

# Hyperglycemia and Insulin Pump Therapy

## What is it?

Hyperglycemia, or high blood sugar, is typically when your blood sugar level is above 14 mmol/L.

## Why does this happen?

Hyperglycemia occurs when sugar cannot enter your cells and builds up in the blood.

<b>Causes of hyperglycemia</b> <ul style="list-style-type: none"> <li>• Excessive exercise without sufficient insulin</li> <li>• Increased stress</li> <li>• Illness</li> <li>• Underestimated carbohydrate intake</li> <li>• Not enough insulin for food eaten or for correction</li> <li>• Basal rate too low or inappropriate temporary basal rate set</li> <li>• Pump cartridge is empty</li> <li>• Infusion set or site failure</li> <li>• Too long between infusion set changes</li> <li>• Suspended pump</li> <li>• Pump failure/failure to reconnect pump</li> <li>• Medications (e.g. Corticosteroids)</li> </ul>		<b>How to treat hyperglycemia</b> <ul style="list-style-type: none"> <li>• If applicable, verify your CGM readings with a BG meter before making any treatment decisions</li> <li>• Immediately take a correction bolus with the insulin pump</li> <li>• Recheck your BG in 1 hour. If your glucose reading is not falling reasonably do the following:               <ol style="list-style-type: none"> <li>1. Take an injection of fast acting insulin with a syringe/pen (not through the pump). The amount should be the same as if you were taking a correction bolus.</li> <li>2. Check for ketones and refer to the following page for help adjusting insulin for ketones.</li> <li>3. Change your infusion site (cannula), tubing, and reservoir or your pod.</li> <li>4. Recheck your blood glucose in 1 hour. If your glucose still fails to come down and you have completed all the steps above, call your health care provider.</li> <li>5. Continue all boluses by manual injection and continue to check your glucose every 2 hours until hyperglycemia is resolved. If BG &gt;14 mmol/L or you have symptoms of DKA, re-check your ketones.</li> </ol> </li> </ul>
<b>Symptoms of hyperglycemia</b> <ul style="list-style-type: none"> <li>• Increased thirst</li> <li>• Frequent urination</li> <li>• Fatigue</li> <li>• Headache</li> <li>• Blurred vision</li> </ul>	<b>Symptoms of DKA</b> <ul style="list-style-type: none"> <li>• Nausea</li> <li>• Vomiting</li> <li>• Abdominal pain</li> <li>• Difficulty breathing</li> <li>• Fruity smelling breath</li> </ul>	

## Diabetic Ketoacidosis (DKA):

DKA usually occurs only in Type 1 diabetes. If you have a high level of sugar in your blood and a low level of insulin, your body cannot use the sugar to produce energy. Instead your body will break down fats and produce substances called ketones. Excess ketones in your blood can make your blood acidic and cause serious symptoms. If left untreated the excess ketones can cause DKA, which can lead to coma or death. DKA is a **medical emergency and should be treated in a hospital**. Following hyperglycemia guidelines and checking your blood sugars frequently can help prevent DKA.

## High Blood Sugar Specifics

1. Check your blood sugar every 2 hours until hyperglycemia is resolved. If your blood sugars are  $>14$  mmol/L or you have symptoms of DKA, recheck your ketones.
2. Additional insulin doses may be needed if your blood sugars are higher than normal or ketones are present.
3. Use the chart below to decide how much fast-acting insulin to take in addition to your usual insulin dose.
4. If your blood sugars are  $<14$  mmol/L but you have symptoms of DKA, check your ketones and treat per recommendations below. Drink fluids that contain sugar to prevent hypoglycemia while treating ketones.
5. If your blood sugars are still high after following the guidelines, if you are experiencing low blood sugar, or you are unable to keep down liquids (vomiting), go to the emergency room.
6. If your blood ketones are  $>3.0$  mmol/L or urine ketones are large, **take your correction dose and go to the emergency room!**

Add up the **TOTAL** number of units of insulin (long acting and rapid acting) that you take on a usual day. This is called your **Total Daily Dose (TDD)**.

**My TDD:** \_\_\_\_\_ units

**Calculate:** 10%= \_\_\_\_\_ units, 15%= \_\_\_\_\_ units, 20%= \_\_\_\_\_ units

**This is the extra dose of rapid acting insulin (or supplement) in ADDITION to your usual correction dose.**

Blood Sugar (mmol/L)	Blood Ketones (mmol/L)	Urine Ketones	Recommended Action If able to take fluids	Your Supplemental Dose
<b><math>&lt;3.9</math></b>	none	none	- No extra insulin - Decrease dose of pre-meal insulin as directed	
<b>4.0 - 16.0</b>	$<0.6$	Neg/trace/small	- Take usual insulin	
<b>4.0 - 16.0</b>	$\geq 0.6$	Moderate/large	- Take 10% TDD	
<b><math>&gt;16.0</math></b>	$<0.6$	Small	- Take 10% TDD	
<b><math>&gt;16.0</math></b>	$\geq 0.7-1.4$	Moderate	- Take 15% TDD	
<b><math>&gt;16.0</math></b>	$\geq 1.5-3.0$	Large	- Take 20% TDD	

*\*\* Please note that these are guidelines only. Please check with your doctor or educator for your individual needs.*

## When to Seek Help

Go to the emergency department if:

- You are unable to take your insulin
- You are unable to keep down liquids (vomiting)
- You have persistent high or low blood sugars
- You have blood ketones  $>3.0$  or urine ketones that are large
- You have symptoms of DKA (see previous page)

Contact your health care provider if:

- You have followed the instructions to treat hyperglycemia and your blood sugars remain elevated but you do not have any symptoms that require you to go to the hospital