

# English abstract

Diabetes mellitus (DM) is the best known endocrine disease of the pancreas where the incidence of the affected individuals is increasing rapidly worldwide. It is caused by defects in both the pancreatic islets and in the pancreas to produce enough insulin resulting in impaired glucose homeostasis leading to higher than normal glucose levels in the blood (hyperglycaemia) which is considered to be the hallmark of diabetes. Consequently the main aim of diabetes management is to monitor the glycaemic status. Diabetes mellitus can be subdivided into two classes, type 1 diabetes mellitus (T1DM) which is also known as insulin-dependent diabetes mellitus and type 2 diabetes mellitus (T2DM) which is known as non-insulin-dependent diabetes mellitus. Management of either type of DM requires a number of lifestyle modifications such as increased exercise and decreased weight with the intention of improving metabolic control and enhancing the quality of life. Unfortunately, the majority of patients will eventually require administration of antidiabetic drugs.

The present study was performed with the intention of reviewing the currently available scientific literature about both types of DM and discuss the current and novel approaches of treatment, thus giving more emphasis on the novel advances. For the purposes of the study, we searched Medline, Pubmed, Google Scholar and the online library of Charles University to identify English language original and review articles about DM and the novel approaches of its treatment.

Well-established antidiabetic agents used for many years include sulphonylureas, thiazolidinediones, biguanides and alpha-glucosidase inhibitors which act mainly by stimulating and improving insulin secretion and associated action. Novel combinations and ways of insulin administration have been developed including oral and inhaled insulin in order to replace the need for frequent injections which complicate patients' life. Moreover much attention has been given to the incretin system as an alternative treatment option including both GLP-1 receptor agonists (exenatide, liraglutide) and DPP-4 inhibitors (saxagliptin, sitagliptin, vildagliptin).

Increased understanding of the pathophysiology of DM provided a narrow window of potential alternative therapies with the aim of eliminating the requirement of exogenous insulin administration and also reversing or preventing the development of immune-mediated response that is observed in T1DM. These strategies include islet cell transplantation,

pancreas transplantation, gene therapy, stem cells and also a number of different drugs as potential compounds for the prevention of diabetes such as oral insulin, abatacept, otelixizumab and glutamic acid decarboxylase which are currently in different phases of clinical trials.

Taking together all of our findings, it can be concluded that in order to have the best management for diabetes, there is a need for a close collaboration between scientists, clinicians and patients. Additionally, continued clinical trials need to be carried out with the intention of developing novel compounds which will be able to provide the best-long-term efficacy and safety profile, lowering at the same time the possible risk of hypoglycaemia and also to avoid the unwanted side effects observed with the currently existing antidiabetic drugs.