Abstract

Insulin producing β-cells are located in the endocrine pancreas. They are a part of pancreatic islets of Langerhans along with α-, β-, δ-, ε- a PP-cells producing glucagon, somatostatin, ghrelin and pancreatic polypeptide. Insulin regulates glucose uptake into cells and thus contributes to the regulation of energy metabolism. The development of β-cells as well as the development of the pancreas is a complex process. Developmental processes of proliferation, differentiation and total pancreatic organogenesis are best described in the mouse model. The developmental processes and pancreatic functions are regulated by a network of transcription factors. Pancreatic duodenal homeobox gene 1 is a transcription factor that is expressed in the precursors of endocrine, exocrine and ductal cells. Neurogenin 3 is expressed in precursors of the islets of Langerhans cells. Islet 1 regulates the formation of the islets of Langerhans as well as the pair domains of transcription factors 4 and 6, whose expression is later limited only to β-cells. Transcription factors Islet 1 and Neurod 1 regulate insulin production in β-cells. Mutations in transcription factors lead to the abnormal development and altered function of pancreatic cells, including β-cells. Diabetes mellitus is a disease resulting from defects in insulin secretion, insulin action, or both. Pancreatic cancer is another disease associated with pancreatic cells dysfunction. Understanding the development and function of β-cells is therefore crucial for early diagnosis and for an improvement of treatment.