How insulin-producing cells develop -- new finding could help fight against diabetes

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A key aspect of how embryos create the cells which secrete insulin is revealed in a new study published tomorrow (18 May) in the *Journal of Biological Chemistry*. The researchers hope that their findings will enable the development of new therapies for diabetes, a condition caused by insufficient levels of insulin.

The research reveals that glucose plays a key role in enabling healthy beta cells, which secrete insulin, to develop in the pancreas of an embryo. Glucose prompts a gene called Neurogenin3 to switch on another gene, known as NeuroD, which is crucial for the normal development of beta cells. If glucose levels are low this gene is not switched on.

Insulin is the principal hormone that regulates the uptake of glucose and if the beta cells are unable to produce sufficient insulin, this can cause diabetes.

The scientists, from Imperial College London and an INSERM Unit at Necker Hospital, Paris, hope that understanding how to switch on the gene that produces beta cells could eventually enable researchers to create these cells from stem cells. They could then transplant beta cells into patients with type 1 diabetes. In this type of diabetes the immune system attacks patients' beta cells and at the moment few patients with the condition are able to have beta cell transplants, because the cells have to be taken from deceased donors.

The researchers also hope that scientists will be able to develop drug therapies that enhance the action of glucose and hence encourage the growth of healthy beta cells.

Professor Guy Rutter, from the Division of Medicine at Imperial College and one of the authors of the paper, said: "We hope that by demonstrating that an 'extrinsic' factor like glucose can regulate the way in which insulin secreting cells develop we may eventually be able to reverse defects in the growth of these cells in patients with diabetes. Research like ours is opening up whole new sets of targets for drug treatments."

The researchers reached their conclusions after conducting research on tissues cultured from the primordial pancreas of very young rat embryos. Using an in vitro system, rather than looking at cells in vivo, enables researchers to gain a greater understanding of when and how different genes are being switched on.

Source: Imperial College London