Biological Roles of Selected microRNAs in Glucose Metabolism as a Candidate Biomarker for Diabetes Mellitus

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Abstract Type 2 diabetes mellitus (T2DM) is a medical disorder characterized by high blood sugar levels resulting from a lack of insulin caused by impaired activity of beta-cells and/or the inability of insulin to efficiently transport glucose from the bloodstream into cells, a condition referred to as insulin resistance. This occurs not only in insulin-sensitive tissues such as muscles, adipose tissue, and the liver, but also in the gastrointestinal tract, which may be caused by a defect in the insulin signaling pathway. MicroRNAs (miRNAs) are RNA molecules that do not code for proteins and play a role in multiple pathways. Several studies have suggested that specific miRNAs could potentially be used as biomarkers for diagnosing diabetes. These miRNAs regulate the formation of pancreatic islets, the differentiation of beta-cells, the secretion of insulin, and the control of glucose metabolism. miRNA-mediated pathways are associated with human genetic illnesses resulting from mutations in the maturation process of miRNAs. The changes in miRNAs impact their ability to bind to mRNA targets, hence modifying gene expression. This review provides a concise overview of the latest studies investigating the correlation between miRNA expression and the regulation of glucose levels in cases of beta-cell malfunction and insulin resistance.

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