

Since this project is fully funded, I began working on it and wanted to provide an update. Human pluripotent stem cell-derived pancreatic beta cells are promising cell source for the treatment of diabetes. However, to use these beta cells in clinic, we have to overcome several major problems, the tumorigenesis risk caused the remaining stem cells, and the high cost of producing these beta cells using these time-consuming protocols. The aim of this project is to purify and expand the intermediate cell types generated in the process of inducing human pluripotent stem cell into pancreatic beta cells, and thus to (a) exclude remaining stem cells, and (b) greatly reduce the cost and time by shortening the differentiation protocol.

In the first stage of this project I will differentiate human pluripotent stem cells into beta cells using our step-wised protocol. We will then purify the intermediate cell types using stage-specific gene markers (e.g. fluorescent proteins, surface proteins). These isolated cells will be tested using different cocktails of factors (growth factors and pathway modulators).

If we could find certain condition(s) which could expand some intermediate cell type(s), we will then investigate these expanded cells for their ability to differentiate further into functional beta cells. We will also test if these expanded intermediate cells could generate human pancreas or pancreatic tissue after injecting into pancreas-deficient animal embryos.