
DiABETES

Agenda

- Understanding Type 2 Diabetes
- Diabetes and Hypoglycemia
- Diabetes and Driving

What is Diabetes?

- To put it simply…Diabetes occurs when the body is unable to regulate the amount of glucose (sugar) in the blood resulting in high blood glucose levels

- Diabetes is a chronic, often debilitating and sometimes fatal disease, in which the body either cannot produce insulin or cannot properly use the insulin it produces

- There are different factors that determine why there is not enough insulin or no insulin production, and those factors determine the diagnosis
  - Type 1
  - Type 2
  - Gestational diabetes
  - Other types of diabetes

How the Body Processes Sugar

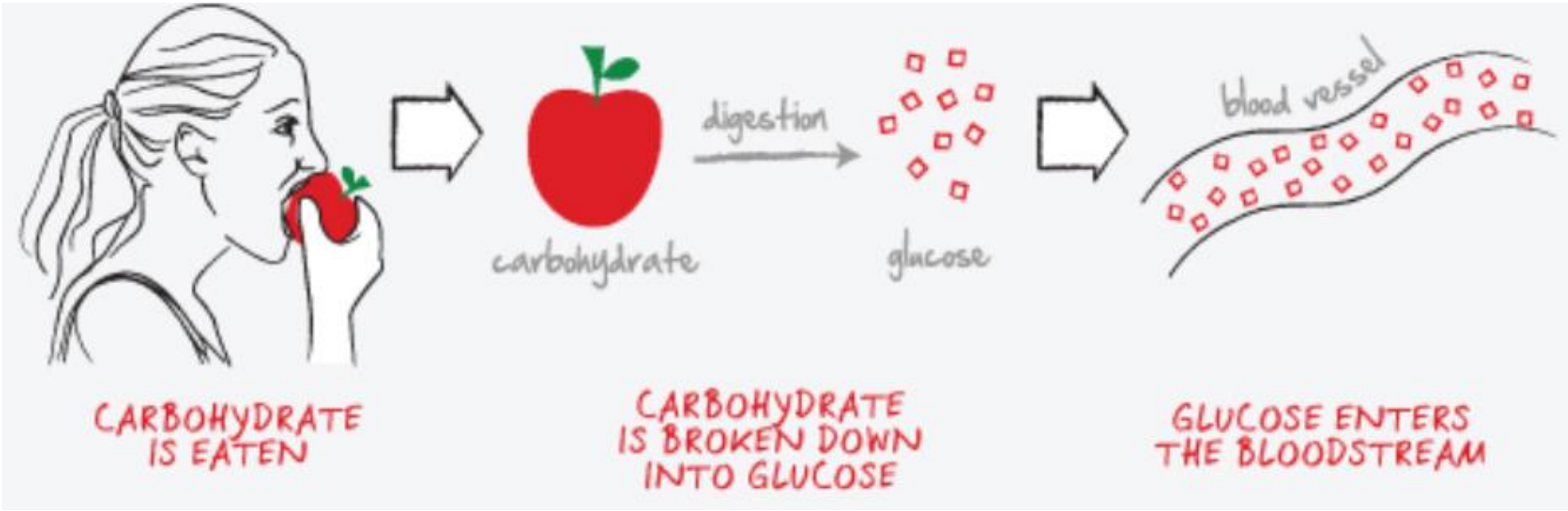
- It is important to understand what is supposed to happen in the body, and what is different in people with diabetes
- Sugar, also known as glucose, is an important and necessary fuel for the body
- So necessary, that both the liver and the kidneys produce it naturally; however, we get the most sugar from the foods we consume
- The levels of glucose in the blood are controlled by a hormone called **insulin**

What is Insulin?

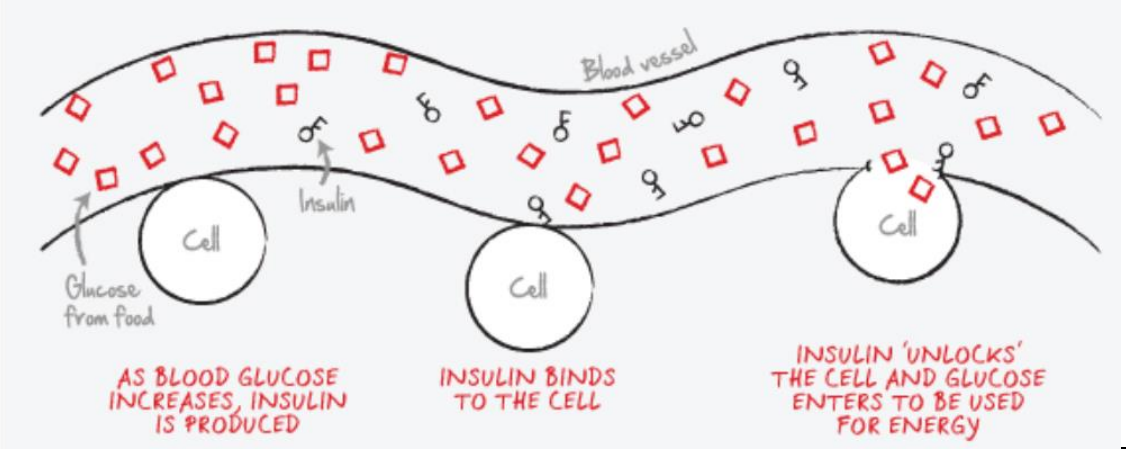
- Insulin is a hormone that is produced by the beta cells and is continuously released into the blood stream
- Beta cells are found in the pancreas, which is an organ located behind the stomach
- Insulin removes glucose from the blood and transports it into the cells of the body where it is needed for energy
- Insulin also regulates the production of glucose by the liver and switches off production when the BG is high

Pathophysiology

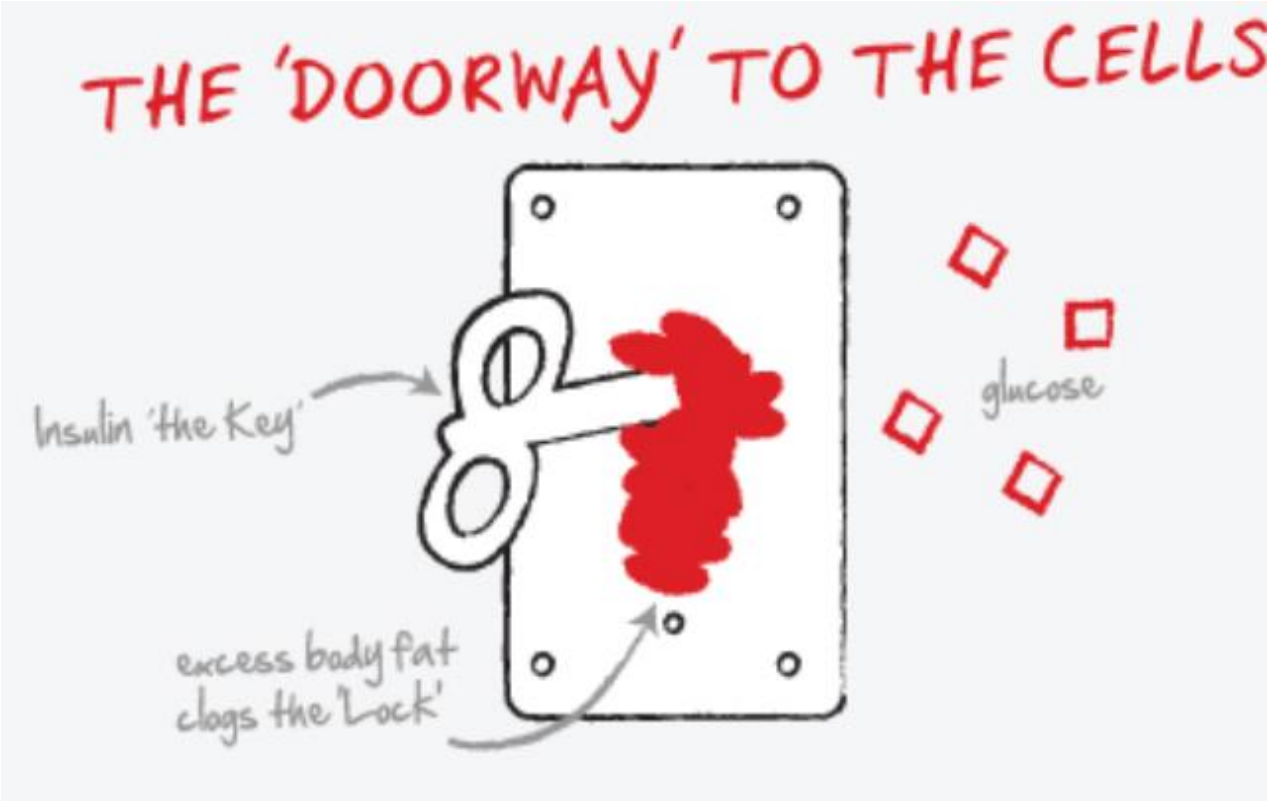
- When food is eaten, it is digested in the stomach and intestines where it is broken down into glucose and then absorbed into the blood stream



- As the BG level increases, insulin is produced in response
- Each cell has a 'door' (receptor) that can allow glucose to enter
- The door is locked until insulin arrives as the key to 'unlock' it
- When insulin is present, and the door is opened, glucose can enter the cell to be used as fuel

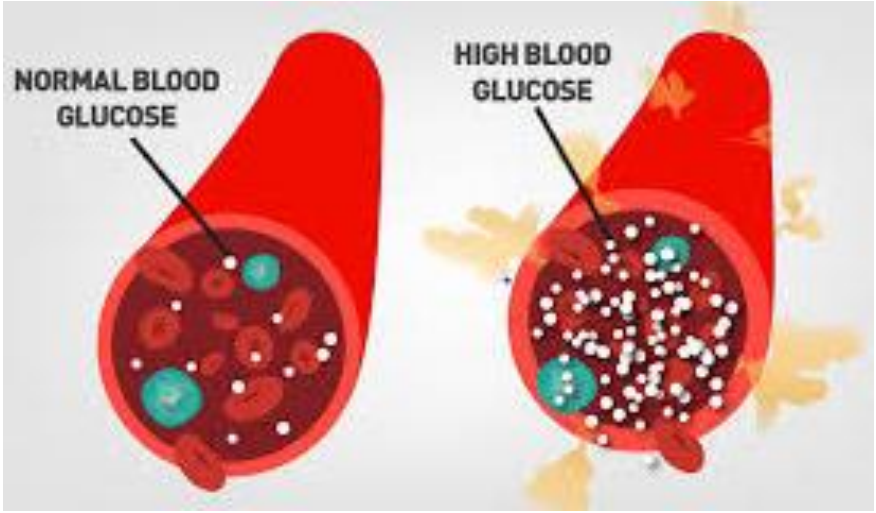


Insulin


THE 'DOORWAY' TO THE CELLS
Insulin 'the Key'
glucose
excess body fat
clogs the 'Lock'

Diabetes Explained

- With diabetes, glucose is unable to travel into the cells due to a **lack of insulin** or **insulin resistance**
- This means too much glucose remains in the blood, causing high BGs



Types of Diabetes

1. Type 1 diabetes
2. Type 2 diabetes
3. Gestational diabetes
4. Other types

Type 1 Diabetes

- Occurs when the immune system mistakenly attacks and kills the beta cells of the pancreas
- Very little or no insulin is released into the body
- As a result, sugar builds up in the blood instead of being used as energy
- About 5% to 10% of people with diabetes have type 1 diabetes
- Generally develops in childhood or adolescence, but can develop in adulthood
- Is **always** treated with insulin

Gestational Diabetes (GDM)

- Is a temporary condition that causes glucose intolerance during pregnancy
- Screening occurs at 24-28 weeks of pregnancy, however women who have risk factors may be screened earlier
- It affects approximately 2% to 4% of all pregnancies
- Involves an increased risk of developing diabetes for both mother and baby
- Elevated maternal glucose levels can lead to pregnancy complications and poses risks to the health of the baby
- Can be managed by diet, exercise and/or medications/insulin

Type 2 Diabetes

- Occurs when the body can not properly use insulin (called insulin resistance) or it does not make enough insulin
- A **dual defect** of resistance to the action of insulin combined with an inability to make enough insulin to overcome the resistance
- Type 2 diabetes is the most common form of diabetes and represents 80% to 90% of diabetes
- Usually diagnosed in adulthood
- Can be managed by diet, exercise and/or medications/insulin

Diagnosis of Diabetes

FPG ≥7.0 mmol/L

or

A1C ≥6.5% (in adults)

or

2hPG in a 75 g OGTT ≥11.1 mmol/L

or

Random PG ≥11.1 mmol/L

Hypoglycemia

What is Hypoglycemia?

- Also called low blood glucose or low blood sugar, occurs when blood glucose drops below 4 mmol/L
- Considered a medical emergency
- It is important to **prevent**, **recognize** and **treat** hypoglycemia

It is safer and more effective to prevent hypoglycemia than to treat it after it occurs

Severity of Hypoglycemia

- **Mild**
  - Autonomic symptoms present (trembling, sweating, hunger, palpitations)
  - Individual is able to self-treat

- **Moderate**
  - Autonomic and neuroglycopenic symptoms (confusion, dizziness, weakness, difficulty concentrating)
  - Individual is able to self-treat

- **Severe**
  - Requires the assistance of another person
  - Unconsciousness may occur
  - Plasma glucose is typically <2.8 mmol/L

When Blood Sugar Is Too Low

What can cause it?

- Too little food or carbohydrates
- Skipped or delayed meals
- More active than usual
- Too much insulin or too many diabetes pills

How do you feel?

- Hungry
- Angry/tense
- Sick to stomach
- Light-headed
- Clammy/sweaty/ pale
- Shaky
- Tired

Does everyone feel the same?

- People have different symptoms
- Some people have no symptoms at all

Who Should be Concerned?

- Anyone who takes insulin or taking any of the medications listed to the right

- If **not** taking insulin or any of the medications listed, there is a very small chance of having hypoglycemia

- Insulin of any kind
- Glyburide
- Gliclazide
- Glimeperide
- Repaglinide
- Nateglinide
- Combination medications that contain any of these

Treating Hypoglycemia

Recognize and Confirm

- If experiencing the signs of hypoglycemia, BG immediately
- If no meter is available, it is important to treat the symptoms anyway…it is better to be safe than sorry!

Treat

The Rule of 15…Eat or drink **15g** of a fast-acting carbohydrate

- 15g of glucose tablets
- 15ml (1 tbsp) or 3 packages of sugar dissolved in water
- 175ml (3/4 cup) of juice or regular pop
- 15ml (1 tbsp) honey
- 8 jelly beans
- 2 pkgs of "rockets" or 5 jumbo "rockets"

Recheck

Wait **15 minutes** and check BG again…if still low

- Treat again with 15g of fast-acting carbohydrate and rerecheck in 15 minutes (this may need to be done more than once)

It is important to avoid overtreatment of hypoglycemia, since this can result in rebound hyperglycemia and weight gain

Eat

- Once blood glucose is **> 4mmol/L**, have usual meal or snack that is due at that time of the day
- If next meal in more than 1 hour away or planning on being active, eat a snack containing 15g of carbohydrates with some protein

Treatment of Severe Hypoglycemia

If BG is <2.8mmol/L and conscious:

1. **Treat** with 20 g of fast-acting carbohydrate
2. **Recheck** in 15 minutes to ensure the BG> 4.0 mmol/L and retreat with a further 15 g of carbohydrate if needed
3. **Eat** usual snack or meal due at that time of day or a snack with 15 g carbohydrate with some protein

Diabetes and Driving

Diabetes can affect driving performance due to:

- Chronic complications which impair sensory or motor function (retinopathy, neuropathy, amputation, vascular disease)
- Transient cognitive dysfunction or loss of consciousness from antihyperglycemic medication-induced hypoglycemia
  - ➢Primarily related to insulin or insulin secretatogues
- Other medical disorders associated with type 2 diabetes such as sleep apnea

- People with diabetes who drive must take added precautions, especially if they are on insulin or medication that can cause low blood sugar
- Diabetes, like many other health conditions, can affect a person's ability to drive safely.
- If you are driving, it is your responsibility to make sure that you are well enough to drive safely every time you get behind the wheel of a vehicle
- DON'T TAKE CHANCES: Low blood sugar while driving can cause serious accidents and even death

Driving Risks Associated with Diabetes

- Case control studies suggest drivers with diabetes pose a modestly increased but acceptable risk of MVAs
- Driving stimulator studies with induced hypoglycemia have demonstrated
  - Driving performance starts to deteriorate with a BG <3.8 mmol/L
  - Only 25% aware driving performance impaired
  - Cognitive function may not recover until ≥ 40 minutes after restoration of euglycemia

Factors Associated with Increased Driving Risk

- Previous episodes of severe hypoglycemia within the past 2 years with greater risk in those with lower A1C levels
- Previous hypoglycemia while driving
- Absence of BG monitoring before driving

Roles and Responsibilities

Driver with diabetes

- ✓ Active role in assessing their own fitness to drive
- ✓ Duty to report conditions that may impair their ability to drive safely

Health-care provider(s)

- ✓ Assess fitness to drive
- ✓ Duty to report unfit drivers according to provincial or territorial regulations
- ✓ Need to educate patients on strategies to reduce risk of hypoglycemia while driving

Recommendation 1

Drivers with diabetes treated with insulin secretagogues and/or insulin should:

- Fitness of people with diabetes to drive should be assessed on an individual basis
- People with diabetes should take an **active role** in assessing their ability to drive safely.

Recommendation 2

- Should undergo a comprehensive medical examination at least every 2 years by a physician/nurse practitioner competent in managing people with diabetes

- The medical exam should include an assessment of glycemic control; frequency and severity of hypoglycemia; symptomatic awareness of hypoglycemia; the presence of retinopathy, neuropathy, nephropathy, amputation, and CVD, to identify if any of these factors could significantly increase the risk of a MVA

Recommendation 3

- Should maintain a **log of their BGs** either by using a meter or electronic record of BG measurement performed at a frequency deemed appropriate by the person with diabetes and their health-care team. BG logs should be verifiable on request
- Should always have **BG monitoring equipment** and supplies of **rapidly absorbable carbohydrate** within **easy reach**

- Consider measuring BG level immediately before and at least every 4 hours while driving or wear a real-time CGMS
- Do not drive when BG level is <4.0 mmol/L
- If BG is <4.0 mmol/L, **should not** drive until at least **40 minutes** after successful treatment has increased BG level to at least 5.0 mmol/L
- **Must** refrain from driving immediately if experience severe hypoglycemia while driving, and notify HCP as soon as possible

Recommendation 4

- Private and commercial drivers with diabetes and **hypoglycemia unawareness or history of severe hypoglycemia** in the past 12 months must measure their BG level immediately before and at least every two hours while driving or wear a real-time CGM device

Recommendation 5

If any of the following occur, HCPs should inform the person with diabetes to no longer drive, and should report their concerns about the person's fitness to drive to the appropriate driving licensing body:

a. **Any** episode of **severe hypoglycemia while driving** in the **past 12 months**
b. **More than 1 episode of severe hypoglycemia** while **awake but not driving** in the **past 6 months for private drivers** and in the **past 12 months for commercial drivers**

Safe Driving Tips

Safe blood glucose (BG) prior to driving = Over 5.0 mmol/L to drive

Consider measuring your blood glucose level immediately before driving

Before Driving

If **BG is <4 mmol/L** prior to driving:

- Follow low treatment guidelines
- Should not drive until at least 40 minutes after successful treatment of hypoglycemia has increased BG level to at least 5 mmol/L

If **BG is 4 to 4.9 mmol/L** prior to driving

- Have a small carbohydrate snack before driving and ensure that BG ≥5 mmol/L

While Driving

- If hypoglycemia is suspected, stop the vehicle in a safe location
- Treat low BG
- Remember to remove keys from ignition
- Always carry blood glucose meter and have a quick sugar and carbohydrate within easy reach

Should not drive until at least 40 minutes after effective treatment

Important Points

- Always have a source of sugar within easy reach when driving
- Always have a glucose meter and supplies in the car
- Consider measuring BG immediately before and at least every 4 hours while driving or wear CGMS
- Consider checking BGs more frequently if there are factors that may increase the risk of hypoglycemia
- **Must** measure BG immediately before and at least every 2 hours while driving or wear CGMS if history of recurrent severe hypoglycemia or hypoglycemia unawareness

The best way to treat hypoglycemia is to avoid it!

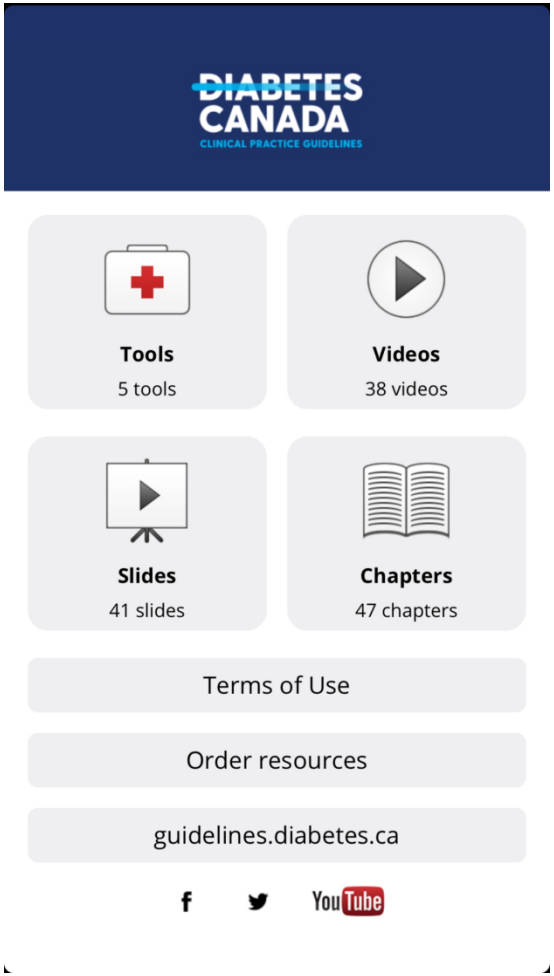
Diabetes Canada Clinical Practice Guidelines

www.guidelines.diabetes.ca – for health-care providers

1-800-BANTING (226-8464)

www.diabetes.ca – for people with diabetes

Or download the App



ANDROID APP ON Google play

Available on the App Store

thank you!

CARING FOR THE BODY, MIND & SPIRIT SINCE 1869

St JOSEPH's HEALTH CARE LONDON