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Short communication

Antidiabetic Agents and the Recent Advances in Pharmacotherapy

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DESCRIPTION

Diabetes mellitus, a chronic metabolic disorder characterized by elevated blood glucose levels, continues to pose a significant global health challenge. The escalating prevalence of diabetes has spurred relentless research efforts to develop and refine antidiabetic agents. These agents play a crucial role in managing blood glucose levels, preventing complications, and improving the quality of life for individuals living with diabetes [1].

Insulin therapies

Insulin, a hormone required for glucose control, is a key component in diabetes therapy. Recent advances have centered on improving insulin administration systems, pharmacokinetics. Long-acting insulin analogs, such as degludec, glargine and provide extended glycemic control with fewer injections by easing the strain on patients. Novel insulin administration technologies, such as insulin pumps and inhalable insulin are intended to improve convenience and adherence to treatment plans [2,3].

Oral antidiabetic medications

Oral antidiabetic medications has an important role in the management of type 2 diabetes. Recent advancements have provided new classes of medications with distinct mechanisms of action, providing healthcare practitioners more alternatives for adapting methods of therapy to particular patient needs [4,5].

SGLT-2 inhibitors: Sodium-Glucose Cotransporter-2 (SGLT-2) inhibitors represent a relatively recent addition to the antidiabetic armamentarium. These drugs, including empagliflozin and dapagliflozin, act by inhibiting glucose reabsorption in the renal tubules, promoting urinary glucose excretion. Beyond glycemic control, SGLT-2 inhibitors have demonstrated cardiovascular and renal benefits, making them a valuable choice for patients with coexisting cardiovascular risk factors.

GLP-1 receptor agonists: Glucagon-like peptide-1 (GLP-1) receptor agonists, such as liraglutide and dulaglutide, mimic the effects of endogenous GLP-1, enhancing glucose-dependent insulin secretion and reducing glucagon release. In addition to improving glycemic control, GLP-1 receptor agonists have been associated with weight loss and cardiovascular benefits. The availability of once-weekly formulations has improved adherence and patient satisfaction.

DPP-4 Inhibitors: Dipeptidyl peptidase-4 (DPP-4) inhibitors, including sitagliptin and saxagliptin, enhance glycemic control by preventing the degradation of endogenous incretins. While they are generally well-tolerated, recent research has explored their potential cardiovascular effects and long-term safety profiles [6].

Dual and triple therapy: Recognizing the heterogeneity of type 2 diabetes, there is a growing emphasis on individualized treatment approaches. Combining different classes of oral antidiabetic medications, such as SGLT-2 inhibitors with DPP-4 inhibitors or GLP-1 receptor agonists, allows for synergistic effects and better glycemic control. Triple therapy regimens, involving combinations of insulin, metformin, and additional oral agents, offer further flexibility in tailoring treatment plans [7,8].

Emerging therapies

Continued research has unveiled promising candidates among novel antidiabetic agents, presenting potential breakthroughs in diabetes management [9].

Bile acid sequestrants: Bile acid sequestrants, traditionally used in lipid-lowering therapy, have shown innovations in improving glycemic control. By modulating bile acid signaling pathways, these agents may contribute to enhanced insulin sensitivity and glucose metabolism.

Glucokinase activators: Glucokinase activators target a key enzyme involved in glucose sensing and insulin release. These agents has potential in regulating glucose homeostasis in a glucose-dependent manner, reducing the risk of hypoglycemia [10,11].

Dual GIP and GLP-1 receptor agonists: Combining the actions of Glucose-Dependent Insulinotropic Polypeptide (GIP) and GLP-1 in a single molecule represents an innovative approach.

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Dual receptor agonists aim to provide comprehensive glycemic control and cardiovascular benefits.

FGF-21 analogues: Fibroblast Growth Factor-21 (FGF-21) analogues have shown metabolic effects, including improved insulin sensitivity and lipid metabolism. These agents are currently undergoing clinical trials to assess their safety and efficacy in diabetic populations [12].

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