients. We also highlight intraocular *in vivo* imaging of islets transplanted into the anterior chamber of the eye in mice to model the key events in the development and progression of T1D and T2D diabetes. Other reviews summarize the latest data on how insights into the glucoregulatory actions of leptin, microRNAs, mitochondrial metabolism and higher order epigenetic regulation can explain islet cell failure and could be targeted for improved beta cell mass and function. We are delighted that we were able to assemble such an excellent and broad overview on cutting edge research and technology in islet biology, and are extremely grateful to the authors for their outstanding contributions. Last, but not least, we would like to wish you some interesting and enjoyable hours reading this special issue of *Molecular Metabolism* on Islet Cell Biology.

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