

Type 2 diabetes is not one-size-fits-all: Subtypes affect complications and treatment options

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You may have heard of Ozempic, the "miracle drug" for weight loss, but did you know that it was actually designed as a new treatment to manage diabetes? In Canada, diabetes affects approximately [10% of the general population](#). Of those cases, 90% have type 2 diabetes.

This metabolic disorder is characterized by persistent high [blood sugar levels](#), which can be accompanied by secondary health challenges, including a higher risk of [stroke and kidney disease](#).

Locks and keys

In type 2 [diabetes](#), [the body struggles to maintain blood sugar levels](#) in an acceptable range. Every cell in the body needs sugar as an energy source, but too much sugar can be toxic to cells. This equilibrium needs to be tightly controlled and is regulated by a lock and key system.

In the body's attempt to manage blood sugar levels and ensure that cells receive the right amount of energy, the pancreatic hormone, insulin, functions like a key. Cells cover themselves with locks that respond perfectly to insulin keys to facilitate the entry of sugar into cells.

Unfortunately, this lock and key system doesn't always perform as expected. The body can encounter difficulties producing an adequate number of insulin keys, and/or the locks can become stubborn and unresponsive to insulin.

All forms of diabetes share the challenge of high blood sugar levels; however, diabetes is not a singular condition; it exists as a spectrum. Although diabetes is broadly categorized into two main types, type 1 and type 2, each presents a diversity of subtypes, especially type 2 diabetes.

These subtypes carry their own characteristics and risks, and [do not respond uniformly to the same treatments](#).

To better serve people living with type 2 diabetes, and to move away from a "one size fits all" approach, it is beneficial to understand which subtype of type 2 diabetes a person lives with. When someone needs a blood transfusion, the medical team needs to know the patient's blood type. It should be the same for diabetes so a tailored and effective game plan can be implemented.

This article explores four unique subtypes of type 2 diabetes, shedding light on their causes, complications and some of their specific treatment avenues.

Severe insulin-deficient diabetes

Insulin is produced by [beta cells](#), which are found in the pancreas. In the severe insulin-deficient diabetes (SIDD) subtype, the key factories—the beta cells—are on strike. Ultimately, there are fewer keys in the body to unlock the cells and allow entry of sugar from the blood.

SIDD primarily affects younger, leaner individuals, and unfortunately, increases the risk of [eye disease and blindness](#), among other complications. Why the beta cells go on strike remains largely unknown, but since there is an insulin deficiency, treatment often involves insulin injections.

Severe insulin-resistant diabetes

In the severe insulin-resistant diabetes (SIRD) subtype, the locks are overstimulated and start ignoring the keys. As a result, the beta cells produce even more keys to compensate. This can be measured as high

levels of insulin in the blood, also known as hyperinsulinemia.

This resistance to insulin is particularly prominent in individuals with higher body weight. Patients with SIRD have an increased [risk of complications such as fatty liver disease](#). There are many treatment avenues for these patients but [no consensus about the optimal approach](#); patients often require high doses of insulin.

Mild obesity-related diabetes

Mild obesity-related (MOD) diabetes represents a nuanced aspect of type 2 diabetes, often observed in individuals with higher body weight. Unlike more severe subtypes, MOD is characterized by a more measured response to insulin. The locks are "sticky," so it is challenging for the key to click in place and open the lock. While MOD is connected to body weight, the comparatively less severe nature of MOD distinguishes it from other diabetes subtypes.

To minimize complications, treatment should include maintaining a healthy diet, managing body weight, and incorporating as much aerobic exercise as possible. This is where [drugs like Ozempic](#) can be prescribed to control the evolution of the disease, in part by managing body weight.

Mild age-related diabetes

Mild age-related diabetes (MARD) happens more often in older people and typically starts later in life. With time, the key factory is not as productive, and the locks become stubborn. People with MARD find it tricky to manage their blood sugar, but it usually doesn't lead to severe complications.

Among the different subtypes of diabetes, [MARD is the most common](#).

Unique locks, varied keys

While efforts have been made to classify diabetes subtypes, new subtypes are still being identified, making proper clinical assessment and treatment plans challenging.

In Canada, [unique cases of type 2 diabetes](#) were identified in Indigenous children from Northern Manitoba and Northwestern Ontario by Dr. Heather Dean and colleagues in the 1980s and 90s. Despite initial skepticism from the scientific community, which typically associated type 2 diabetes with adults rather than children, clinical teams persisted in identifying this as a distinct subtype of type 2 diabetes, called childhood-onset type 2 diabetes.

Childhood-onset type 2 diabetes is on the rise across Canada, but disproportionately affects Indigenous youth. It is undoubtedly linked to the [intergenerational trauma associated with colonization in these communities](#). While many factors are likely involved, recent studies have discovered that exposure of a fetus to type 2 diabetes during pregnancy [increases the risk that the baby will develop diabetes later in life](#).

Acknowledging this distinct subtype of type 2 diabetes in First Nations communities has led to the implementation of a [community-based health action plan](#) aimed at addressing the unique challenges faced by Indigenous Peoples. It is hoped that partnered research between communities and researchers will continue to help us understand childhood-onset type 2 diabetes and how to effectively prevent and treat it.

A mosaic of conditions

Type 2 diabetes is not uniform; it's a mosaic of conditions, each with its own characteristics. Since diabetes presents so uniquely in every patient, [even categorizing into subtypes does not guarantee how the disease will evolve](#). However, understanding these subtypes is a good starting point to help doctors create personalized plans for people living with the condition.

While Indigenous communities, lower-income households and individuals living with obesity already face a higher risk of developing type 2 diabetes than the general population, tailored solutions may offer hope for better management. This emphasizes the urgent need for more precise assessments of diabetes subtypes to help customize therapeutic strategies and management strategies. This will improve care for all patients, including those from vulnerable and understudied populations.

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