Summer Research Program 2026 – Projects

Project #8

Title: Investigation of the Role of MAFB in the Maturation and Functionality of Induced Human Pluripotent Stem Cell-derived Pancreatic β cells

Description: Impaired insulin secretion contributes to the pathogenesis of type 1 diabetes (T1DM) and Type 2 diabetes (T2DM). Since cadaveric islet transplantation using Edmonton protocol has served as an effective intervention to restore normoglycaemia in T1DM patients for months, insulin-producing β cells generated from induced human pluripotent stem cells have potential as a therapy for insulin-dependent diabetes. Thus, great effort has been concentrated on developing in vitro differentiation protocols to realize this therapeutic potential. However, most of the differentiation protocols generate insulin-positive pancreatic β cells with immature phenotypes, such as low or absence expression of islet-enriched transcription factors like MAFB, and consequently impaired glucose-stimulated insulin secretion (GSIS) as compared with their in vivo counterparts. Using MAFB knock out iPSC line with CRISPR-Cas9 technology, we aim to investigate the specific role of this transcription factor in the maturation and functionality of hPSC-derived pancreatic β cells using a 2D differentiation protocol.

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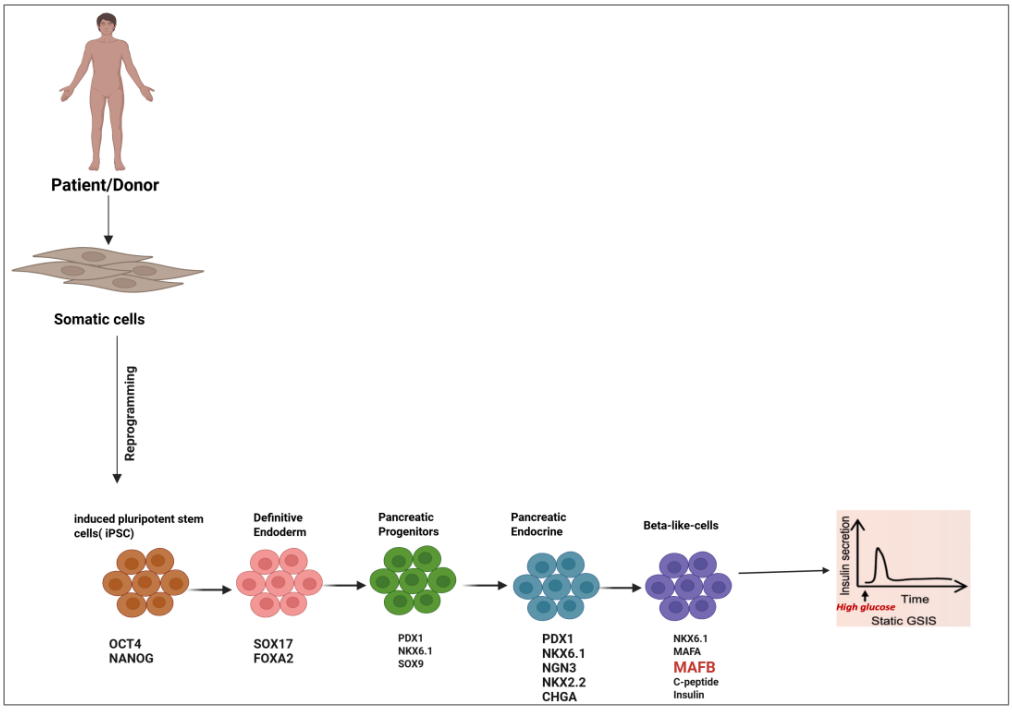

Figure. Schematic of the induced hPSC-derived pancreatic β cell differentiation protocol with relevant-stage gene expression markers.