



Improving Insulin Action in Type 2 Diabetes and Microvascular Complications

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DESCRIPTION

Type 2 diabetes is a chronic condition that affects millions of people worldwide and increases the risk of microvascular and macrovascular complications, such as kidney disease, eye disease, nerve damage, and cardiovascular disease. Glycemic control refers to the management of blood glucose levels to prevent or delay these complications and improve the quality of life of patients with type 2 diabetes. Several studies have shown that lowering blood glucose levels can reduce the incidence and progression of microvascular complications in patients with type 2 diabetes. For example, the UKPDS (UK Prospective Diabetes Study) found that intensive glycemic control with a target HbA1c (glycated hemoglobin) level of less than 7% (53 mmol/mol) reduced the risk of retinopathy, nephropathy, and neuropathy by 25%, 33%, and 16%, respectively, compared with conventional glycemic control with a target HbA1c level of less than 7.9% (63 mmol/mol). Similarly, the ADVANCE (Action in Diabetes and Vascular Disease: Preterax and Diamicon Modified Release Controlled Evaluation) trial reported that intensive glycemic control with a target HbA1c level of less than 6.5% (48 mmol/mol) reduced the risk of nephropathy by 21% and retinopathy by 30%, compared with standard glycemic control with a target HbA1c level of less than 7.3% (56 mmol/mol).

The effect of glycemic control on macrovascular complications, such as heart attack, stroke, and death, is less clear and may depend on several factors, such as the duration of diabetes, the type and intensity of glucose-lowering therapy, and the presence of other cardiovascular risk factors. Some studies have suggested that intensive glycemic control may reduce the risk of nonfatal myocardial infarction by 15%, but not the risk of cardiovascular mortality or stroke. However, other studies have found no significant benefit or even harm from intensive glycemic control on cardiovascular outcomes. Therefore, the optimal level of glycemic control for preventing macrovascular complications may vary from person to person and should be individualized based on the patient's characteristics, preferences, and goals.

There are various methods to achieve glycemic control in patients with type 2 diabetes, including lifestyle modifications, pharmacological interventions, and bariatric surgery. Lifestyle modifications include dietary changes, physical activity, weight management, and smoking cessation. These interventions can improve insulin sensitivity, lower blood glucose levels, and reduce cardiovascular risk factors. Pharmacological interventions include oral antidiabetic agents, injectable agents (such as insulin and glucagon-like peptide-1 receptor agonists), and combination therapies. These interventions work by increasing insulin availability or secretion, improving insulin action, delaying carbohydrate absorption or digestion, or increasing urinary glucose excretion. Bariatric surgery is a surgical procedure that alters the gastrointestinal tract to reduce food intake or absorption. It can lead to significant weight loss and remission of type 2 diabetes in some patients. This may be due to several challenges and barriers that affect the implementation and adherence of glycemic control strategies. Some of these challenges and barriers include:

- Lack of awareness or education about the benefits and risks of glycemic control.
- Lack of access or affordability to glucose-lowering medications or devices.
- Lack of support or motivation from health care providers or family members.
- Fear or experience of hypoglycemia or other adverse effects of glucose-lowering therapy.
- Complexity or inconvenience of glucose-lowering regimen.
- Psychological factors such as depression, anxiety, stress, or low self-efficacy.
- Social factors such as cultural beliefs, stigma, discrimination, or peer pressure.
- Environmental factors such as food availability, quality, or cost.
- Comorbidities or complications that interfere with glucose-lowering therapy.

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CONCLUSION

Glycemic control is an important aspect of managing type 2 diabetes and preventing its complications. However, glycemic control is not a one-size-fits-all approach and should be tailored to each patient's individual needs, preferences, and goals. Patients with type 2 diabetes should be educated about the benefits and risks of glycemic control and empowered to make

informed decisions about their glucose-lowering therapy. They should also receive adequate support and guidance from their health care providers and family members to overcome the challenges and barriers that may hinder their glycemic control. Despite the availability of various methods to achieve glycemic control in patients with type 2 diabetes, many patients still fail to reach their target HbA1c levels.