

# Insulin resistance and insulin therapy related metabolic diseases: Managing diabetes challenges

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## Description

Diabetes is a chronic condition characterized by elevated blood sugar levels due to insufficient insulin production or the body's inability to use insulin effectively. Insulin, a hormone produced by the pancreas, plays a crucial role in regulating blood glucose levels. However, in individuals with insulin resistance, the body's cells do not respond properly to insulin, leading to persistently high blood sugar levels. Insulin resistance is a key feature of type 2 diabetes, and addressing this issue is essential in diabetes management. Insulin therapy is one of the primary treatment approaches to manage insulin resistance and achieve optimal glycemic control.

### ■ The role of insulin therapy

Insulin therapy is a cornerstone of diabetes management, particularly for individuals with type 2 diabetes and those with advanced type 1 diabetes. Its primary goal is to supplement the body's insulin supply or replace the hormone when the pancreas cannot produce enough of it. Insulin therapy helps lower blood sugar levels, reduce complications, and improve overall health and well-being.

### ■ Types of insulin

Various types of insulin are available, and they are classified based on their onset, peak, and duration of action. The common types of insulin include:

**Rapid-acting insulin:** This type of insulin begins

to work within 15 minutes after injection, peaks in about 1 to 2 hours, and remains active for 3 to 4 hours. It is often used before meals to control post-meal blood sugar spikes.

**Short-acting insulin:** Regular insulin takes effect within 30 minutes of injection, peaks in 2 to 3 hours, and lasts for about 3 to 6 hours. It is typically used before meals.

**Intermediate-acting insulin:** Intermediate-acting insulin starts working in 2 to 4 hours, peaks in 4 to 12 hours, and remains active for about 12 to 18 hours. It is commonly used in combination with rapid-acting or short-acting insulin.

**Long-acting insulin:** Long-acting insulin has a slow and steady release, providing a basal level of insulin over an extended period (up to 24 hours). It helps maintain stable blood sugar levels between meals and during the night.

**Premixed insulin:** Some insulin preparations combine rapid-acting or short-acting insulin with intermediate-acting insulin in fixed ratios. These are convenient for individuals who require both types of insulin.

### ■ Insulin therapy in insulin resistance

For individuals with insulin resistance, insulin therapy can be highly effective in improving insulin sensitivity and reducing blood sugar levels. The therapy can be initiated as a monotherapy or combined with other diabetes medications, depending on the individual's

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needs and treatment plan.

**Basal insulin:** Long-acting insulin or basal insulin is often prescribed to address fasting blood sugar levels, which tend to be higher in insulin-resistant individuals. Basal insulin provides a steady release of insulin throughout the day and night, mimicking the body's basal insulin secretion.

**Mealtime insulin:** Rapid-acting or short-acting insulin may be used to cover the rise in blood sugar after meals. It is administered before meals to prevent post-meal hyperglycemia.

**Insulin sensitizers:** Certain oral medications, like thiazolidinediones, are used to improve insulin sensitivity in insulin-resistant individuals. They work by increasing the responsiveness of cells to insulin.

#### ■ Challenges and considerations

**Hypoglycemia:** Excessive insulin or mismatched insulin dosing with food intake can lead to low blood sugar levels (hypoglycemia). Hypoglycemia

can be dangerous and requires prompt treatment.

**Weight management:** Some individuals may experience weight gain with insulin therapy. A balanced diet and regular exercise are crucial for managing weight while on insulin treatment.

**Individualization of therapy:** Insulin therapy should be tailored to the individual's needs, lifestyle, and blood sugar patterns. Regular monitoring and adjustments by healthcare providers are essential for optimal glycemic control.

**Injection technique and adherence:** Proper insulin injection technique and adherence to the prescribed regimen are vital for successful insulin therapy.

Insulin resistance poses a significant challenge in diabetes management, particularly for individuals with type 2 diabetes. Insulin therapy plays a pivotal role in improving insulin sensitivity, reducing blood sugar levels, and preventing complications.