

A GUIDE FOR FAMILIES:

Diabetes Care for Children and Teens with Type 1 Diabetes



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This edition of the diabetes teaching binder (© 2025) was made possible by the Diabetes Transformation Project, an initiative funded by the BC Children's Hospital Foundation. The funding supported the creation of an online virtual platform with educational modules. This funding additionally supported the updates to the initial teaching binder for families with children newly diagnosed with type 1 diabetes. Thank you to the donors for supporting this project.

Credit to [Digital Lab](#) for the illustrations throughout this document, originally created for the [Learn Diabetes](#) online modules.

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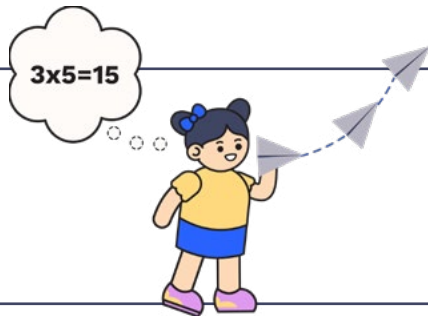
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WHAT IS DIABETES

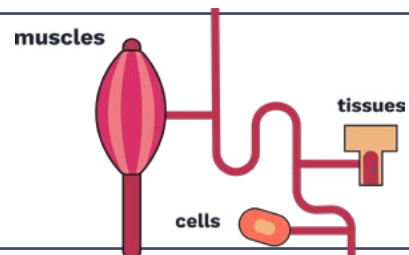
Introduction to diabetes

Diabetes is a chronic health condition that affects how the body uses glucose.



Glucose is the body's main source of fuel that gives you energy to do all the things in your day, like thinking and playing!

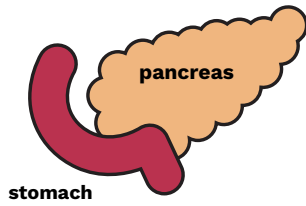
All of the cells, tissues and muscles in the body are connected by the bloodstream.



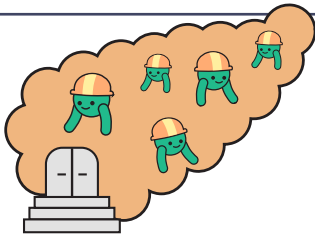
When you eat most foods, you chew the food, swallow it, and it starts to digest and break down into glucose.

Glucose from the food enters your bloodstream and the blood glucose level starts to increase.

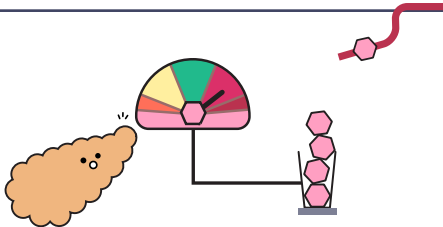
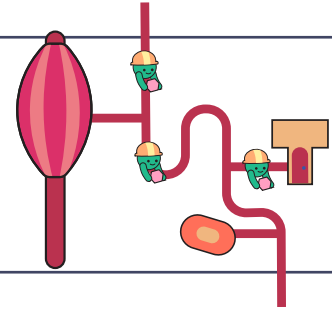




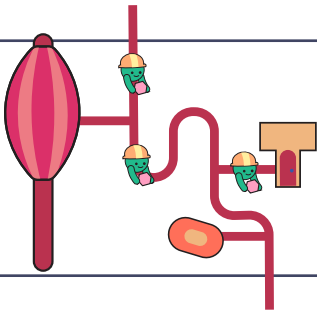
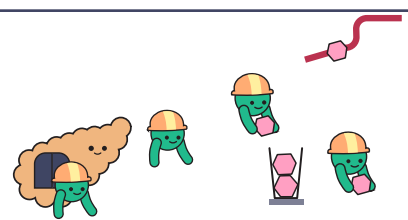
Your pancreas is an organ behind your stomach that makes a hormone called insulin.



Insulin helps the glucose get into the body's cells through the bloodstream.



The pancreas notices when the blood glucose level increases and sends insulin into the bloodstream.

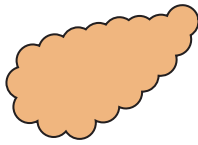


The insulin works with the glucose to carry it out of the bloodstream to all the cells in your muscles and tissues where it can be used for energy.

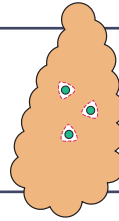


Notes:

What is type 1 diabetes?

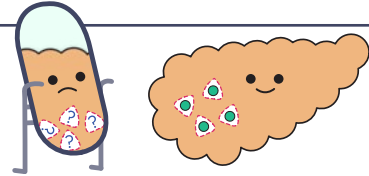


With type 1 diabetes, the pancreas makes no insulin.



The cells that make insulin in the pancreas are called "beta cells".

Imagine that your pancreas looked at itself in the mirror and didn't recognize its own beta cells, so your own immune system tried to destroy them.

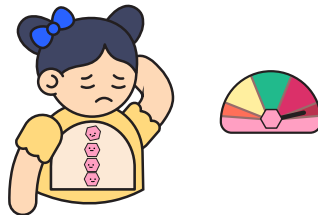


An unknown environmental trigger can start the process of the immune system destroying its own beta cells.

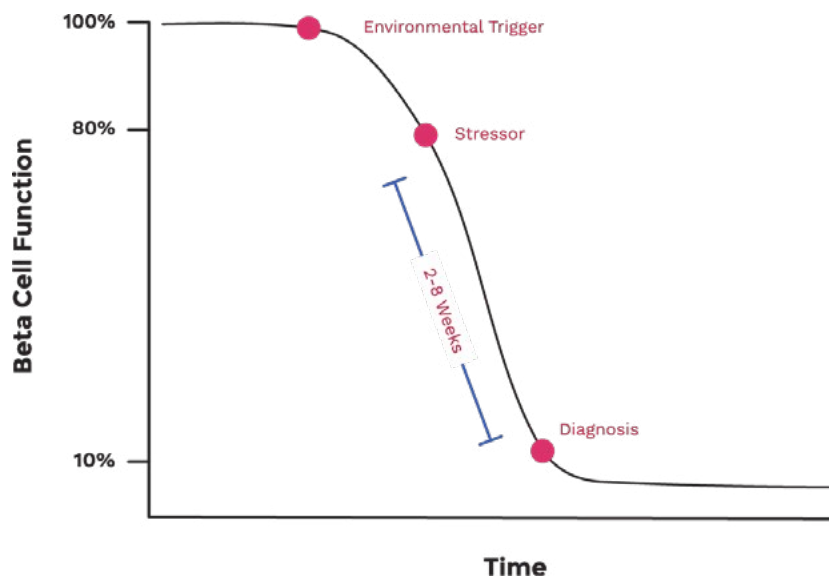


Another stressor, such as an illness, can cause the immune system to destroy the beta cells at an even faster rate.

In type 1 diabetes the blood glucose level starts to rise, but there is no insulin in the body to carry the glucose to the muscles and other tissues.



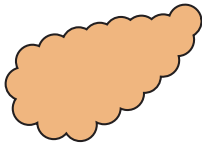
When people are diagnosed with type 1 diabetes, the blood glucose levels may have been high for a few weeks, even up to a few months.



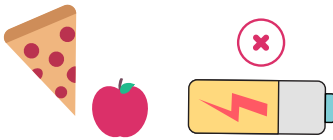
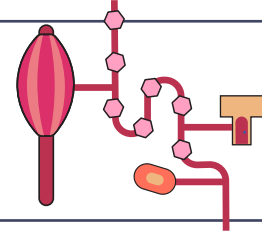
How does type 1 diabetes affect your body?



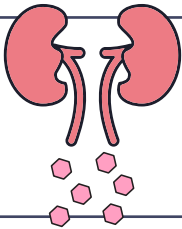
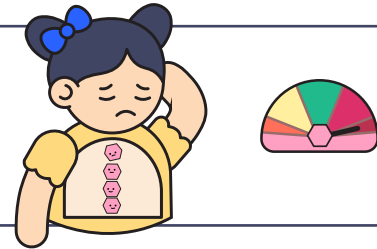
When a meal or snack is eaten, it turns into glucose and goes directly into the bloodstream.



In type 1 diabetes, the pancreas cannot make insulin, so the glucose stays in the blood.



Without insulin your body cannot use the glucose for energy.



Your body tries to get rid of the extra glucose through the urine.

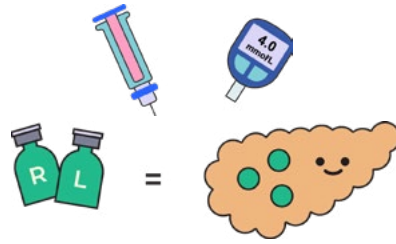


Your body requires insulin by injection to get energy from the foods you eat.

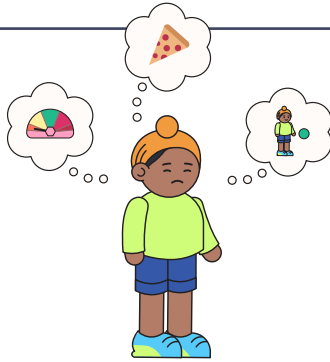
Notes:

Treatment of type 1 diabetes

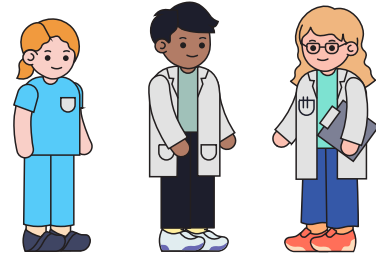
With type 1 diabetes, the only way to transport the glucose to where it needs to go is to take insulin by injections.



You cannot take insulin by mouth because it will get digested before it has a chance to work.



Being diagnosed with diabetes can feel overwhelming at first! Your health care team, which may include a nurse, dietitian, social worker, and doctor, will help you navigate through your journey.



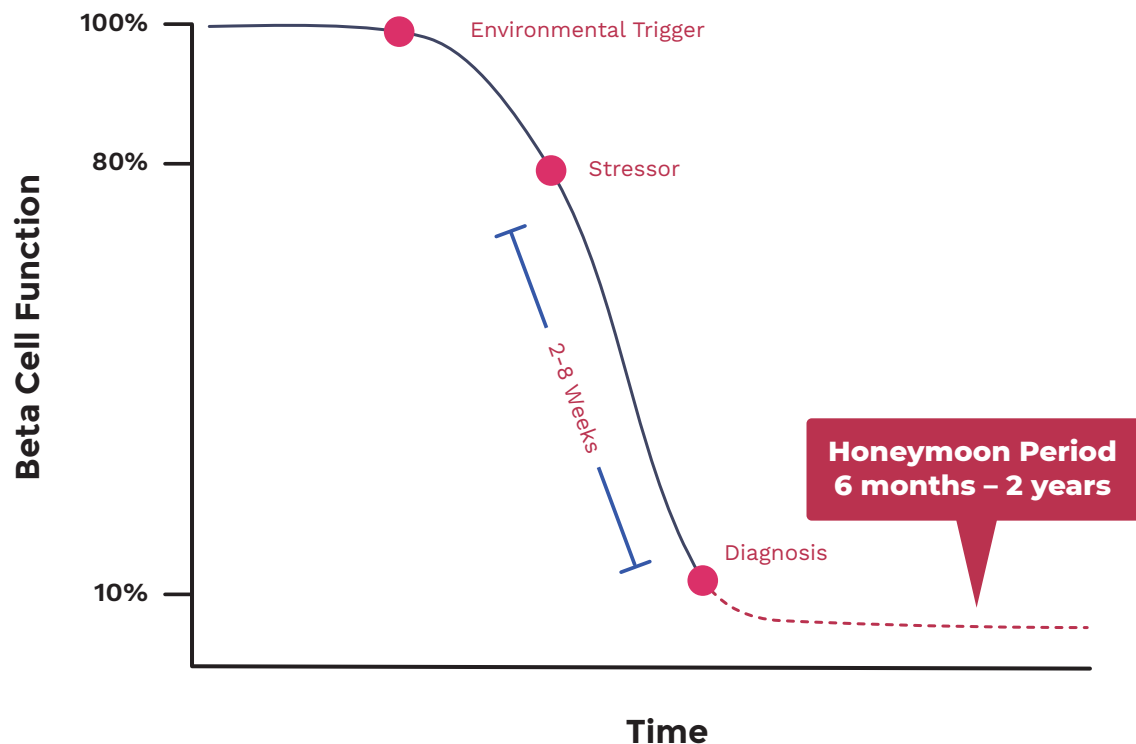
Whether it's playing sports, travelling the world, or becoming a famous musician, **you can do anything with diabetes!**



The “honeymoon period” of type 1 diabetes

At the point that most people are diagnosed with type 1 diabetes, only 10-20% of beta cells in the pancreas are still producing insulin. This is like one person doing the job of 10 people, which would be very tiring!

Once you start taking insulin by injection, the beta cells that are left in your pancreas—which have been working so hard—finally have some help. Instead of one person doing the job alone, it’s like having a team of 10 again! After these cells have had help for a few weeks, and regain their strength, you may enter a temporary stage called the “honeymoon period”.



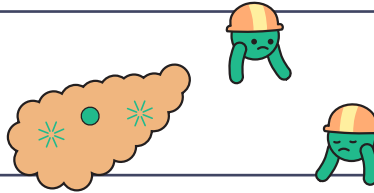
Once your remaining beta cells temporarily regain their strength, they will continue to produce insulin in your body for a short period of time and work together with the insulin received by injection.

Often during this time, blood glucose levels are lower and you need less insulin by injection. It is not uncommon that your diabetes team will recommend lowering your insulin doses now that your beta cells are better at making some of their own insulin.

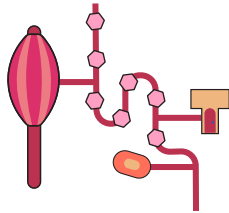
About 80% of children will experience the honeymoon period within a few months of diagnosis of type 1 diabetes. However, the honeymoon period will end, and the remaining beta cells will eventually stop producing insulin. This can last anywhere from several months to years. When this happens, you will notice that your blood glucose levels begin to rise and that you need more insulin by injection.

What is type 2 diabetes?

With type 2 diabetes, the pancreas makes some insulin.



The insulin that your pancreas makes may not work effectively.

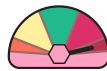
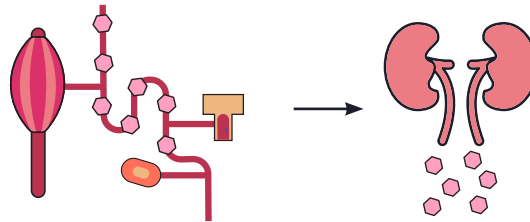


Much of the glucose stays in the blood.



Your body cannot use all of the glucose for energy.

Your body tries to get rid of the extra glucose through the urine.



Type 2 diabetes can be managed with medications taken by mouth or medications given by injection, along with any diet or lifestyle changes that may apply.



Notes:

Coping with your type 1 diabetes diagnosis

Learning that your child or teen has type 1 diabetes can be stressful for everyone in your family.

Remember that children of all ages can adjust to life with diabetes. They can follow their dreams, achieve their goals, and do the things they like to do.

Common reactions

It is natural to experience a range of thoughts, feelings, and emotions as you and your family adjust.

DISBELIEF AND SHOCK

You may feel numb. Or you may find it hard to believe that the diagnosis is real. These feelings are ways that the body protects you from powerful emotions.

You may want answers now. You may ask:

- *Are the doctors sure?*
- *Is there a cure?*

FEAR AND ANXIETY

Fear and anxiety are expected feelings when we experience something new.

You may wonder:

- *How will diabetes affect my child's health and well-being?*
- *How will my child make important transitions?*
- *What will happen when they become a teenager?*
- *What will happen when they move away from home?*

As a parent or caregiver, you can help your child cope with this diagnosis. The way you react will affect your child. You, your child, and your family will adjust to your child's diagnosis. Try to focus on one day at a time.

GUILT AND BLAME

You may feel surprised or guilty when you learn that your child has type 1 diabetes. Nothing you or your family did caused your child's development of diabetes.

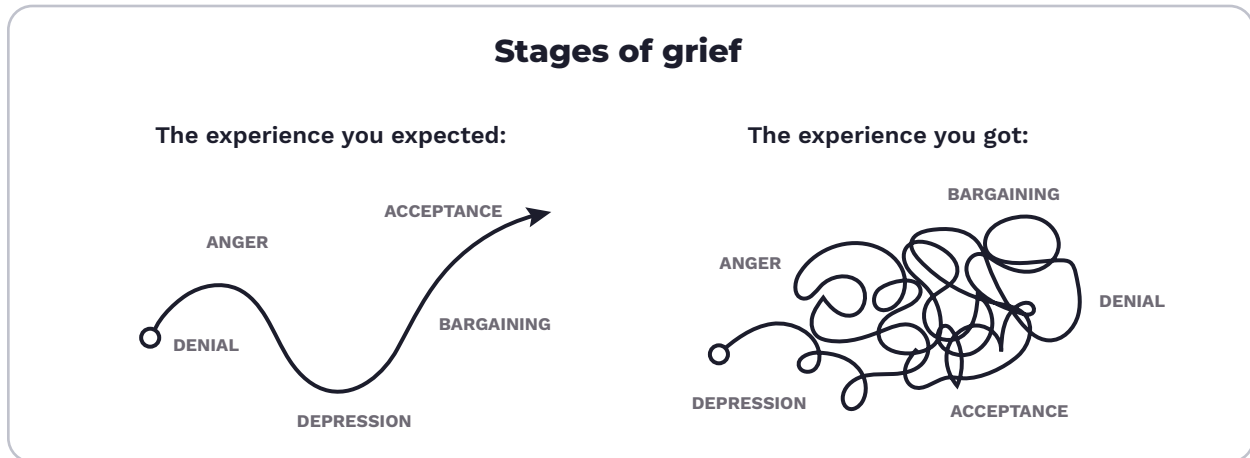
There was no way to prevent or stop this diagnosis.

If you feel guilt, focus on the things you can control, like treatments. Learn about what you and your family can do to increase your child's future health and well-being.

SADNESS AND ANGER

You might wonder *Why did my child get diabetes? Why did diabetes happen to our family?* You may grieve the life you shared before the diagnosis. You may also feel sad that diabetes is a life-long health condition.

Diabetes does not have to change your child's dreams and goals. They can live the life they want, with diabetes.



Coping with your emotions

Each member of your family may have different feelings about your child's diagnosis.

If you have other children, it can be valuable to speak with them to explore how they are feeling during this phase of transition.

- We all cope with feelings and emotions in our own ways.
- There is no right or wrong way to feel.

However, it can be difficult to support your child when you feel exhausted, worried, or unsure. It is important for you to take care of yourself as your family adjusts to life with diabetes.

Getting support

The diabetes team is here to help you learn about life with diabetes.

Friends and family members may ask how they can help you. Sometimes the best thing they can do is to help with other tasks in your life. This lets you focus on learning.

You can ask friends or family to:

- care for your other children and/or pets
- run errands
- cook
- bring you and your child to hospital visits

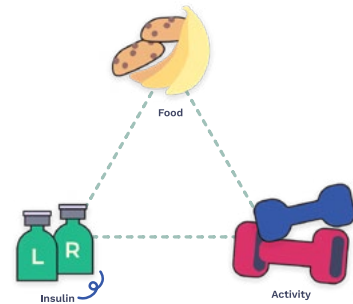
It is good to ask for help. If you are struggling, but don't know how to ask for help, people may not know you need support. Tell family and friends how they can support you during this time.

Notes:

CHECKING BLOOD GLUCOSE

Introduction to checking blood glucose

- Checking blood glucose levels is an important part of managing diabetes.
- Writing down your blood glucose levels on a log sheet can be a helpful way to learn more about your diabetes.
- By reviewing your log sheets, you may start to notice how food, insulin, and activity effect blood glucose levels.



There are different ways to check these levels:

Blood Glucose Meter: a small device that shows what your blood glucose level is at the exact time you check it.

- A blood glucose meter measures the amount of glucose in the tiny blood vessels below your skin.
- This is how people living with diabetes have checked their blood glucose for a long time.



Glucose Sensor: a small device that sits on your skin and provides continuous sensor glucose readings to a smart device or receiver.

- A glucose sensor measures interstitial glucose, which is the glucose in the fluid between your cells.



As a blood glucose meter and a glucose sensor take their measurements from 2 different places in the body, there can be a difference between the readings they both provide, even when taken at the exact same time.

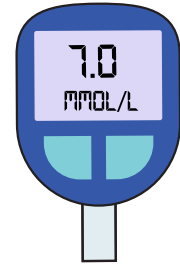
Measuring blood glucose using a blood glucose meter is an important tool that everyone living with diabetes needs to know.

BLOOD GLUCOSE METERS:

- Can store the date, time, and result of a glucose reading in the meter memory for 3 or more months.

Newer blood glucose meters can:

- Connect to smart phones.
- Allow you to add notes or label a blood glucose reading with tags, such as before meal check, sick day, and exercise.



Notes:

Blood glucose targets

Blood GLUCOSE = Blood SUGAR

- Check blood glucose at least 4 times a day: **before breakfast, lunch, supper, bed and when you feel low.**
- Check blood glucose more often when you are sick.
- Write down your blood glucose and **review often.**
- Checking blood glucose helps you learn about the balance between **food, activity,** and **insulin.**
- It is normal for blood glucose to be above target when first diagnosed.

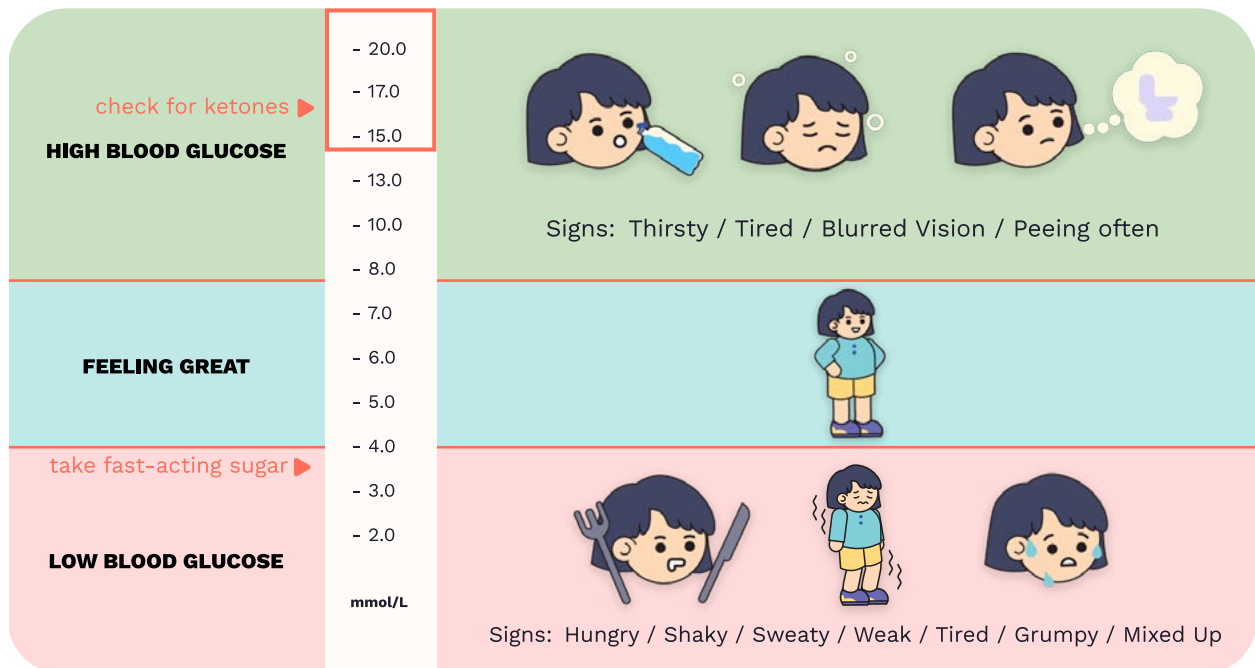
Blood glucose targets

BEFORE MEALS:

4 – 7 mmol/L

BEDTIME:

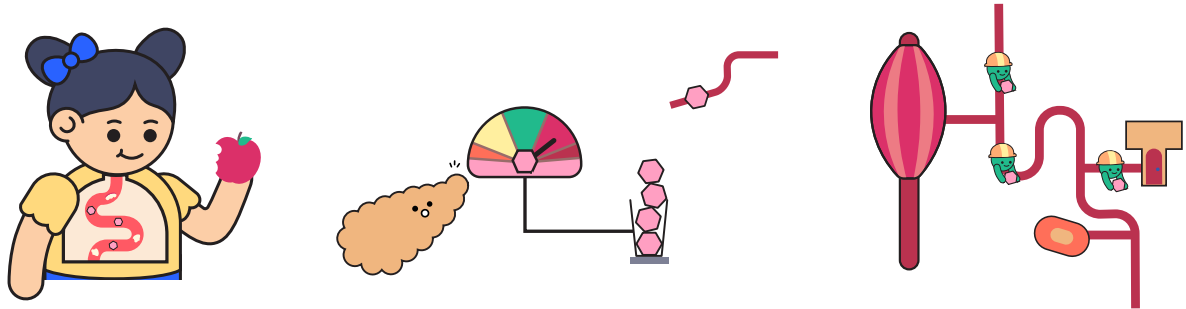
4.4 – 7.8 mmol/L



*Refer to the High Blood Glucose and Ketones section on page 87 to review guidelines for testing.

Notes:

Blood glucose levels

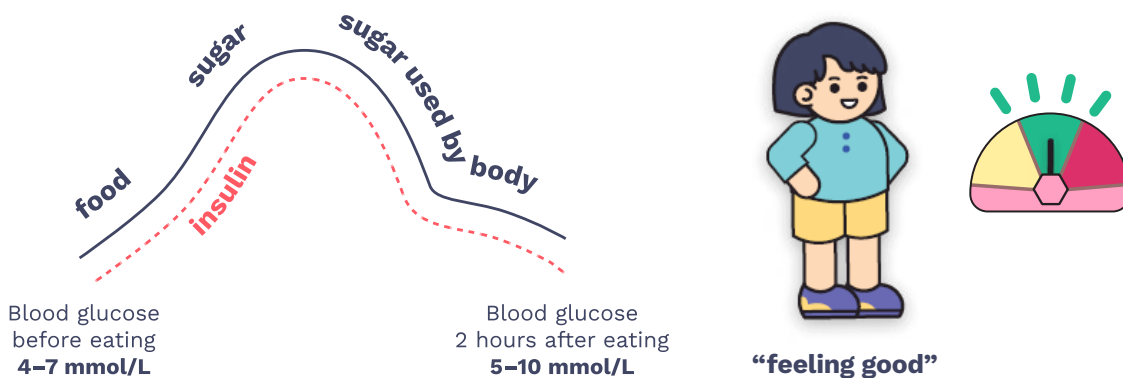


- **When you eat food, your blood glucose levels increase.** This is true for all people—including people without diabetes.
- **When someone living with type 1 diabetes eats food, the blood glucose level increases, but their pancreas does not produce insulin.** So, the person needs an injection of insulin to match their blood glucose level and the food they eat.

When you measure your blood glucose, remember:

- Blood glucose levels will not always be in the target range. That is okay.
- There are no good or bad blood glucose levels. A blood glucose level is just a piece of information. You, your child, and your diabetes team can use that information to manage your child's diabetes.

Food and activity affect your blood glucose levels:



Other factors that could affect your blood glucose levels:

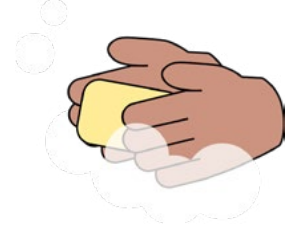
- stress
- sleep
- hormonal changes
- temperature
- illness, infection, injury or surgery
- dehydration
- medication
- allergies
- expired insulin
- celiac disease
- smoking

Notes:

Completing a blood glucose check

Step 1: Wash your hands with soap and warm water

- Any sugar from a snack or meal that is sitting on your finger can give a false reading.
- Dry your hands well as water can dilute the blood sample and give an inaccurate reading.
- You don't need to use alcohol swabs to clean your finger.



Step 2: Set up your lancing device



- A.** Take your lancing device and remove the cap.



- B.** Insert a lancet into the lancing device.



- C.** Once it is secured, twist the plastic top and remove the cap to expose the needle.



- D.** Place the cap back onto the lancing device.

Step 3: Prepare your meter

- Remove one test strip from its container and close the lid.
- Insert the test strip into the port on the glucose meter to turn it on.
- The screen may turn off after a certain amount of time if no sample is applied.



Step 4: Check your blood glucose



A. Choose a finger that you want to check.



B. Place your lancing device on the side of your finger pad.



C. If you were to divide your finger pad into 3 sections, you would want to place your lancing device on either of the outer edges.



D. Once positioned, press the button on your lancing device to puncture the skin.



E. Squeeze from the base of your finger up to the tip to get a large enough sample.

F. When you have your sample, take your meter, and use the test strip to collect the sample.

G. The meter will count down when the sample is collected and display your blood glucose once the test is complete.

Step 5: Dispose of sharps and strips

- Pull the used strip out of the meter and dispose of it in a sharps container.
- Your diabetes team will show you how to safely remove the lancet from the lancing device.
- Place the used lancet into a sharps container.
- Once your sharps container is full, take it to your pharmacy to exchange it for a new one.



Notes:

LOW BLOOD GLUCOSE

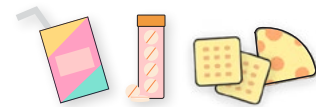
Introduction to low blood glucose

Any blood glucose less than 4 is too low for someone with diabetes. It must be treated right away.

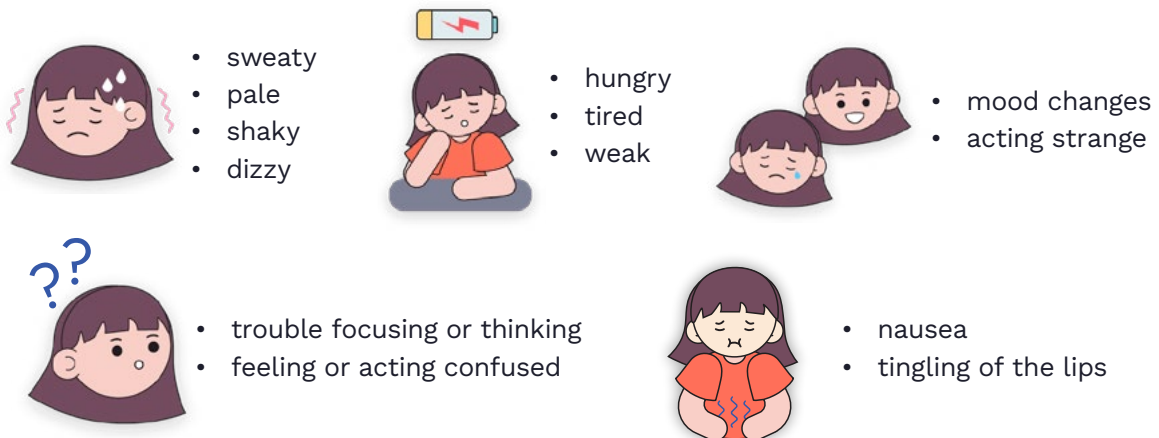
- Hypoglycemia is another word for low blood glucose.
- Hypoglycemia can happen even when the blood glucose levels are well managed.

Always take supplies with you to treat low blood glucose.

- Fast acting sugar such as fruit juice or glucose tablets; and
- Extra food such as a granola bar, cheese and crackers or half a sandwich.

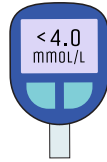


What are the signs of low blood glucose?



Treating low blood glucose

The steps for treating low blood glucose are **Check, Treat, Repeat**.



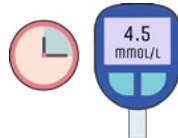
STEP 1

Check the blood glucose level. If the blood glucose is under 4 mmol/L, it needs to be treated immediately.



STEP 2

Treat the low blood glucose with fast acting sugar, refer to the table below to find out how much fast acting sugar to take based on your age.



STEP 3

Recheck your blood glucose in 15 minutes to see if it is back in target range. If the blood glucose reading is still under 4, repeat steps 2 and 3.



STEP 4

When your blood glucose is above 4.0 mmol/L, check when the next planned meal or snack is.

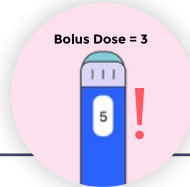
*If it's more than 45 minutes away, have a snack containing 10-15 grams of carbohydrates and some protein or fat. This snack will help prevent further lows until your next scheduled meal or snack.

Infants (5 grams)	For ages 1-5 years old (5 grams)	For ages 5 to 10 years old (10 grams)	For ages over 10 years old (15 grams)
<p>Sugar water solution can be made at home and used to treat low blood glucose in infants:</p> <ul style="list-style-type: none"> Mix 3 teaspoons of white sugar with ¼ cup (59ml) of warm water to produce 2 treatments. One treatment would be 30 ml of sugar water solution. <p>After providing the treatment, follow up with breast milk or formula.</p>	40ml of fruit juice	1/3 cup (79 ml) of fruit juice	½-2/3 cup (118-158 ml) of fruit juice
	1 teaspoon of maple syrup	2 teaspoons of maple syrup or honey	1 tablespoon of maple syrup or honey
	-	10 skittles	15 skittles or 2 small rocket candy packets
	1-1.5 glucose tabs*	2.5-3 glucose tabs*	4 glucose tabs*
	*Typically, glucose tabs are 4 grams of fast acting sugar per tab.		

Cause and prevention of low blood glucose

What causes low blood glucose?

- Too much insulin
- Not eating enough food
- Missing or delayed food
- Unplanned physical activity
- Drinking alcohol



Can low blood glucose be prevented?

Children with diabetes may experience hypoglycemia up to 2 to 3 times a week. Hypoglycemia can usually be treated quickly and easily.

To help prevent problems with low blood glucose levels:

- Always carry fast acting sugar and food with you.
- Treat right away. Do not wait!
- Measure insulin carefully. Supervise children's injections.
- Eat extra food or give less insulin for extra physical activity.
- Teach family and friends when and how to treat low blood glucose.
- Tell your doctor or nurse if there are more than 3 low blood glucose readings a week, especially without reason.
- Wear diabetes medical ID at all times.



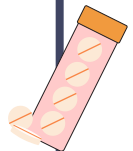
QUESTION

I can treat low blood glucose with:

TIP

Glucose tabs are a good choice for older kids.

They work faster than juice and are easy to carry.



Notes:

Glucagon for severe low blood glucose (hypoglycemia)

What is glucagon?

Glucagon is a hormone made by the alpha cells in the pancreas (neighbours to the beta cells that typically produce insulin). It is used to treat severe low blood glucose. It raises the blood glucose by sending a signal to the liver to release stored sugar.



*** For glucagon to work properly, a person must be eating carbohydrates regularly in their diet.**

*** Glucagon may not work if you have been drinking alcohol.**

You can get glucagon from your pharmacy. Glucagon is now available as injectable or for nasal administration. Your pharmacy may need to order these products, and it can take a few days.

1. Injectable glucagon should be stored at a controlled room temperature of 20–25°C (68–77°F).
2. Glucagon nasal powder can be given into the nose for people 4 years of age and above. It can be stored up to 30°C (86°F).

When should I give glucagon?

Use glucagon when your child is having a **severe low blood glucose**. Your child may be:

- Unable or unwilling to eat or drink fast acting sugar
- Having a seizure
- Unconscious (or unable to wake up)

If your child is unconscious or having a seizure, turn them on their side.

How do I give injectable glucagon?

Injectable glucagon is given the same way as an insulin injection, except that the needle is longer. Injectable glucagon comes as a kit, which includes:



- A small bottle that has 1 milligram (mg) of glucagon. The glucagon is a dry powder.
- A syringe that is filled with 1 mL of sterile liquid.



1. Remove the cap from the vial of dry powdered glucagon.



2. Remove needle protector and inject the liquid from the syringe into the dry powder vial. Remove the syringe from the vial.



3. Swirl the vial gently to dissolve the powder. **Do not shake.**



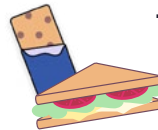
4. Use the glucagon solution as soon as it is mixed. Insert the same syringe back into the glucagon vial. Turn the vial upside down and draw the fluid back into the syringe.



- 5.** Inject glucagon into the middle outer side of the thigh.
- If your child is unconscious, turn them on their side.
 - Glucagon can cause an upset stomach and/or vomiting. The side position helps drain any possible vomit out of the mouth and will not block the airway.
 - Your child may take around 15 minutes to respond fully.



6. Once your child is alert, give juice or other fast-acting sugar.



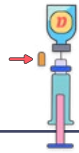
7. After the fast-acting sugar, give your child some longer-acting carbohydrate. This is to stop the blood sugar from dropping too low again.

8. If your child is not alert and able to swallow after 15 minutes, give another dose of glucagon and call 911.

9. Contact your family doctor or your diabetes team before giving the next dose of insulin. Your child's insulin dose may need to be changed.

How much injectable glucagon should I give my child?

If your child is:	Give this much glucagon:
Under 2 years of age	¼ bottle (¼ cc or ¼ mg)
2 to 5 years of age	½ bottle (½ cc or ½ mg)
6 years of age or older	1 bottle (1 cc or 1 mg)



*** For children under 2 years of age:** use an insulin syringe with an orange cap to draw the liquid into the syringe.

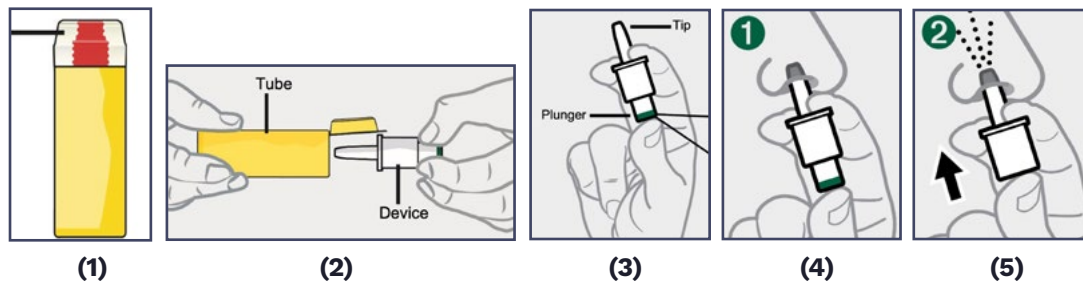
How do I give glucagon nasal powder?

Glucagon nasal powder can be used for kids 4 years of age and older.

The device is prefilled with one dose of glucagon nasal powder.

Follow the steps below:

1. Remove the shrink-wrap by pulling on the red stripe.
2. Open the lid and remove the device from the tube.
3. Hold the device between fingers and thumb (do not push yet!)
4. Insert the tip into the nose until your fingers touch the outside of the nose.
5. Push the plunger firmly until the green line is no longer showing.



Are there any side effects of using glucagon?

Your child may have an upset stomach or vomit after getting glucagon. This can last up to 24 hours.

Glucagon has an expiry date!

Check the expiry date on your supply of glucagon. Make sure your supply is never out of date. Keep this handout with your glucagon kit.

To learn more about other uses of glucagon, read: [Mini-Dose Glucagon to Prevent Serious Hypoglycemia](http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/minigluc.pdf) (<http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/minigluc.pdf>)

Notes:

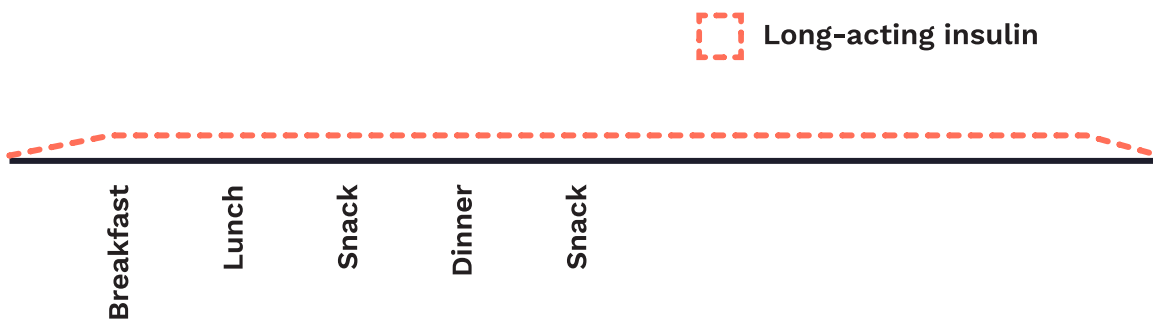
INSULIN

How does insulin work?

- Insulin helps the glucose get into the body's cells.
- Insulin works with the glucose to carry it out of the bloodstream to all the cells in your muscles and tissues where it can be used for energy.
- The body needs insulin continuously throughout the day and night to maintain blood glucose levels.
- As people with type 1 diabetes do not make insulin, they must take different types of insulin by injection to match how insulin is usually made by the pancreas.
- As your child grows, they will need more units of insulin. This is expected and natural.

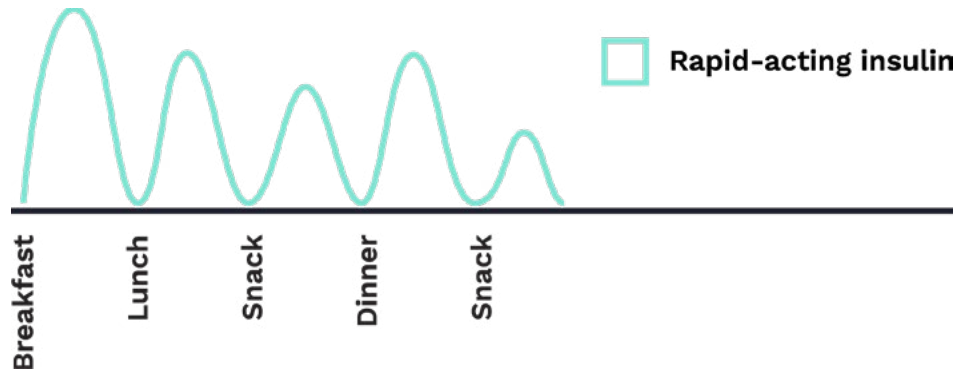
Long-acting insulin:

- Also known as basal insulin.
- Works in the background to keep baseline blood glucose levels stable throughout the day.
- Even without eating, your body still needs small amounts of insulin.
- Long-acting insulin is given 1 to 2 times daily.

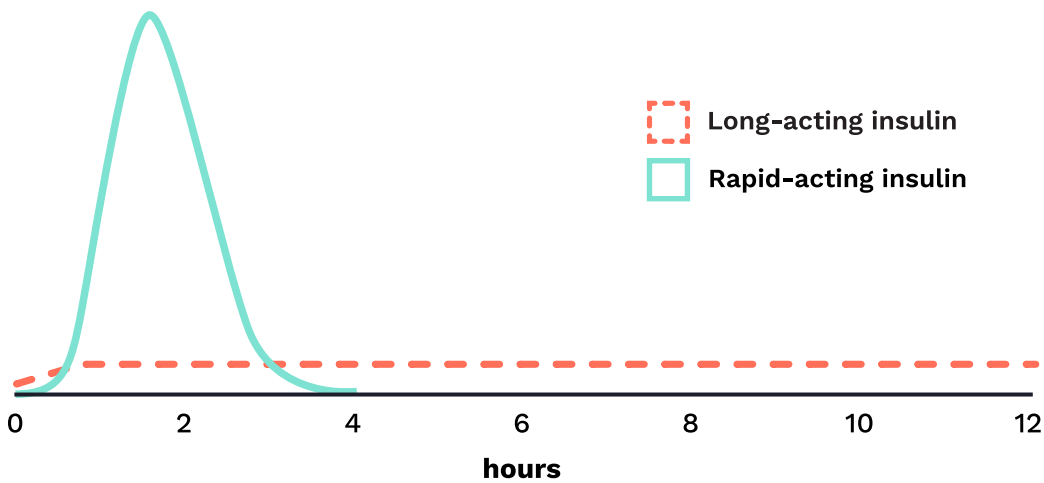


Rapid-acting insulin:

- Also known as bolus insulin.
- Given before meals. By giving insulin before the meal, you are allowing time for the insulin to start working before the food is broken down into sugars.
- Works to manage the expected rise in blood glucose when you eat food.
- The amount of rapid-acting insulin given depends on how much you eat and what your blood glucose level is.



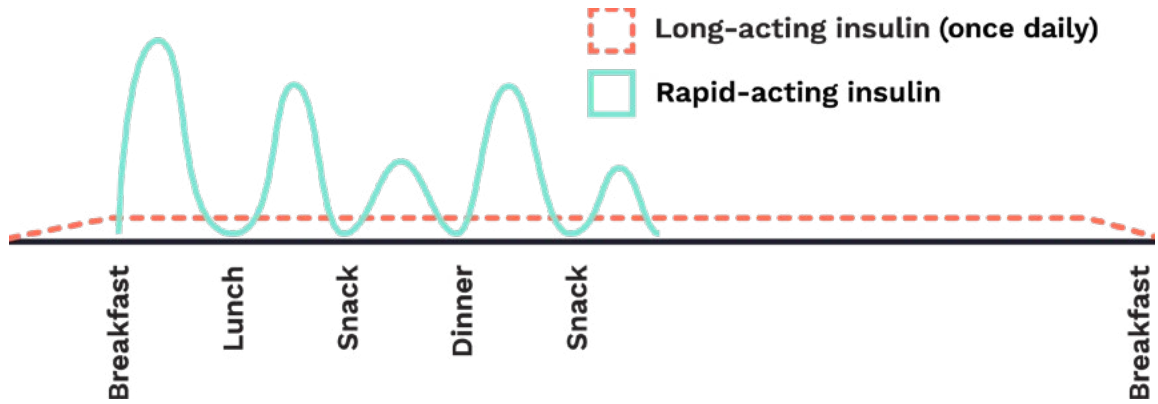
Insulin Action Times



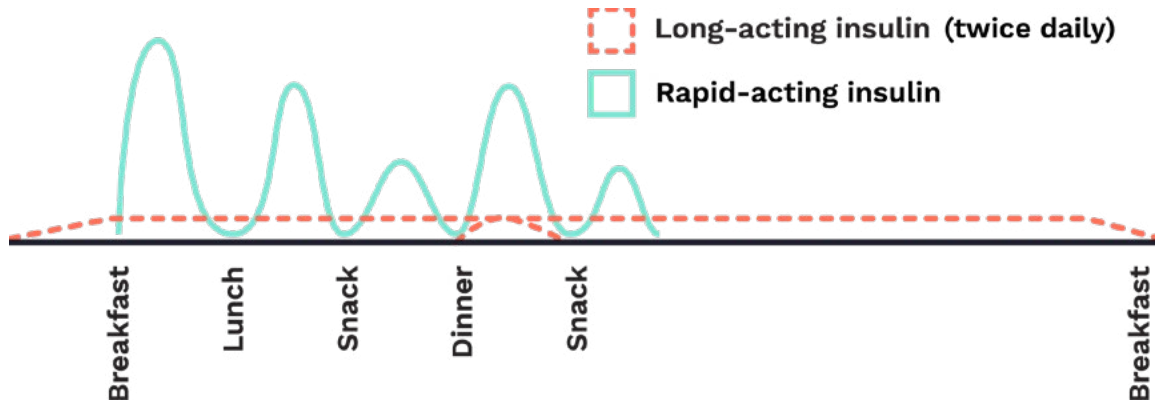
INSULIN NAME	Starts	Strongest	Lasts
Rapid-acting insulin	10–15 min	60–90 min	3–4 h
Long-acting insulin*	1–1½ h	—	12–24 h

*Depending on the type of long-acting insulin, you may take the dose once or twice per day.

Basal-Bolus with Long-Acting Insulin—once daily



Basal-Bolus with Long-Acting Insulin—twice daily



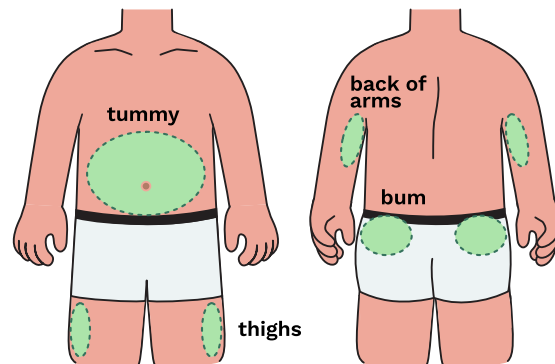
Notes:

Where can I give insulin?

You can give insulin in the:

- arms
- legs (thighs)
- tummy (abdomen)
- backside (bum)

Give your insulin in a new spot every time.

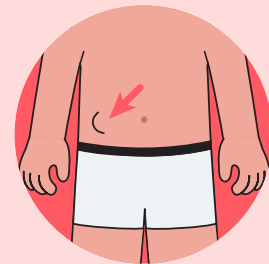


What happens if you use the same area too often?

A hard lump will form under the skin. This can affect your blood glucose levels.

It is important to rotate a few different injection sites to prevent a hard lump at the injection site.

If you notice a hard lump at your injection site, let it heal before you inject into the same site again—this can take months.



Which area is the best?

For all children, it is good to rotate injections to many areas—arms, legs, tummy and backside.

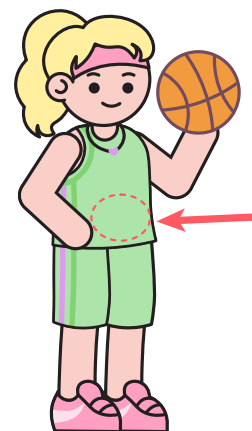
Choose the tummy area if you plan to do any exercises that use the arms or legs. Exercise can change how smoothly and quickly insulin works. Your insulin may work too quickly if you give it in the arm and then go for a swim or play basketball.

Discuss with your team which injections sites would be best for you to include in your rotation.

THINK ABOUT THIS...

QUESTION: Where should you give your morning insulin if you are going for a bike ride after breakfast?

ANSWER: Tummy.

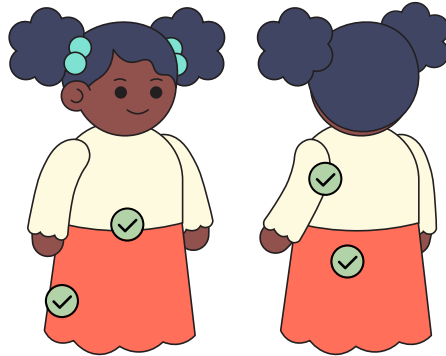


Older kids and teens

PREFERRED: TUMMY; USE ARMS, THIGHS AND BUM FOR ROTATION

TUMMY

- easy to reach
- area of best absorption—insulin works at a smoother rate
- best site to use if exercise is planned



ARMS & THIGHS

- alternative sites that can be used to rotate
- if exercising, could cause insulin to work too fast

BUM

- slightly slower absorption rate overall

Babies and little kids

USE ALL SITES: ARMS, LEGS, TUMMY AND BUM

TUMMY

- about 2 fingers away from the belly button

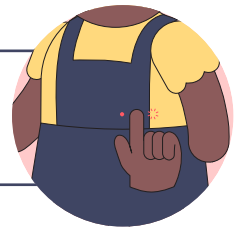


BUM

- upper backside area—not the part you sit on

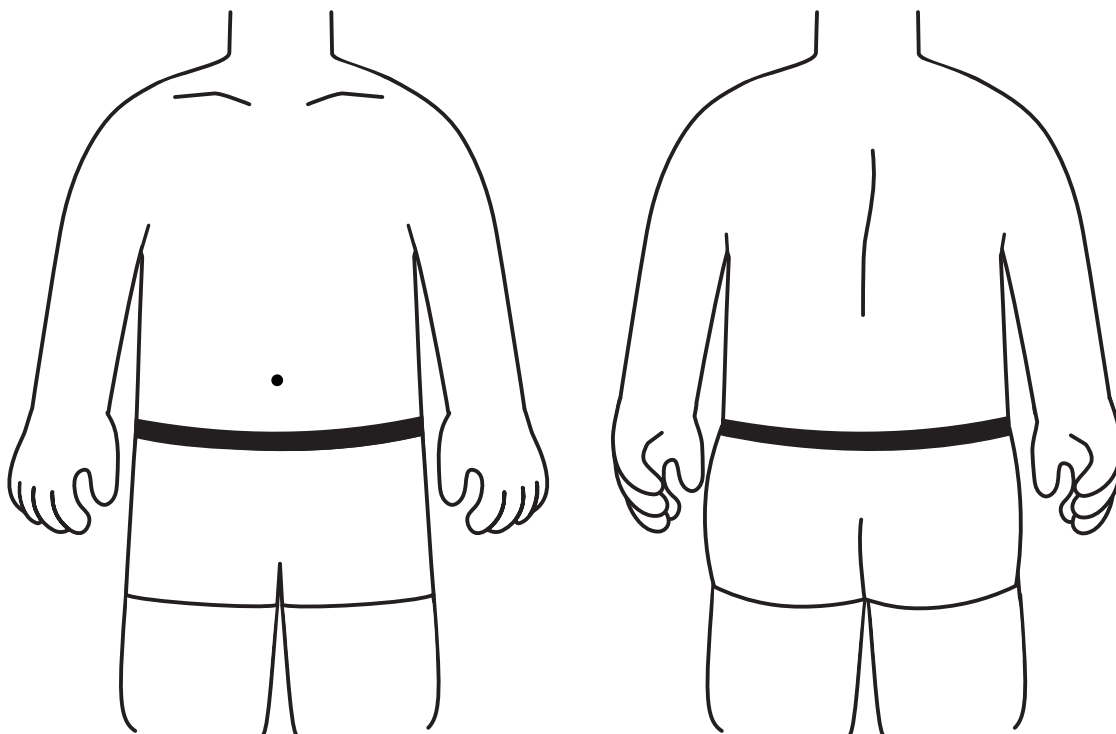
TIP

Space insulin about 1 finger apart from the previous injection dose



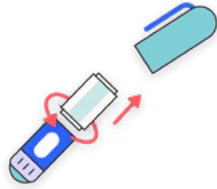
Notes:

My preferred injection sites:



Setting up an insulin pen/syringe

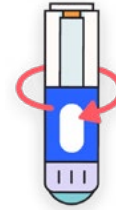
Setting up an insulin pen



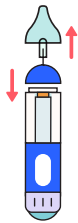
1. Pull off pen cap and untwist cartridge holder from the pen body. Make sure the plunger is pushed all the way back.



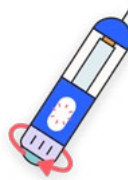
2. Insert the pen cartridge into the holder with the coloured end down. Twist the cartridge so the name of the insulin is visible in the window of your holder.



3. Reattach the holder by twisting it onto the pen.



4. Attach a new pen tip and remove both caps.



5. Turn the dial on the pen to 2 units while holding the pen with the pen tip pointing up.

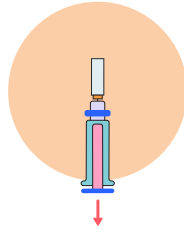


6. Push on the dial so insulin can be released into the pen tip. If no insulin comes out, turn the dial another 2 units, and repeat again—it can take several attempts when you insert a new cartridge. **Priming the pen tip ensures air is not delivered into the tissue.*

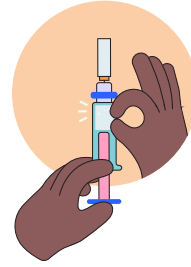
7. The pen is now ready to be used.

Setting up an insulin syringe

INSULIN CARTRIDGE:



1. Insert the syringe needle where the pen tip attaches and draw back the amount of insulin you want to administer.

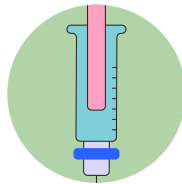


2. If air bubbles are present, flick the syringe so that the bubbles float to the top and push the syringe plunger to remove the air bubbles.

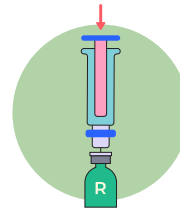
Repeat this step until you have the amount of insulin you want to administer in the syringe with no air bubbles.

VIAL:

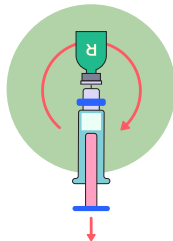
When using an insulin vial, it is important to maintain the pressure inside the vial.



1. Prepare the syringe by drawing the same units of air as the units of insulin you want to give. For example, you will draw 3 units of air into the syringe if you plan on giving 3 units of insulin.



2. Inject the air into the vial and without removing the needle.



3. Turn the vial upside down and draw out the amount of insulin needed. If air bubbles are present, flick the syringe so the bubbles float to the top and inject the air back into the syringe.



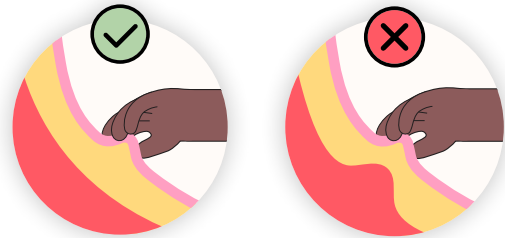
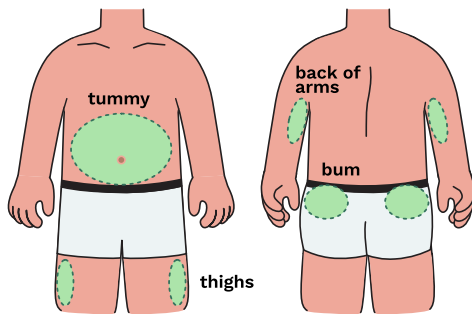
4. Remove the needle from the syringe once you have drawn the correct amount of insulin with no air bubbles. Only one insulin can be used in each syringe—never mix insulins in the same syringe.

**Always use a new syringe with each injection.*

How do I give insulin?

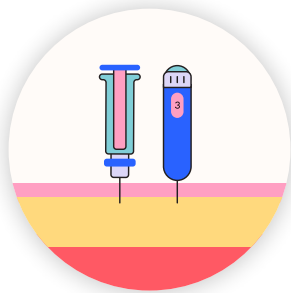
You can give insulin with a syringe or an insulin pen. Insulin is injected into the layer of tissue under the skin and not the muscle. This layer of tissue is called the subcutaneous tissue.

The steps below explain how to give insulin. These steps are the same if you use a syringe or an insulin pen.

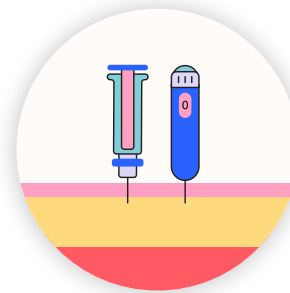


1. Choose a site to give the insulin.
(See previous section, 'Where to give insulin' to determine the optimal site to inject.)

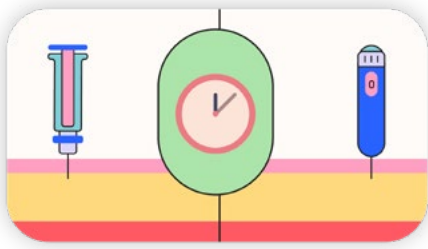
2. Based on the age and the availability of subcutaneous tissue for your child, your team may guide you to gently lift up the skin for the injection. Make sure you leave the muscle layer behind.



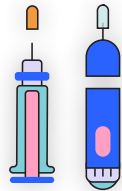
3. Hold the syringe or pen straight up and down. Push the needle into the skin. Make sure the needle is fully inserted.



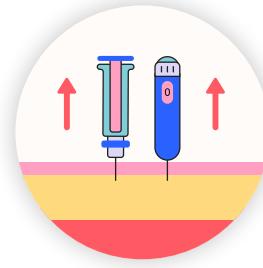
4. Push down on the plunger of the syringe or the dial of the insulin pen until all the insulin has been administered. Check the window of the pen and make sure it reads zero.



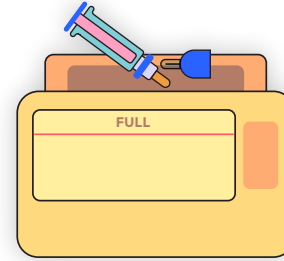
5. Count to 10 slowly—this makes sure that the insulin has started to absorb into the tissue before you remove the needle.



7. Replace the orange cap on the syringe or the clear cap onto the pen tip and untwist the pen tip until it is loose enough to remove from the cartridge.



6. Remove the needle by pulling straight out.



8. Put the used syringe or pen cap in a sharps container.

TIPS

- Your team may guide you to use your thumb and index finger to lift up the skin if necessary, for your child.
- Make sure to pick a spot on your body that isn't too bony or with thin skin.
- If there isn't a lot of subcutaneous tissue in the spots that you choose to inject insulin, make sure to space injections at least 1 finger apart to prevent lumps.
- There are many types of insulin pens. For details on how to use your insulin pen, see the instructions that come with your pen.

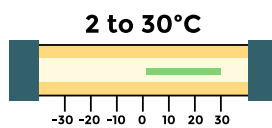


NOTES:

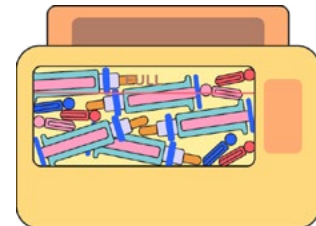
Taking care with insulin and sharps



- **Check the expiry date of your insulin.**
- **Make sure your insulin does not get too warm or too cold.**
 - » Once out of the fridge, most insulin is okay for about 1 month at room temperature.
 - » Some long-acting insulin can stay at room temperature for 6 weeks.
 - » Extra insulin should be kept in the fridge.
 - » Do not freeze.



- **Put all used needles, pen tips, and syringes in a sharps box.**
Do not put them in the garbage.
- **Sharps boxes are also called sharps containers.**
 - » Keep sharps out of reach of children and pets.
 - » Many pharmacies provide them for free or a small charge.
 - » Ask your pharmacy for a sharps box.
 - » Ask if you can bring the box back to the pharmacy when it is full.
 - » If your pharmacy will not take back a full sharps box, ask where else you can take it.
 - » You can also ask your nurse or public health unit about this.



Notes:

Needle phobia resources

How can I support my child or teenager to adapt to needle use associated with diabetes care and overcome fears or phobias they may experience?

It is common for some children and teenagers to be upset or distressed regarding needle use when checking blood sugars and administering insulin, particularly at the time of diagnosis.

There are many ways for parents and care givers to support and implement coping strategies for their children and teenagers to adapt and develop the skills required to overcome any challenges, fears and/or phobias associated with needle use and diabetes management.

HELPFUL CAREGIVER BEHAVIOURS

- Suggest coping strategies and support your child to implement them (e.g. *distraction techniques*)
- Modelling being calm, find a way to manage your own worries/anxieties appropriately
- Providing distraction and support
- Give honest answers to your child's questions (e.g. *It may feel like a pinch*)
- Bringing a familiar toy or blanket
- Praising your child (e.g. *for holding arm or leg still*)

UNHELPFUL CAREGIVER BEHAVIOURS

- Making multiple reoccurring comments (e.g. *It won't hurt at all, I promise*)
- Criticizing
- Apologizing or bargaining
- Getting upset
- Talking about previous negative experiences

For more information about overcoming needle fear and phobias often associated with type 1 diabetes, please refer to the below handouts on this topic:

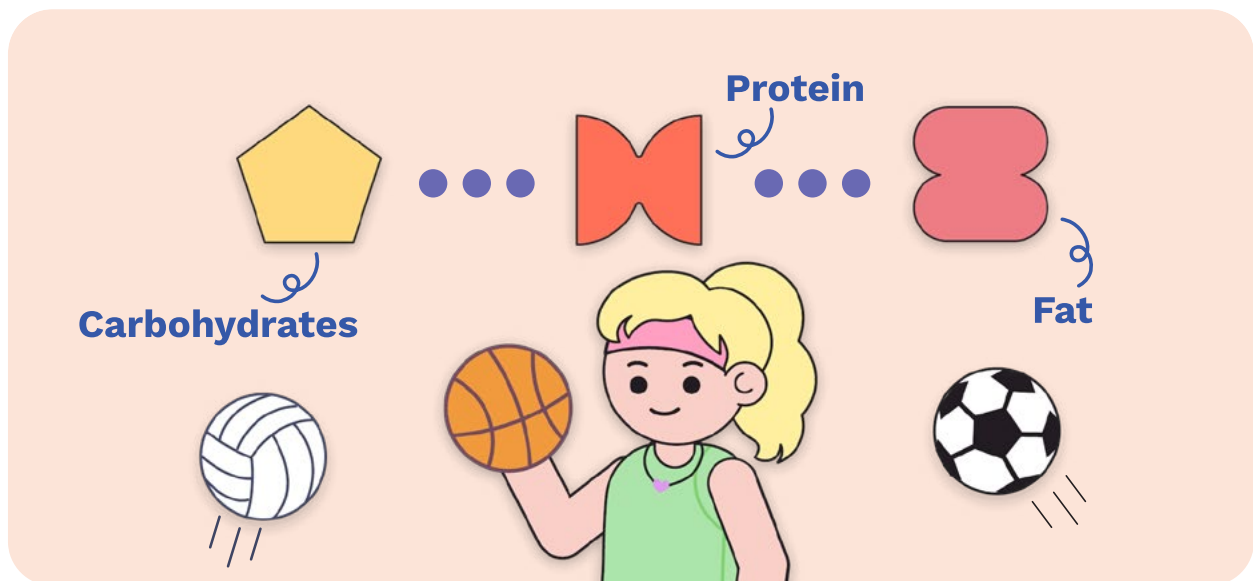
- **It Doesn't Have to Hurt Website:** <https://itdoesnthavetohurt.ca/resources/>
- **Anxiety Canada Website—My Anxiety Plan for Specific Phobias in Children:** <https://anxietycanada.com/disorders/specific-phobia-2/>
- **Needle Fears:** <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/needlefears.pdf>
- **Needle fears and phobia—Making a difference in the lives of children, youth and families:** <https://www.cheo.on.ca/en/resources-and-support/resources/P5018E.pdf>
- **Free downloadable resources:** <https://www.anxietycanada.com/free-downloadable-pdf-resources/>

Some children and teenagers may experience ongoing acute needle fears and phobias. If you feel your child would benefit from support, please connect with your diabetes team to learn about your local community resources.

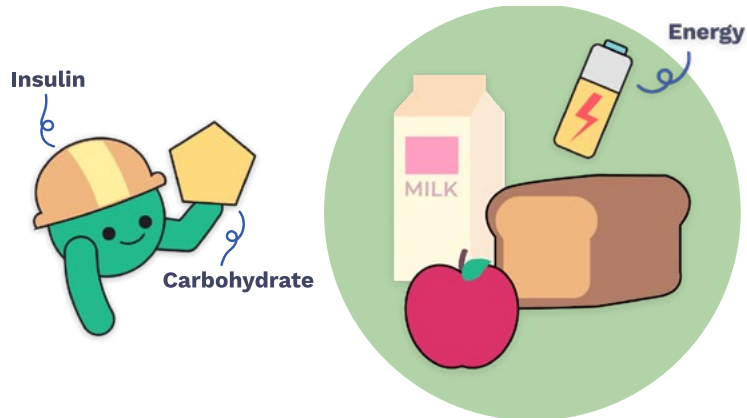
FOOD

Food choices for children and teens with type 1 diabetes

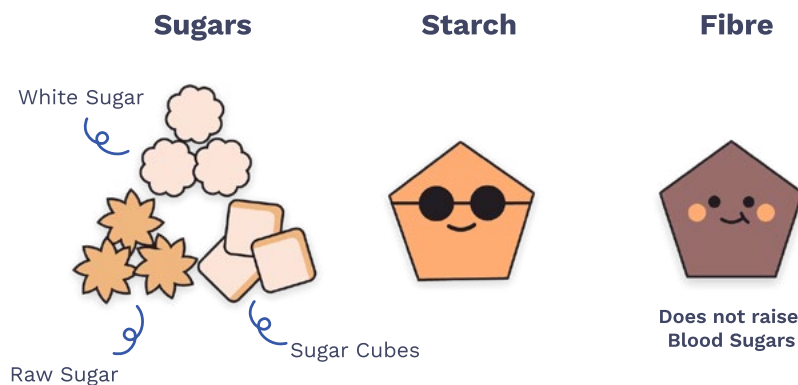
- When it comes to nutrition and diabetes, the first thing to know is there is no “diabetes diet”.
- In general, you do not need to restrict the amount or kind of foods you eat.
- There are no “good” or “bad” foods, and all foods can fit as part of a healthy, balanced diet.
- It’s most important to focus on living a healthy lifestyle and having a good relationship with food and your body.
- While there is no specific diet, you will need to know how different foods affect blood glucose.
- There are three main components of food that give the body energy. All are important for growth and to provide energy for daily activities such as learning and movement.
- **The three main energy sources from food are: carbohydrates, protein, and fat.**



Carbohydrates



- **Important: you do not need to cut out or restrict carbohydrates when you have diabetes!**
- Carbohydrate containing foods are an important source of energy, vitamins and minerals.
- Carbohydrates and insulin work together to help keep blood glucose in balance. This means blood glucose that is not too high or too low.
 - » Carbohydrate raises blood glucose.
 - » Insulin lowers blood glucose.
- An important skill for you to learn is how to match carbohydrate containing foods to insulin because carbohydrates affect blood glucose levels the most.
- Carbohydrates include: **sugars, starches, and fibre.**
- Even though fibre is technically a part of carbohydrates, it does not raise blood sugars like other carbohydrates do.
- The fibre in foods such as vegetables, fruits, whole grains, and other plant-based foods actually help balance blood glucose levels by slowing down the release of sugars into the blood.



Foods that contain carbohydrates



GRAINS & STARCHY FOODS

- Foods made from wheat, rice, oats and other starchy grains.
- Good source of fuel for the body.
- Good source of vitamins, minerals and fibre.



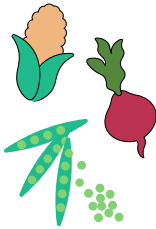
FRUITS

- Good source of vitamins, minerals and fibre.
- Fruit is a better choice than fruit juice for blood glucose.
- Fruit juice is a type of liquid sugar. It raises the blood glucose quickly.



MILK & ALTERNATIVES

- Good source of calcium and other vitamins and minerals.
- Milk is a good source of Vitamin D.



STARCHY VEGETABLES AND LEGUMES

- Corn, beets, and peas contain carbohydrates.
- Beans and lentils contain both carbohydrates as well as protein.
- Good source of vitamins, minerals, fibre and water.

Foods with little or no carbohydrates



VEGETABLES

- Most vegetables do not raise blood sugar.
- Good source of vitamins, minerals, fibre and water.



MEAT & PLANT-BASED PROTEINS

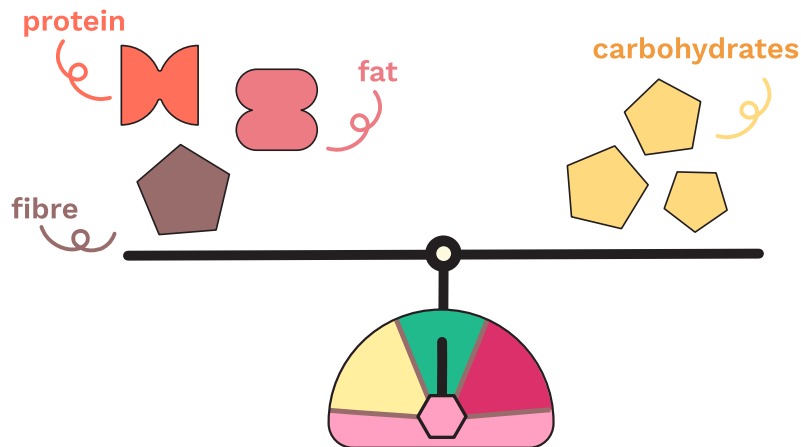
- Have important minerals and vitamins.
- Important for building muscle.
- Needed for normal growth and good health.



FATS

- Help you feel full and satisfied.
- Help the body absorb certain nutrients.
- Needed for normal growth and brain function.

- Most vegetables, proteins and fats do not contain large amounts of carbohydrates. Most often, you do not need to count these foods when adding up your carbohydrate count for your meals or snacks.
- Most herbs, spices and flavourings such as vinegar, lime juice and soy sauce contain little or no carbohydrate, so they do not affect blood glucose levels.
- Carbohydrates when combined with protein, fibre and fats help prevent big changes in blood glucose levels.



TIPS

- You do not need to completely stop eating sugar or your favorite sweet foods and snacks.
- We know sugar containing foods and drinks raise blood glucose, and we want to be mindful of this.
- Continue to incorporate these foods if you enjoy them and try to aim for structure and balance when offering these foods.
- Try one serving of dessert for each person.

Reference: Ellyn Satter: *Feeding with Love and Good Sense*. 2018



QUESTION

What snacks do you like to eat? List them here. Your dietitian can teach you how to count the carbohydrates.

Speed of sugar

As a review, carbohydrates are found in:

- starches and grains such as pasta, bread, roti and rice
- milk and yogurt
- fruit and fruit juices
- drinks with sugar added
- sugar and many desserts such as cookies, ice cream and cake

How quickly do carbohydrates raise blood glucose levels?

Some carbohydrate foods and drinks raise the blood glucose levels very quickly.

Fast acting sugars are found in:

- glucose tablets
- regular pop
- fruit juices
- candies
- jam
- honey
- syrup
- sugar
- sugar syrups used in sweet coffees



Other carbohydrate foods and drinks raise blood sugar more slowly.

- Many grains and starches take longer to turn into sugar after they are eaten. They are a good source of long-lasting fuel.
- Fruits cause a slower increase in blood sugar compared to fruit juice, and here's why:
 - » When you eat a whole piece of fruit, it takes longer to chew than drinking fruit juice, which means the sugar is released into your bloodstream more slowly.
 - » Fruits are a good source of fibre, which helps slow down the rise in blood sugar.

Cow's milk contains sugar, protein, and fat.

- The protein and fat slow down absorption of the sugar in milk.

Do proteins and fats raise blood glucose?

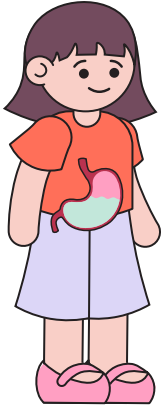
- Proteins and fats do not raise blood sugar much and they do so very slowly.
- They can help slow down the speed of faster acting foods.



Does fibre raise blood sugar?

- Fibre, which is sometimes called dietary fibre, is the part of plant foods that the body cannot digest.
- Fibre is found in vegetables and fruit, whole grain foods such as oats, wheat, barley, nuts and seeds, dried beans, peas and lentils.

Fibre is important to include in your meals and snacks as it:



- Helps keep your gut healthy and prevents constipation.
- Lowers cholesterol and promotes good heart health.
- Helps manage blood glucose levels, helps prevent big highs and lows in blood glucose.
- Keeps you feeling full longer and supports longer-lasting energy.

How to increase fibre intake:

- Include a vegetable or fruit in meals and snacks.
- Include whole grain breakfast cereal such as oatmeal or whole grain tortillas or chapati at breakfast.
- Add cooked brown rice, quinoa, farro or bulgur to your soup, salad or stir fry.
- Add cooked lentils or beans to your soup, stew, pasta or salad.
- Try chickpeas in a wrap or sandwich or include falafel at lunch or dinner.
- Add nuts or seeds to yogurt, muffins, or salads, or eat them on their own.

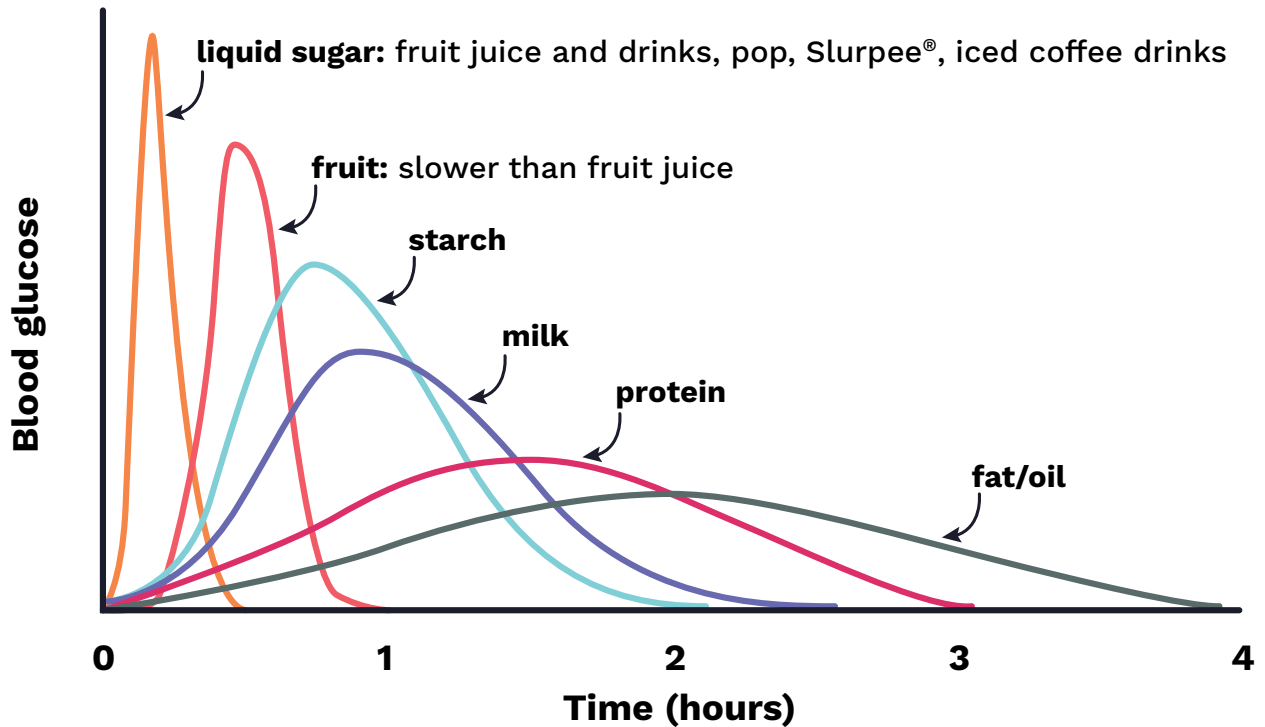
TIPS

What can I do to help balance after-meal blood glucose levels?

- Mix carbohydrates with foods that do not contain carbohydrate. For example, when you eat foods from the starch group, try to eat some protein too.
- Eat fruit instead of drinking fruit juice.
- If you drink fruit juice, make it part of a meal instead of drinking it on its own.
- It is helpful to balance everyday foods and sometimes foods like sweets and treats so you can enjoy all the food you like.



Blood glucose responses of different food groups



- Liquid sugars such as fruit juice and pop raise blood glucose quickly; this is why they are often used to treat low blood glucose when you want to raise the blood glucose quickly.
- While milk contains carbohydrate, it also has protein and fat, which help slow down the absorption of sugar.
- Protein and fat do not raise the blood glucose by much and their peaks are very low and slow, which is why they can help insulin do its job better to manage blood glucose levels.
- Remember, there is no “perfect” when it comes to nutrition or diabetes; it is okay if every meal and snack does not have a perfect balance of fat, protein and carbohydrates.

Notes:

Carbohydrate counting resource

Foods that contain **carbohydrates raise your blood glucose**. These include grains & starches, fruits, milk & alternatives, and other foods. Carbohydrates provide energy and helps us grow and are important for health. Carbohydrates can contain starch, sugar and fibre.

One portion of any of these foods listed below contains approximately 15 grams (g) of available carbohydrate. These amounts are just a measurement for carbohydrate counting—these amounts are not the portions your child has to be eating. Your dietitian can help you find the right amount of carbohydrate that is right for your health and lifestyle.

1 serving = approx. 15 grams available carbohydrate or 1 carbohydrate choice

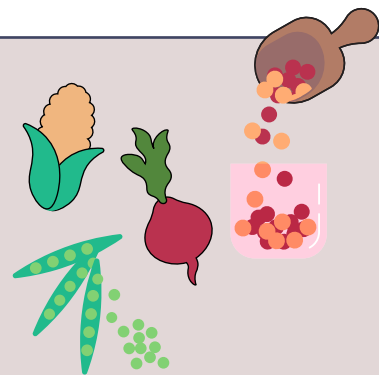
Grains & starches

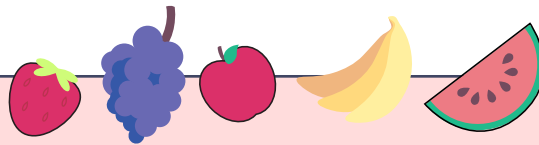


- **bagel:** 1/4 large or 1/2 small
- **barley/bulgur/couscous:** 1/2 cup COOKED
- **bannock (baked or fried):** 1.5 x 2.5"
- **bread (whole grain/white):** 1 slice
- **cereal (dry, flaked):** 1/2 cup *look at label for specific cereals
- **cereal (hot, cooked, oatmeal):** 3/4 cup
- **chapatti/roti/whole wheat tortilla:** 1 x 6"
- **corn:** 1/2 cup
- **cornstarch:** 2 tbsp
- **croutons:** 3/4 cup
- **dosa:** 1 x 10"
- **english muffin:** 1/2
- **flour:** 3 tbsp
- **french fries:** 10 or 1/2 cup
- **hamburger or hotdog bun:** 1/2
- **naan:** 1/4 of 8"x2" (6" diameter)
- **pancakes:** 1 x 4" or 1/4 cup batter
- **pasta:** 1/2 cup cooked
- **potato or sweet potato:** 1/2 cup cubed or 1/3 cup mashed
- **pita:** 1/2 6"
- **pizza crust:** 1/12 of 12"
- **quinoa:** 1/2 cup COOKED
- **rice (long grain):** 1/3 cup COOKED
- **rice (short grain):** 1/4 cup cooked
- **soda crackers:** 7
- **taco shells (hard):** 2 x 5"

Starchy vegetables

- **beets or peas:** 1 cup
- **carrots:** 2 cups
- **squash:** 1 cup
- **tomato sauce:** 1 cup
- **PROTEIN + STARCH:**
 - **beans/lentils:** 1/2 cup
 - **dahl:** 1/2 cup (cooked-thick consistency)





Fruit

- **apple:** 1 medium
- **applesauce(unsweetened):** 1/2 cup
- **apricots:** 4 whole
- **banana:** 1/2 medium
- **blackberries:** 2 cups
- **blueberries:** 1 cup
- **cherries:** 10-12
- **dates/figs:** 2 medium
- **fruit juice:** 1/2 cup
- **grapefruit:** 1/2
- **grapes:** 10-12
- **kiwis:** 2 medium
- **mango:** 1/2 medium or 1/2 cup
- **melon:** 1 cup (cubed)
- **orange:** 1 medium
- **peach/nectarine:** 1 large
- **pear:** 1 medium
- **pineapple:** 3/4 cup
- **raspberries, strawberries:** 2 cups
- **watermelon:** 1 cup (cubed)



Milk & alternatives

- **buttermilk:** 1 cup
- **chocolate milk:** 1/2 cup
- **evaporated, canned milk:** 1/2 cup
- **fruit yogurt tubes:** 2 tubes
- **goats milk:** 1 cup
- **small yogurt drinks:** 2 drinks
- **lassi, artificially sweetened:** 1 cup
- **milk:** 1 cup = 12g carbs
- **skim milk powder:** 4 tbsp
- **soy beverage (flavoured):** 1 cup
- **soy beverage (unsweetened):** 2 cups
- **yogurt (flavoured):** 1/2 cup
- **yogurt (plain):** 1/4 cup



Other choices

- **arrowroot/gingersnap cookies:** 3
- **honey/syrup:** 1 tbsp
- **ice cream:** 1/2 cup
- **jam:** 1 tbsp
- **ketchup:** 3 tbsp
- **muffin:** 1/2 small
- **popcorn:** 3 cups (cooked/popped)
- **pretzels:** 7 large/30 sticks
- **sugar (white):** 3 tsp or 1tbsp
- **sweetened shredded coconut:** 1/2 cup

Foods that have little to no carbohydrates

DIETARY FATS

- avocado
- bacon
- butter or margarine
- cream cheese
- mayonnaise
- nuts and seeds
- oils
- salad dressing
- sour cream

PROTEIN

- cheese, paneer
- eggs
- unsweetened soy milk
- peanut butter
- hummus
- chicken, poultry
- beef, pork, wild game
- fish, shellfish
- tofu, bean curd
- edamame, tempeh, miso

VEGETABLES

- asparagus
- broccoli
- mushrooms
- cucumber
- tomatoes
- lettuce
- celery
- peppers
- green beans
- eggplant

OTHER

- lemon/lime
- dill pickle
- vinegar
- hot sauce
- soy sauce

**Note: some may need to be counted depending on portions. Discuss with your dietician.*

Label Reading

3 KEY COMPONENTS TO LOOK AT:

1. Serving Size

- The serving size is usually listed underneath the title: Nutrition Facts.
- The serving size is not how much you need to eat.
- The serving size simply tells you the quantity of food used to calculate the nutrition facts table.
- If you are eating more or less than the serving size listed, you will need to do some math to adjust the nutrition information to the amount you plan on eating.

2. Carbohydrate (g)

- This may also be listed as total carbohydrate.
- Make sure to look at carbohydrate in grams (g); do not look at the percentages, as this is not helpful for carb counting.

3. Fibre (g)

- Carbohydrates are made up of fibre, starch and sugars.
- Fibre does not raise blood glucose and should be subtracted from carbohydrate
“Net” or “Available” Carbohydrates = Carbohydrates - Fibre
- You do not need to look at other components of the label, such as sugar or calories for carbohydrate counting.

Example: 26g carbohydrate - 6g fibre = 20g available carbohydrate

Nutrition Facts Valeur nutritive

Per 1 cup (250 mL)
pour 1 tasse (250 mL)

	% Daily Value*
	% valeur quotidienne*
Calories 110	
Fat / Lipides	0 %
Saturated / saturés 0 g	0 %
+ Trans / trans 0 g	0 %
Carbohydrate / Glucides 26 g	
Fibre / Fibres 6 g	24 %
+ Sugars / Sucres 22 g	22 %
Protein / Protéines 2 g	
Cholesterol / Cholesterol 0 mg	
Sodium 0 mg	0 %
Potassium 450 mg	10 %
Calcium 30 mg	2 %
Iron / Fer 0 mg	0 %

*5% or less is a **little**, 15% or more is a **lot**
 *5% ou moins c'est **peu**, 15% ou plus c'est **beaucoup**

Notes:

Diabetes nutrition apps and websites

Apps for phone/tablet

Some foods do not have a label or are not listed on carbohydrate counting handouts, such as fast food, restaurant meals or other foods you enjoy.

Apps and websites can be helpful tools in determining carbohydrate amounts for these foods. These are a few examples:

CalorieKing (calorieking.com): available online or as a free app for Apple and Android

You can use a food scale along with the Calorie King App:

1. Weigh out how much of the food you would want to eat on your scale.
2. Enter the weight in the quantity on CalorieKing and serving size as grams (g). For example, if you enter 100g into the serving size for raspberries, you get: 11.9g carbs – 6.5g fibre = 5.4g carbs.

Carbs & Cals (carbsandcals.com): paid app for Apple and Android

- Uses photos to help estimate portion sizes of carb foods.

My Fitness Pal (myfitnesspal.com): available online or as a free app for Apple and Android

- This app may not always be accurate as the public can submit their own values; however, it can be helpful when looking up unique foods. Try comparing 3 values for the same food and use an average of the 2 most similar carbohydrate amounts. Items with a green check mark may be more reliable.
- You can also calculate the carbohydrates in recipes using this site.

Nutritionix (nutritionix.com): available online or as a free app for Apple and Android

- Food database that has good variety.

Happy Forks Recipe Analyzer (happyforks.com/analyzer): available online

- For those who like to bake!

Websites

BC Children's Hospital Endocrinology and Diabetes website (endodiab.bcchildrens.ca)

- Look for "**For patients and families**" in the right-hand menu, click on "**Diabetes Resources**"
 - » Diabetes handouts and links
 - » Food and nutrition information

Notes:

Carb counting using carbohydrate percentages

Food is made up of carbohydrates, proteins, fats, water, and other nutrients such as vitamins and minerals. Carbohydrate percentages represent the portion (percentage) of a food's weight that is carbohydrate. It stands for the carbohydrate per gram of that particular food. Using carbohydrate percentages involves weighing a portion of food and then multiplying the weight of that food (in grams) by its carbohydrate percentage.



Carbohydrate percentages are helpful with:

- foods that are eaten at home (unless you carry around a food scale all the time)
- foods that are of odd shapes or variable sizes (e.g. fresh fruits, berries)
- foods with variable density within a volume measure (for example, packed rice versus loosely scooped up rice in a measuring cup)
- a food item that is a mixture of several ingredients (e.g. stews, stir-fries, pastries)

To carb count using carbohydrate percentages, you will need:

- a digital food scale
- the carbohydrate percentages list or a food label
- a food that is in its edible form (without the peel, rind, seeds, packaging, or other parts that are not consumed)

To find out how much carbohydrate you are eating in a particular food, you will need to do a simple calculation:

1. Weigh the food on a gram scale to get its total weight.

You place an apple (without seeds) on a scale and see that it weighs 185 grams.

2. Find that food's carbohydrate percentage in the food groups listed in the following tables.

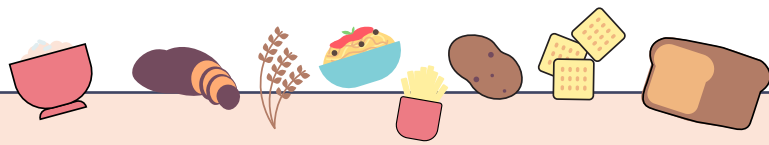
You look up the carbohydrate percentage of an apple and see that it is 0.12, or 12%.

3. Multiply the food's weight in grams by its carbohydrate percentage.

You multiply the weight of the apple (185 grams) by the carbohydrate percentage of the apple (0.12).

4. The answer is the number of grams of carbohydrate you are eating.

185 grams of apple \times 0.12 = 22 grams of carbohydrate.



Carbohydrate percentages—grain products

BREADS & GRAINS

• bagel, onion, poppy or sesame	.51	• japanese soba	.21
• biscuits, plain or buttermilk	.47	» japanese somen	.28
• bread		» macaroni	.27
» italian	.47	» rice noodles	.24
» rye	.42	• pancakes, buttermilk	.29
» wheat	.39	• spaghetti	
» white	.49	» plain	.26
• bread crumbs	.67	» whole wheat	.22
• bread sticks, plain	.65	• rice	
• cornstarch	.90	» brown	.22
• couscous, cooked	.22	» white	.29
• english muffin	.43	» wild	.19
• flour		• rolls, dinner	
» white	.78	» plain	.51
» whole wheat	.61	» whole wheat	.22
• noodles, cooked		• tortillas	
» egg noodles	.24	» corn	.42
		» flour	.53

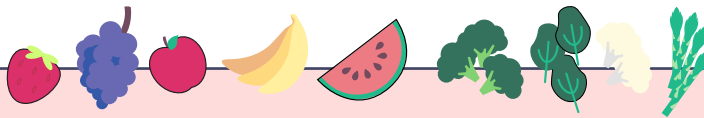
COLD CEREALS, DRY (AVERAGE ALL BRANDS)

Cereal names and varieties change frequently. To get the most up-to-date carbohydrate count for cereals, please make use of household measures (measuring cups) and the information on the nutrition label. If you are using carbohydrate percentages, below is a rough guide.

• Bran Flakes	.80	• Puffed Wheat	.67
• Corn Flakes	.80	• Raisin Bran	.73
• Granola	.53	• Rice Crisps	.80
• Oat Bran Cereal	.56	• Shredded Wheat	.67
• Puffed Rice	.87	• Frosted Flakes	.93

HOT CEREALS, COOKED

• corn grits	.13
• cream of wheat	.11
• oatmeal	.09



Carbohydrate percentages—fruits & vegetables

FRUITS

• apple	.12	• grapes	.16
• applesauce, unsweetened	.10	» american	.16
• apricot	.09	» european	.17
• apricot, canned in juice	.10	• honeydew melon	.08
• apricot, canned in syrup	.14	• kiwi	.12
• banana	.23	• mango	.15
• berries		• nectarine	.09
» blackberries	.05	• orange	.10
» blueberries	.12	• papaya	.08
» cranberries	.07	• peach	.09
» raspberries	.06	• peaches, canned in juice	.11
» strawberries	.06	• peaches, canned in light syrup	.14
• cantaloupe	.12	• pear	.12
• cherries	.14	• pear, canned in juice	.11
• crabapple	.20	• pear, canned in light syrup	.13
• cranberry sauce, sweetened	.39	• persimmons	.15
• dates	.68	• pineapple	.12
• figs	.16	• pineapple, canned in juice	.15
• figs, dried	.54	• plum	.10
• fruit cocktail		• pomegranate	.16
» canned in juice	.11	• dried prunes	.57
» canned in light syrup	.14	• raisins	.75
• grapefruit	.09	• tangerines	.09
		• watermelon	.08

VEGETABLES

• beans, kidney, lima, pinto, red or white	.21	• potato	
• corn		» baked	.21
» canned	.13	» boiled	.18
» boiled	.18	» french fries	.35
» sweet, creamed	.17	» hash browns	.24
• french fries	.35	» mashed, homemade	.16
• parsnip	.13	• sweet potato	.22
• peas, green, cooked	.11		

How to calculate carbohydrates in recipes

When you live with diabetes, you can still eat delicious baked goods! You do not need to use special ingredients or cut out all the sugar. Think of it similarly to a meal, you will need to start by figuring out the carbohydrate amount for the ingredients.

Ask yourself:

1. Which foods or ingredients raise blood glucose? Which foods do I need to count?
2. What is the amount in the recipe? 1 cup? ½ cup? 2 tablespoons?
3. What tools can I use to count the carbohydrate amount for those foods?



Tools for calculating carbohydrate amounts

Now that you know which ingredients to count, the next step is to calculate the carbohydrate amount for the portions in the recipe.

This can be done using different tools:

WEBSITES:

- Calorie King (calorieking.com)
- Happy Forks (happyforks.com)

MOBILE APPS:

- Calorie King
- Nutritionix

BC CHILDREN'S HOSPITAL HANDOUT:

- Common Baking Ingredients and their Nutrient Contents (page 61 of this guide)

Notes:

Recipe calculation

BLUEBERRY YOGURT MUFFINS

	CARB
1 cup (250 mL) whole wheat flour	76
1 cup (250 mL) white flour	92
⅓ cup (80 mL) sugar	70
1 tsp (5 mL) baking powder	-
1 tsp (5 mL) baking soda	-
¼ tsp (1 mL) salt	-
¼ cup orange juice*	7
2 Tbsp (30 mL) oil	-
1 tsp (5 mL) vanilla extract	-
1 cup (250 mL) regular vanilla yogurt*	36
1 egg	-
1 cup (250 mL) fresh or frozen blueberries	15
vegetable cooking spray	-
1 tbsp (15 mL) sugar	13
TOTAL	309 g



*Carbohydrates from nutrition label on package.

Combine first 5 ingredients in a large bowl; make a well in centre of mixture. Combine orange juice and next 4 ingredients; stir well. Add to dry ingredients, stirring just until moistened. Gently fold in blueberries. Divide batter evenly among 12 medium or 18 small muffin cups coated with cooking spray: sprinkle 1 tbsp sugar evenly over muffins. Bake at 400°F for 18 minutes. Remove from pan, let cool on a wire rack.

12 muffins: 309 g carbs ÷ 12 = 26 g carbs per muffin

18 muffins: 309 g carbs ÷ 18 = 17 g carbs per muffin



Notes:

Common baking ingredients and their nutrient contents

The values given here are averages of multiple brands. The nutrition label will present the most up-to-date information about that product.

Common baking ingredients

For 1 cup = 250 mL



WEIGHT	FOOD	TOTAL CARB [†]	FIBRE	NET CARB
114	Breadcrumbs (white, dry)	82	5	77
178	Chocolate chips (semisweet)	113	11	102
91	Cocoa (unsweetened)	53	30	23
98	Coconut (sweetened, shredded)	47	4	43
135	Cornstarch	123	1	122
347	Corn syrup (light)	266	-	266
132	Flour (white, all-purpose, unbleached)	96	4	92
127	Flour (whole wheat)	87	11	76
358	Honey	295	-	295
356	Molasses	266	-	266
99	Oat bran (raw, dry)	66	11	55
111	Oats (old-fashioned, dry)	76	11	65
100	Oats (minute, dry)	67	9	58
72	Skim milk powder (instant)	38	-	38
233	Sugar (brown, packed)	228	-	228
127	Sugar (powdered/icing, unsifted)	127	-	127
211	Sugar (white, granulated)	211	-	211
61	Wheat bran (raw)	40	26	14
122	Wheat germ (raw)	63	16	47

[†]Total Carb = total carbohydrates (including fibre, starches and sugars)

Notes:

Non-wheat flours

For 1 cup = 250 mL



WEIGHT	FOOD	TOTAL CARB [†]	FIBRE	NET CARB
112	Almond flour*	24	12	12
193	Amaranth flour*	129	18	111
135	Arrowroot flour*	119	5	114
156	Barley flour	117	16	101
136	Bean flour, black*	88	20	68
125	Bean flour, white*	80	32	48
127	Buckwheat flour*	90	32	58
109	Carob flour*	97	9	88
97	Chickpea flour (besan, chana) *	53	10	43
80	Corn bran*	69	63	6
124	Corn flour (yellow, whole grain) *	95	11	84
168	Corn meal (yellow, degermed) *	133	9	124
170	Flaxseed flour*	49	48	1
125	Millet flour (whole grain) *	88	9	79
94	Oat flour (whole grain) *	63	7	56
169	Potato flour*	140	16	124
170	Potato starch*	164	-	164
113	Quinoa flour*	72	8	64
125	Rice bran*	62	26	36
167	Rice flour (brown)*	128	4	124
136	Rice flour (glutinous)*	109	8	101
167	Rice flour (white)*	134	8	126
108	Rye flour (medium)	84	4	80
136	Sorghum flour*	100	16	84
113	Spelt flour (whole)	83	9	74
125	Tapioca flour*	104	14	90
125	Teff flour*	88	16	72

[†]Total Carb = total carbohydrates (including fibre, starches and sugars)

*Generally considered gluten-free, although some grains (especially oats) are processed in mills where gluten-containing flours are also made

References: CalorieKing (calorieking.com)

Notes:

Sugar and sweeteners

Sugars are carbohydrates that add sweetness to foods and beverages. There are different types of sugars and sugar substitutes. These can affect your blood glucose levels in different ways.

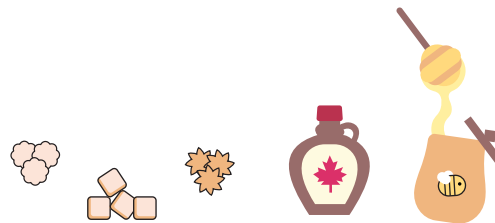
Sugars can:

- Occur naturally such as in fruits and milk.
- Be added to foods in the form of corn syrup, white sugar or fruit juice concentrate.

Most people, including those living with diabetes, can eat sugars in moderation. There is no advantage to using one type of sugar over another. For example, whether you use honey, white sugar, or brown sugar, they will all raise blood glucose.

There are many names of sugar to look for in ingredient lists on food labels. For example, sugar may appear as:

- Glucose
- Fructose
- Sucrose
- Maltose
- Honey and syrup

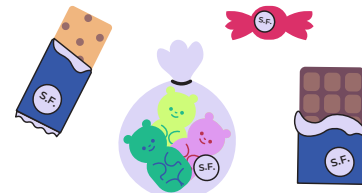


Sweeteners that don't increase blood glucose levels

- Sugar substitutes can give a sweet taste, but do not raise the blood glucose at all or very much.
- Sweeteners do not need to be chosen over sugar but it's important to be aware of them. Neither option is "good" or "bad".

1. SUGAR ALCOHOLS

- Sugar alcohols are often found in "sugar-free" or "no sugar added" foods, candies and chocolates.
- Sugar alcohols do not raise blood glucose much. You do not need to match rapid-acting insulin to sugar alcohols.
- Sugar alcohols approved for use in Canada include the following:
 - » *Erythritol isomalt, lactitol, maltitol, mannitol, sorbitol, and xylitol.*
- When counting carbohydrates, sugar alcohols are like fibre; when looking at a nutritional label, you want to **subtract them from the total carbohydrates**.
- **Note:** sugar alcohols are not usually recommended for children and youth with diabetes, because they can often cause an upset stomach if eaten in large amounts.
 - » For children and youth living with diabetes, small amounts of regular candies and chocolates are ok.



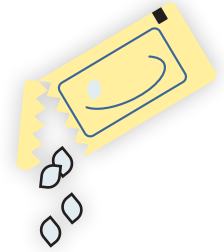
Nutrition Facts Valeur nutritive

Per 1 bar (50 g)
par 1 tablette (50 g)

	% Daily Value* % valeur quotidienne*
Calories 240	
Fat / Lipides 18 g	24 %
Saturated / saturés 11 g + Trans / trans 0.2 g	56 %
Carbohydrate / Glucides 27 g	
Fibre / Fibres 1 g	4 %
Sugars / Sucres 4 g	4 %
Sugar Alcohols / Polyalcools 21 g	
Protein / Protéines 3 g	
Cholesterol / Cholestérol 10 mg	
Sodium 40 mg	
Potassium 200 mg	2 %
Calcium 100 mg	4 %
Iron / Fer 1.75 mg	8 %
	10 %

*5% or less is a **little**, 15% or more is a **lot**
*5% ou moins c'est **peu**, 15% ou plus c'est **beaucoup**

- » You do not need special “sugar-free” treats.
- » You can simply include the carbohydrate amount of the candy or chocolate into your carbohydrate count for that meal or snack.



2. SUGAR SUBSTITUTES

- Many people have heard of sugar substitutes such as Sucralose and Aspartame.
- Generally, they are considered safe to use. Health Canada has set acceptable daily intake values, which is the amount thought to be safe to consume based on someone’s body weight.
- These levels are set high and most people would not consume more than the limit.
- Examples of sugar substitutes include the following:
 - » Aspartame or Acesulfame-k in diet pop/soda.
 - » Splenda®
 - » Stevia-sweetened sodas such as Zevia®
- There is no evidence to show harmful effects of occasionally having sugar substitutes. However, there is limited research in this area.
- Sugar substitutes are not suitable for infants under 12 months of age.
- The overall goal for everyone, not just those living with diabetes, is to limit added sugars and sugar alternatives.
- Your family can start by giving these pop and juice alternatives without any sweeteners or sugars a try:
 - » Flavoured sparkling water
 - » Water or sparkling water with lemon/lime/cucumber or mint



Notes:

Supporting food choices for children and youth with diabetes by age

As bodies grow and change over the lifespan, there are specific age-related recommendations to help ensure adequate growth and support a positive relationship with food and body image.

Less than 6 months old

- Breastfeeding or chestfeeding, when possible, provides your baby with important nutrients and antibodies.
- Your care team will discuss how to dose insulin for your breastfed or formula-fed infant.
- Breastmilk or formula is a source of carbohydrates, and the timing and amounts need to be considered.
- Insulin is important for your infant to be able to use the nutrition from breastmilk or formula for growth and development.
- Your infant may feed more frequently soon after being diagnosed with diabetes, to make up for any growth that was paused when their body wasn't making enough insulin.
- Infants with diabetes are expected to grow the same as any other infant. Discuss with your care team if your baby is not growing as expected.
 - » See the BCCH handout for details on counting carbohydrates for infant food and drinks: <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/carbinfant.pdf>



6-9 months old

- There is no need to prepare specialized food for your baby with diabetes.
- Offer them the same foods as everyone else, in age-appropriate textures when they are ready for solids.
- Continue to breastfeed as desired.
- When starting to eat solid foods, it is unlikely that your baby will eat amounts large enough to need insulin for their food; but in some cases, insulin may be required. Discuss with your care team for further guidance as needed.
- Consistent feeding times can help set your baby up for success in terms of planning the insulin dose schedule and feeding practices.



9-12 months old

- During this time when babies are trying new foods and exploring their hunger and fullness, try not to control their portions of foods in order to manage blood sugars. Offer meals and snacks on a schedule when possible.
- Allow your baby to explore and learn their hunger and fullness.
- At this age, your baby may eat quantities large enough to need an insulin food bolus. Discuss with your care team for further guidance.
- For more information about hunger and fullness cues, you can refer to the Ellyn Satter Institute website: <https://www.ellynsatterinstitute.org/>



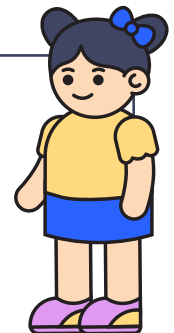
12–24 months

- Having structured meals and snack times, rather than grazing on snacks all throughout the day, can help with your toddler's blood glucose and insulin management.
- At this age, pre-meal food insulin boluses may be challenging to give, as your child may eat different amounts at each meal or each day, making it hard to predict how much they will eat. Discuss with your care team if this becomes challenging.
- If your child does not eat, or does not eat the carbohydrates planned, but you have already given pre-meal insulin, try the food again 15 minutes later. If that is unsuccessful, try a substitute carbohydrate. If this happens consistently, discuss options with your care team.



Toddler–school age

- The less pressure you put on your child to eat, the more likely they will eat according to their own body's needs.
- At this age, they are learning about boundaries.
- Respecting their cues can reduce stress and anxiety related to eating and can help make mealtime more enjoyable and less stressful for everyone.



Adolescents

- Allow the space for your child to make some independent choices around eating but maintain structure to help them learn consistency and balance.
- Resistance to diabetes care related to meals, snacks, exercise, blood glucose checks, and insulin dosing is common during this stage. Validate your adolescent's feelings and reassure them with consistent and caring messaging.
- It is not realistic to expect someone this age to be completely independent with their diabetes care.
- Adolescents still need support from caregivers for diabetes care needs.



Tips for meal time:

- **Keep to a structured meal and snack-time schedule.** This is important to help your child feel secure, knowing there is always another meal or snack in a few hours.
- **Make mealtimes no longer than 30 minutes.** Setting a time limit will help establish a regular insulin bolus dosing rhythm and better match insulin action.
- **Do not pressure your child to eat, this will increase their resistance.** They will eat when they are hungry.

It is expected that your child may eat different amounts at meals and snacks, and sometimes refuse to eat altogether. At times, this can make it challenging for insulin dosing.

If you have given a pre-meal insulin bolus and they refuse a meal:

- Try offering the same food again in 15 minutes.
- Offer a carbohydrate substitute of your choosing (not the child's).
- Avoid giving in to your child's requests as this can set a bad habit of allowing them to choose what they are eating, which is the caregiver's role.
- Discuss with your care team alternative insulin dosing strategies.

Plan ahead to support insulin dosing:

- Label food with carbohydrate counts for school assistants to help insulin dosing for your child.
- Discuss possible situations with your child where food may be offered without caregivers present.
- Make a plan ahead of time together so your child does not miss out on our regular activities and socialization during childhood.

Tips for supporting independent diabetes care:

- Remind your child about diabetes care-related activities when needed.
- If they have been living with diabetes for some time, it is still normal and expected that they will forget activities like blood glucose checks and insulin dosing.
- Be kind, consistent, and assertive with your reminders.
- Discuss your child's skill and confidence level for dosing insulin at school with your school's nursing support services coordinator and/or diabetes care team as needed.
- With guidance, your child will be able to identify carbohydrate containing foods, perform basic carb counting math, or memorize carb content in their favourite or common foods.
- Start conversations with your child about how they feel about their body and diabetes care and the various influences in society.
- A discussion around the social media they consume is especially important at this age.
- Encourage independent decision-making, but provide support as needed. The goal is for them to be involved in regular activities and socialization.

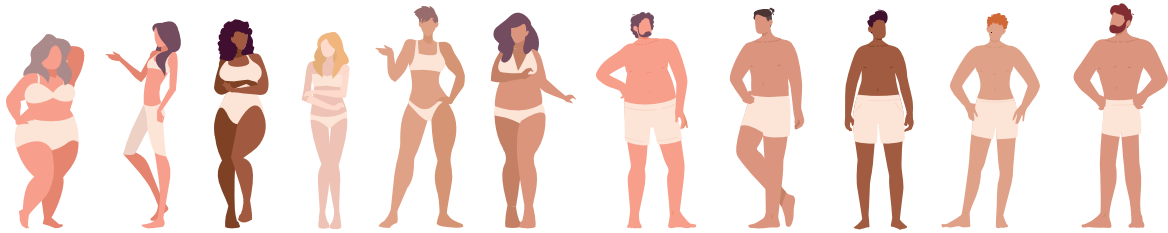
All ages recommendations and reminders:

- Children with diabetes do not need different foods compared to children without diabetes.
- There is no "diabetes diet".
- It is normal for the appetite to increase after a diagnosis of diabetes.
- Use the division of responsibility approach to support your child in eating well and developing a positive relationship with food. This includes thinking about your child's role and your role at mealtimes.
 - » Your child is responsible for whether or not they eat and how much they want to eat.
 - » You, as a parent or caregiver, are responsible for the where, when, and what of feeding.

Tips for creating a positive relationship with food:

- Avoid labelling foods as "good" or "bad", focus on the joys of eating.
- Serve the same foods as the rest of the family.
- Eat together when possible.
- When you demonstrate good behaviour and enjoyment at mealtimes, your child picks up on it.
- Adult role-modelling is the number one influence on a child's eating behaviour.

Body image and relationship with food



Your body image is the way you feel about your body and what you believe about your own appearance.

Your relationship with food is the way you think about, feel about, and act around food. Your body image and your relationship with food are important. They can affect your thoughts, actions, and quality of life. A healthy relationship with food is part of a healthy body image.

When you feel good about your body:

- You accept and respect your body, no strings attached. You do not try to change your body to look a certain way.
- You tune in to what your body needs. Nourish your body with a variety of foods, and engage in movement that feels good for your unique, individual body. This can change from day to day.
- You embrace imperfection. Everyone is unique. Your worth is not tied to how you look.
- You celebrate yourself. You recognize the strengths and qualities that make you special.

When you have a healthy relationship with food:

- You feel free to choose what you eat, and you are flexible with what you eat without feeling boxed in by diet rules.
- You also feel free from pressure to follow diets and change how you look, and you eat foods you enjoy, in amounts that feel good for your body.
- You feel free to enjoy your food. Eating is not just about fueling your body; it is also about enjoying flavours, taking part in family or cultural traditions, and spending time with others.

How to nurture healthy body image, and a healthy relationship with food:

- Be kind to yourself. Avoid or limit negative self-talk.
- Remember each body is unique. There is no perfect approach to health, diabetes, and appearance. Embrace your body, and celebrate all shapes and sizes.
- Eat balanced meals with a variety of foods if possible.
- Engage in enjoyable movement.
- Dress in a way that makes you feel comfortable.
- Be aware of the media you consume. Unfollow influencers and accounts that promote diets, diet culture and looking a certain way. Remember that many media messages are unrealistic.
- Surround yourself with friends and family who recognize your uniqueness and like you just as you are.
- Share meals: food tastes better when we eat with friends and loved ones.
- You have the power to control and change how you see, feel, and think about your body.
- If you have any concerns about your body image or your relationship with food, please ask your dietitian.

References:

Body Image. 2012. National Eating Disorders Association Body Image: nedc.com.au
Clinical Tools and Resources: keltyeatingdisorders.ca/health-professionals/clinical-tools-and-resources/

To learn more, visit:

Foundry BC—Info & Tools: foundrybc.ca
Jessie's Legacy: jessieslegacy.com
Looking Glass Counsellor Directory: lookingglassbc.com/resources/counsellor-directory/

Notes:

BASAL-BOLUS INSULIN THERAPY

Introduction

What is a Basal-Bolus Approach to Diabetes Management?

The body needs insulin continuously throughout the day and night to maintain blood glucose levels.

As people living with type 1 diabetes do not make insulin, they must take two different types of insulin by injection to mimic how insulin is usually made by the pancreas. This approach to insulin therapy is known as basal-bolus therapy and uses both a long-acting and a rapid-acting insulin.

1. **Long-acting insulin:** Works in the background to keep baseline blood glucose levels stable throughout the day. Even without eating, your body still needs small amounts of insulin.
2. **Rapid-acting insulin:** Is given before meals to manage the expected rise in blood glucose when you eat food in order to bring the blood glucose back to target range.

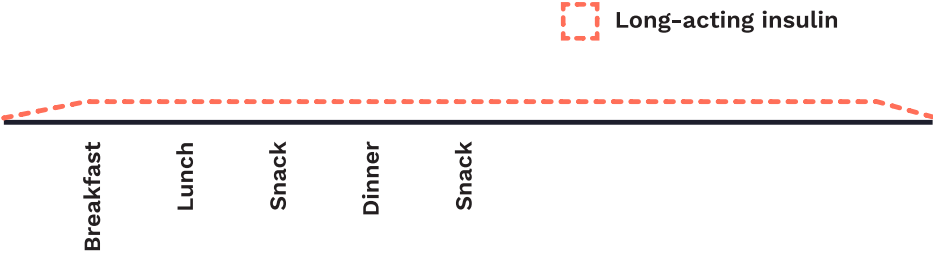
This basal-bolus insulin therapy approach aims to keep blood glucose levels in a healthy range as much as possible.

Other names for basal-bolus insulin therapy are:

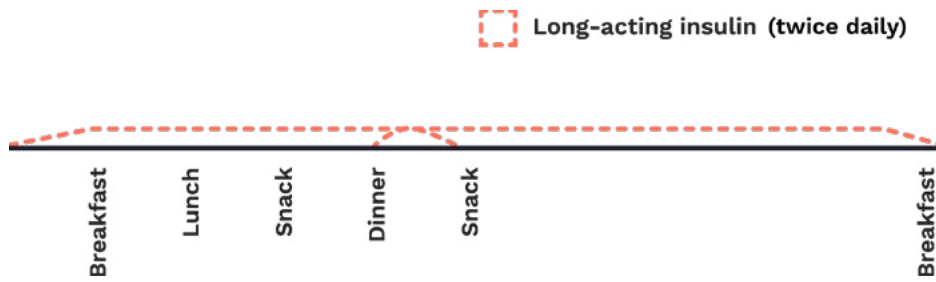
- Flexible Intensive Therapy
- Intensive Diabetes Management
- Multiple Daily Injections (MDI)

ABOUT LONG-ACTING INSULIN:

- Long-acting insulin is also known as basal insulin.
- A person with diabetes may need a dose of long-acting insulin 1-2 times daily.
- Long-acting insulin works in a steady way, throughout the day and night.
- Your dose of long-acting insulin will stay the same no matter what you eat.
- If you use long-acting insulin, you will also need rapid-acting insulin.



- People who take 1 dose of long-acting insulin daily often take it at dinnertime or bedtime.

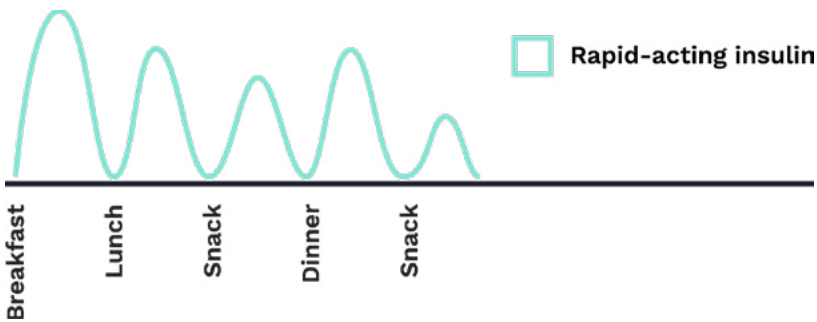


- People that take 2 doses of long-acting insulin daily often take it at breakfast and bedtime. Spreading the doses out means that the coverage will be steady, all day and night.

If you have questions about your basal insulin, ask your diabetes team.

ABOUT RAPID-ACTING INSULIN

- Rapid-acting insulin is also called bolus insulin.
- Rapid-acting insulin starts working in the body after 10-15 minutes. It is most effective after 60-90 minutes. It can last up to 4 hours.
- You will calculate your rapid-acting insulin dose to match the food you eat and lower blood glucose levels when they are above the target range.
- People often take rapid-acting insulin before mealtimes. You may also need rapid-acting insulin with snacks.



Notes:

Calculating your dose of bolus insulin:

Your dose of bolus insulin will depend on your food intake, and your blood glucose levels.

To calculate your bolus insulin dose:

Step 1: Calculate your correction bolus: the amount of rapid-acting insulin you need to bring above-target blood glucose levels back into target range.

Step 2: Calculate your food bolus: the amount of rapid-acting insulin you need for the food you will eat.

Step 3: Add your correction bolus and your food bolus, to get your rapid-acting insulin dose.

STEP 1: CALCULATE YOUR CORRECTION BOLUS

You will need:

- **Current BG (blood glucose) level**
- **Target BG (blood glucose) level:** You want your rapid-acting insulin dose to help you reach this level. Target BG may be different in the daytime and at bedtime.
- **ISF (Insulin Sensitivity Factor):** This is also called the Correction Factor. The ISF is how much your blood glucose level will come down with 1 unit of rapid-acting insulin. At first, your ISF value will be provided to you by your diabetes team. In time, you will learn how to adjust your ISF independently.

Use this formula to calculate your correction bolus:

$$\frac{\left(\begin{array}{cc} \text{Current BG} & \text{Target BG} \\ \boxed{10.9} & - \quad \boxed{6} \end{array} \right)}{\boxed{2}} = \boxed{2.45} \text{ Units}$$

ISF (Insulin Sensitivity Factor)

STEP 2: CALCULATE YOUR FOOD BOLUS

You will need:

- **The carb ratio:** The amount of carbohydrates covered by 1 unit of rapid-acting insulin. At first, your carb ratio will be provided to you by your diabetes team. Over time, you will learn how to adjust your carb ratio independently.
- **Carbs in meal:** The amount of carbohydrates in your meal.

To calculate your food bolus, divide the carbohydrates in your meal by the carbohydrate ratio.

Use this formula to calculate your food bolus:

$$\begin{array}{ccc} \text{Carbs in Meal} & & \text{Carbs in Meal} \\ \boxed{45} & & \boxed{45} \\ \hline & = & \boxed{3} \text{ Units} \\ \boxed{15} & & \boxed{18} \\ \text{Carb Ratio} & & \text{Carb Ratio} \end{array}$$

STEP 3: ADD YOUR CORRECTION BOLUS AND YOUR FOOD BOLUS.

The sum is your rapid-acting insulin dose.

$$\begin{array}{ccccc} \text{Correction Bolus} & & \text{Food Bolus} & & \text{Total Bolus} \\ \boxed{2.4} & + & \boxed{3} & = & \boxed{5.4} \rightarrow \boxed{5.5} \\ & & & & \text{Round to the nearest half unit} \end{array}$$

You can download the bolus calculation worksheet (on the following page) from the BC Children's Hospital website: <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/boluscalc.pdf>

Bolus calculation worksheet

STEP 1: INSULIN TO CORRECT HIGH BLOOD GLUCOSE (CORRECTION BOLUS)

$$\frac{\left(\begin{array}{c} \text{Current BG} \\ \square \\ \text{---} \\ \square \end{array} - \begin{array}{c} \text{Target BG} \\ \square \\ \text{---} \\ \square \end{array} \right)}{\begin{array}{c} \square \\ \text{---} \\ \square \\ \text{ISF (Insulin Sensitivity Factor)} \end{array}} = \square \text{ Units}$$

STEP 2: INSULIN FOR FOOD TO BE EATEN (FOOD BOLUS)

$$\frac{\begin{array}{c} \text{Carbs in Meal} \\ \square \\ \text{---} \\ \square \end{array}}{\begin{array}{c} \square \\ \text{---} \\ \square \\ \text{Carb Ratio} \end{array}} = \square \text{ Units}$$

STEP 3: ADD TOGETHER FOR TOTAL BOLUS DOSE

$$\begin{array}{c} \text{Correction Bolus} \\ \square \end{array} + \begin{array}{c} \text{Food Bolus} \\ \square \end{array} = \begin{array}{c} \text{Total Bolus} \\ \square \end{array}$$

Other bolus calculation resources

Along with your Bolus Calculator Worksheet, there are a few other resources that can help you complete a bolus calculation from the BCCH website or your smartphone.

Bolus Calculator Spreadsheet

- Located on the BCCH website: <http://www.bcchildrens.ca/health-info/coping-support/diabetes> (Click on the **Basal-bolus insulin with MDI** dropdown, then select the download link under **Bolus Calculators (Microsoft® Office Excel® spreadsheets)**)
- **You can enter your carb ratios, ISF, target blood sugars, and average food intake into the spreadsheet to create an individualized calculator sheet.**
- Calculated doses from spreadsheet include both the correction and the food bolus.
- There will be different sections for breakfast, lunch, dinner, and bedtime calculations. (This is helpful if you have different carb ratios throughout the day.)
- Due to the range of carbohydrates and blood glucose values, you may notice that the spreadsheet dose may be smaller than a calculation with the bolus calculator worksheet. **For example, if your carb ratio was 1:15, ISF 3, and target blood sugar of 6 in the daytime and 8 at bedtime this is what would be created:**

	Breakfast	Lunch	Dinner	Night		for carb ratios 4-60 grams, sensitivity factors 1-20 mmol/L																			
Carb Ratio	15	15	15	15	grams																				
Sensitivity Factor	3	3	3	3	mmol/L	Does not account for active insulin/insulin-on-board, nor for activity!																			
Target Glucose	6	6	6	8	mmol/L																				
Carb Range	0-112	0-112	0-112	0-112	grams																				
CARBS (grams) →						0-7	8-14	15-22	23-29	30-37	38-44	45-52	53-59	60-67	68-74	75-82	83-89	90-97	98-104	105-112					
B R G E L A U K C F O A S E T	0.0-8.3	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
	8.4-11.3	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
	11.4-14.3	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5
	14.4-17.3	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5
	17.4-20.3	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5
	20.4-23.3	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5
	23.4-26.3	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5
	26.4-29.3	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5
	29.4-32.3	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	15.5	16.0	16.5	17.0	17.5	18.0	18.5	19.0	19.5

***The spreadsheet does not account for active insulin or activity.**

- Before giving a dose from the spreadsheet, be mindful of what time your last dose of rapid-acting insulin was, or if you have been active.
- If you have had a recent dose of rapid-acting insulin or have been active, you will need to adjust the total amount of rapid-acting insulin being given for your meal.

Bolus Calculator for School Lunches

- Located on the BCCH website: <http://www.bcchildrens.ca/health-info/coping-support/diabetes> (Click on **Basal-Bolus insulin with MDI** and select the **Bolus Calculator for School Lunches** document.)
- Can enter your carb ratios, ISF, target blood sugars, and average food intake into the spreadsheet to create an individualized calculator sheet for lunch.
- The guidelines in red indicate when a parent would be called for blood sugars 20 mmol/L or above. It also indicates to treat a low blood glucose first, before giving insulin for lunch.

Lunch		for carb ratios 4–60 grams, sensitivity factors 1–20 mmol/L														
Carb Ratio	15	grams														
Sensitivity Factor	3	mmol/L	ALWAYS REFER TO CARE PLAN BEFORE GIVING INSULIN!													
Target Glucose	6	mmol/L	FOR BG ≥20 MMOL/L CALL PARENT!													
Carb Range	0–112	grams	TREAT IF LOW BEFORE GIVING INSULIN!													
Rapid Insulin	Humalog		Does not account for active insulin/insulin-on-board, nor for activity!													
CARBS (grams) →		0–7	8–14	15–22	23–29	30–37	38–44	45–52	53–59	60–67	68–74	75–82	83–89	90–97	98–104	105–112
G L U N C H S E	0.0–7.1	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
	7.2–8.6	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5
	8.7–10.1	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0
	10.2–11.6	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
	11.7–13.1	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0
	13.2–14.6	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5
	14.7–16.1	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0
	16.2–17.6	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5
	17.7–19.1	4.0	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0
	19.2–20.6	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5
	20.7–22.1	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0
	22.2–23.6	5.5	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5
	23.7–25.1	6.0	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0
	25.2–26.6	6.5	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5
26.7–28.1	7.0	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	
28.2–29.6	7.5	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	
29.7–31.1	8.0	8.5	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	13.0	13.5	14.0	14.5	15.0	

Note: in schools Educational Assistants would use a spreadsheet like this with lunch boluses noted to be able to safely administer a dose of rapid insulin for lunch.

Bolus Calc App

- Our clinic's Endocrinologist, Dr. Metzger, has created an app which functions as a virtual bolus calculator.
- This app is accessible on the BCCH website (<http://www.bcchildrens.ca/health-info/coping-support/diabetes/insulin-calculators-apps/simple-bolus-calculator>) as well as on Android and iPhone smartphones.
- For both the website and smartphone app, if you type in your carb ratio, ISF, Target BG, current BG, and carbs in your meal you can calculate your meal-time insulin dose. *(Please be aware that the app does not account for activity or a recent dose of rapid-acting insulin—you must adjust your dose in these situations.)*
- We find this calculator to be just as helpful as the Bolus Calculator Worksheet as it will note the specific correction bolus and food bolus doses for you.

WEB APP

BolusCalc:
Simple Bolus Calculator

mmol/L mg/dL

Carb Ratio: grams

Correction/ISF: mmol/L

Target BG: mmol/L

Current BG: mmol/L

Meal Carbs: grams

Insulin Dose: units

CALCULATE

CLEAR ALL

SMARTPHONE APP

Simple Insulin Bolus

B'FAST **LUNCH** **DINNER** **BED**

Name: <name>

Carb Ratio: 20 grams

Sensitivity Factor: 5 mmol/L

Target BG: 6 mmol/L

Current BG: 12.1 mmol/L

Meal Carbs: 36 grams

Insulin Dose: 3.0 units

[1.8 units for carbs + 1.2 units for correction = 3.0 total]

Does not account for active insulin/insulin-on-board, nor for activity!

Timestamp: 2023-01-26 @ 14:57 h

To send this information by text or email, click the "Share" icon.

CALCULATE **CLEAR MEAL**

RESET ALL FIELDS

BolusCalc

Note: when using the Smartphone app, you can enter your carb ratios and ISF for breakfast, lunch, dinner, and bedtime. This is helpful in case you have a different carb ratio or ISF at different mealtimes.

Insulin stacking

Sometimes you may want a second serving, a dessert, or a snack after a meal.

It is important to remember when taking rapid-acting bolus insulin that it will be active in your body for up to 3-4 hours.

If correction boluses are given too close to previous bolus insulin injections, the action of all the insulin injections add up and can cause a low blood glucose to occur later on.

This is called insulin stacking.

For example, your blood glucose before breakfast is 12.1 and you plan to eat 55 grams of carbohydrates. Your carb ratio and ISF are noted below:

	Breakfast	Lunch	Dinner	Night
Carb Ratio	15	15	15	15
ISF	3	3	3	3
Target Glucose	6	6	6	8

STEP 1: INSULIN TO CORRECT HIGH BLOOD GLUCOSE (CORRECTION BOLUS)

$$\left(\begin{array}{c} \text{Current BG} \\ \square \end{array} - \begin{array}{c} \text{Target BG} \\ \square \end{array} \right) \div \begin{array}{c} \text{ISF} \\ \square \\ \text{(Insulin Sensitivity Factor)} \end{array} = \begin{array}{c} \square \\ \text{Units} \end{array}$$

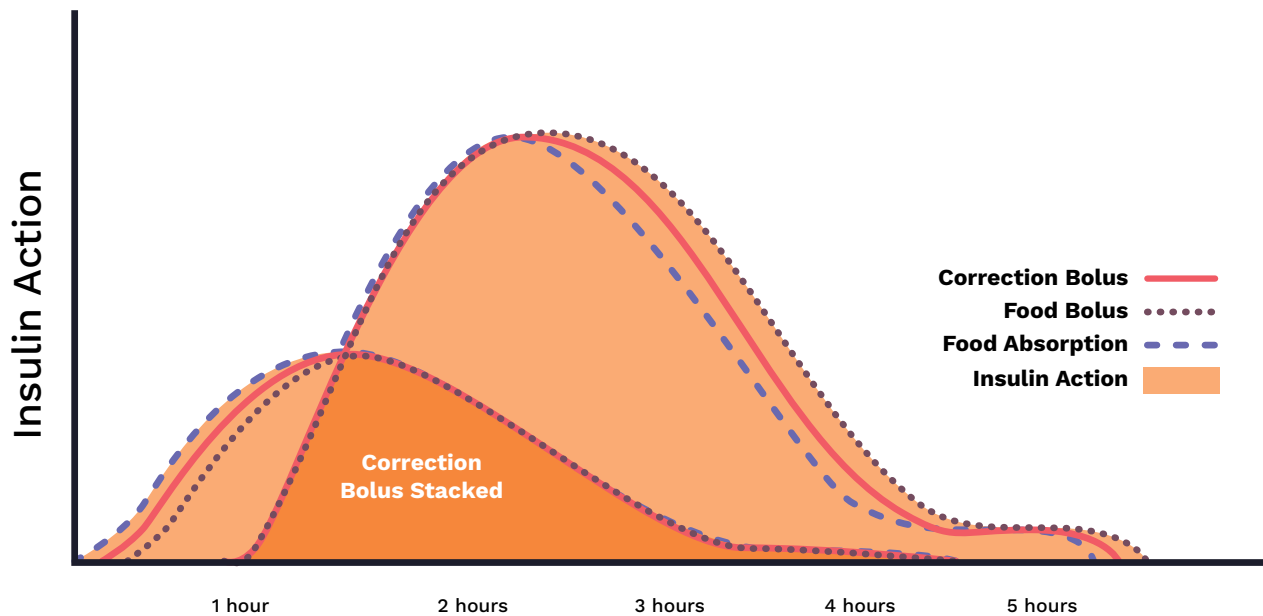
STEP 2: INSULIN FOR FOOD TO BE EATEN (FOOD BOLUS)

$$\begin{array}{c} \text{Carbs in Meal} \\ \square \end{array} \div \begin{array}{c} \text{Carb Ratio} \\ \square \end{array} = \begin{array}{c} \square \\ \text{Units} \end{array}$$

STEP 3: ADD TOGETHER FOR TOTAL BOLUS DOSE

$$\begin{array}{c} \text{Correction Bolus} \\ \square \end{array} + \begin{array}{c} \text{Food Bolus} \\ \square \end{array} = \begin{array}{c} \text{Total Bolus} \\ \square \end{array}$$

It's been one hour since breakfast, and you want to have a snack with 22 grams of carbohydrates. Your blood glucose is now 15.3. What might happen if you give your food bolus for the carbohydrates in your snack plus another correction bolus?



Breakfast:

BG = 12.1
 Total carbs = 55 grams
 Correction bolus = 2 units
 Food bolus = 3.5 units

Morning snack: (1 hour after breakfast)

BG = 15.3
 Total carbs = 22 grams
 Correction bolus = 3 units
 Food bolus = 1.5 units

Lunch:

BG = 3.5

- As we can see, the insulin from the insulin actions of both corrections have been added together.
- This happens because the first correction was still working when the second correction was given.
- This action is known as insulin stacking. The insulin from the second correction bolus acts in addition to the previous correction bolus which likely will result in a low blood sugar.

*Please note insulin stacking only occurs with correction boluses and does not apply to food boluses.

How can you prevent insulin stacking?

Bolus calculation worksheet

STEP 1: INSULIN TO CORRECT HIGH BLOOD GLUCOSE (CORRECTION BOLUS)

$$\frac{\left(\begin{array}{c} \text{Current BG} \\ \square \end{array} - \begin{array}{c} \text{Target BG} \\ \square \end{array} \right)}{\begin{array}{c} \square \\ \text{ISF (Insulin Sensitivity Factor)} \end{array}} = \square \text{ Units}$$

STEP 2: INSULIN FOR FOOD TO BE EATEN (FOOD BOLUS)

$$\frac{\begin{array}{c} \text{Carbs in Meal} \\ \square \end{array}}{\begin{array}{c} \square \\ \text{Carb Ratio} \end{array}} = \square \text{ Units}$$

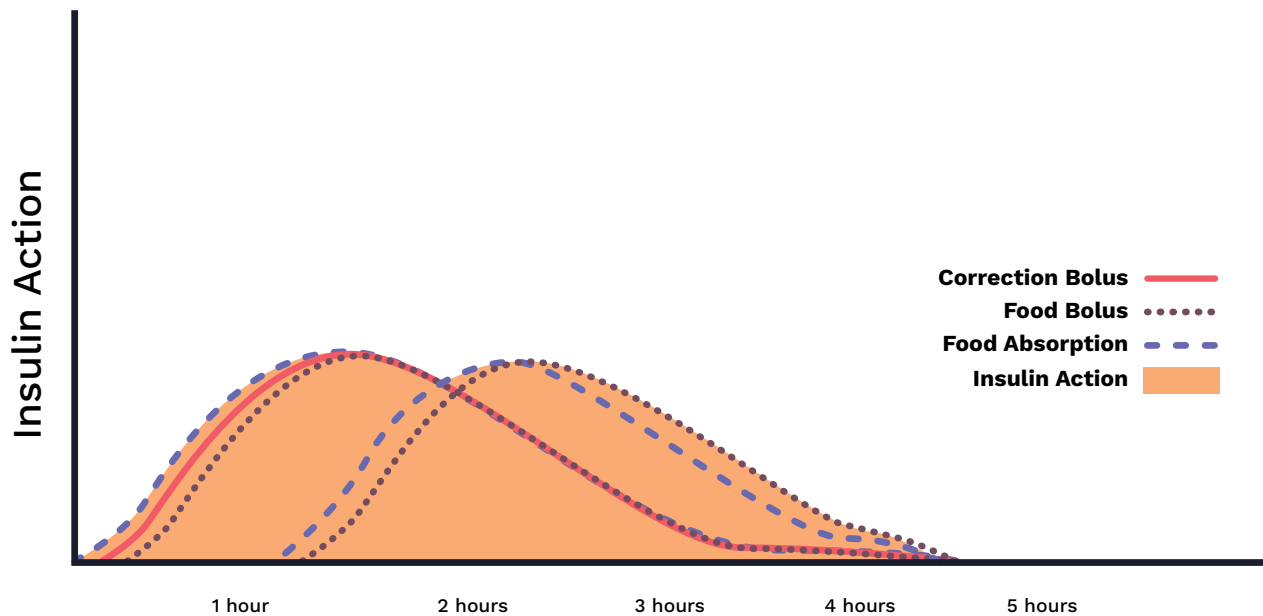
STEP 3: ADD TOGETHER FOR TOTAL BOLUS DOSE

Correction Bolus	+	Food Bolus	=	Total Bolus
□		□		□

Give corrections 3 hours apart from any rapid-acting insulin dose.

If giving insulin for snacks, only calculate the food bolus.

Following these recommendations, let's see what would happen if this person received just a food bolus for the previous example.



Breakfast at 8am:

BG = 12.1
 Total carbs = 55 grams
 Correction bolus = 2 units
 Food bolus = 3.5 units

Morning snack at 9am:

BG = 15.3
 Total carbs = 22 grams
 Food bolus = 1.5 units

Lunch at 12pm:

BG= 8.4
 Total carbs = 45 grams
 Correction bolus = 1 unit
 Food bolus = 3 units

As we can see, the person only had a food bolus for the snack, and they did not have a low blood sugar at lunch.

Timing of food intake and insulin action

It is still important to think about the timing of when snacks are eaten and when you will be eating your next meal.

For example, if you have a snack 30 minutes before your blood sugar test at lunch, your blood sugar naturally will rise due to the absorption of the food (and you also may not be hungry enough for lunch).

Speak with your team to discuss the timing of meals and snacks.

Insulin for snacks

If your health care team has noted that you require rapid-acting insulin for your snacks, please be mindful of the following:

- If the next meal or snack is less than 3 hours from your last snack, check blood sugars as usual but only take insulin for the food portion (food bolus).

Notes:

PHYSICAL ACTIVITY

Physical activity and blood glucose

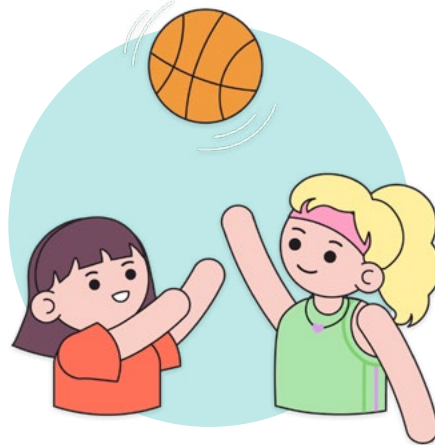
Staying active every day is important! Whatever activity works for you, make it fun!

Being active helps:

- build strong bones and muscles
- reduce stress
- improve mood

Sports are a good way to:

- learn team skills
- make friends
- build confidence



Visit live5210.ca/resources to find out more about creating healthy environments where kids can eat well and be active where they live, learn and play.

How does physical activity affect blood glucose?

- Most physical activity lowers blood glucose.
- Glucose is used by your body for energy when you're active.
- If you plan to be more active than usual, eat extra carbohydrate before you start.
- Always keep fast-acting carbohydrate and a snack with you. You will need them if your blood glucose gets low. Glucose tablets and fruit juice are both fast acting.

Types of activity & competitive sports

Aerobic (or “cardio”) activities get you “huffing and puffing” and keep your heart pumping fast. This includes activities like running, playing soccer and riding a bike.

- These activities can lower your blood glucose soon after you start the activity.



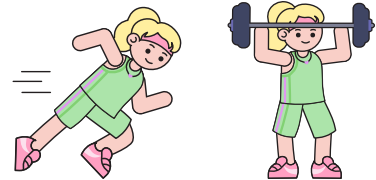
Anaerobic activities have bursts of activity that are followed by periods of rest, like weightlifting, sprinting or jump rope.

- These types of activities can initially increase your blood glucose level, however, can lower the glucose level even hours after the activity.

A mixture of all types of activities are a part of a healthy lifestyle.

If you play competitive sports, your blood glucose may be lower during practices, but higher during games or competition.

- This is because when you feel extreme emotions, like excitement during a competition, your body releases a hormone called adrenaline which can raise your blood glucose levels.



How to prepare for physical activity:

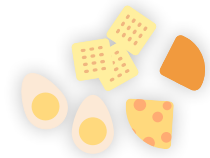
To lower your risk of hypoglycemia, there needs to be enough glucose in the blood to provide extra energy for the duration of the activity.

- Eat an “activity snack” before being active. An activity snack is a snack that you do not take insulin for and should contain long lasting carbohydrates.
- When choosing an activity snack, starchy foods like granola bars or crackers will last longer than fruit or juice.
- Most people need to eat about 10-15 grams of extra carbohydrate for every hour of extra activity with no insulin. This could vary depending on the age of the person and how hard they are working during the activity.
- Have a fast-acting sugar and snack with you. Physical activity can cause low blood glucose to happen quickly.
- If you are going to be active after dinner or have been active all day, have a bigger snack at bedtime to prevent low blood glucose overnight. Physical activity can cause low blood glucose many hours after the activity is completed. Your bedtime snack should include some fat, protein, and carbohydrates.



Should my insulin be changed for physical activity?

- You may need **less insulin** when extra activity is planned. This is common for activities that last a long time.
- Talk to your doctor or diabetes educator about how to change your insulin. With practice, you will learn to change it on your own.



TIPS

- Check your blood sugar before, during, and after being active. This will help you learn how much extra food you need for each activity.
- Different activities may affect blood sugars in unique ways. Make note of your activities on your blood sugar log to keep an eye out for patterns.
- Do not give insulin near muscles that will be active. For example, do not give insulin in the arms before swimming—use the tummy area.
- Wear a medical ID.



Are there times I should not be active?

You should not be active if:

- Your blood sugar is higher than 15mmol/L and you have ketones, or;
- You are sick.

Exercise during these times can increase the production of ketones.

FOR MORE INFORMATION ABOUT PHYSICAL ACTIVITY AND DIABETES, READ:

Adjusting Guidelines for Activity: <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/activity.pdf>

Notes:

HIGH BLOOD GLUCOSE & KETONES

High blood glucose—causes and symptoms

Some high blood sugars can be expected in type 1 diabetes, even with the best care. Another word for high blood glucose is hyperglycemia.

High blood glucose can be caused by:

- Not enough insulin
- Having more food than expected
- Less activity than usual
- Growth, illness, infection, stress, hormone changes

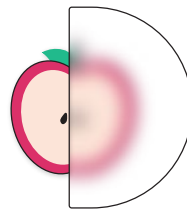
Signs of high blood glucose include:



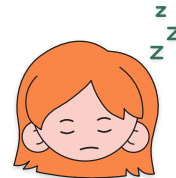
Thirst and drinking lots



Peeing lots



Blurry vision



Feeling tired

What should I do if my blood glucose is high?

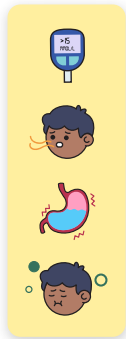
- If you have any signs or symptoms of high blood glucose, the first step is to check your blood glucose.
- If the blood glucose is 15 mmol/L or higher and it has been over 3 hours since the last meal or snack, you can give a correction dose of insulin. If it has not been 3 hours since the last meal or snack, continue to monitor the blood glucose levels.
- Check for ketones if the blood glucose reading is 15 mmol/L or higher for two checks in a row, at least 3 hours apart, OR if the blood glucose is 20 mmol/L or higher for one check.
- If your child has high blood sugar and ketones, extra rapid-acting insulin is needed. Please contact your diabetes team for support.
- If the blood glucose is 15 mmol/L or higher and your child feels well and there are no ketones, you don't need to do anything right away.
 - » Keep watching the blood glucose to make sure the level is coming down.
 - » If there is a pattern of high blood sugar, it likely means that your child needs more insulin. A pattern of high blood sugar is when the blood sugar is high at the same time of day for at least 2-3 days in a row. Contact your diabetes team for further assistance.

What are ketones?

- In type 1 diabetes, **ketones can be a sign that extra rapid-acting insulin is needed right away.** Ketones are strong acids that the body makes when there is a severe lack of insulin.
- You can check for ketones in the urine or blood.
- Ketones can be treated at home with extra rapid-acting insulin, but if ketones are not treated and build up in the body, **a serious medical problem can occur called Diabetic Ketoacidosis (also known as DKA).**
- Contact your doctor or diabetes team immediately if your child has high blood sugar and ketones. You may also refer to BCCH Sick Day Management guidelines for instructions on calculating insulin dose if you feel comfortable using this formula. <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/sickdaysmdi.pdf>

Diabetic Ketoacidosis (DKA)

What are the warning signs of DKA?



- High blood sugar and high ketones in the urine or blood
- Feeling very tired and other signs of high blood sugar
- Dry mouth
- Flushed face (reddish colour)
- Breath that smells fruity or like nail polish remover
- Stomach pain
- Vomiting
- Shortness of breath
- Difficulty breathing

DKA is a medical emergency! It must be treated in a hospital.

What causes DKA and how can it be prevented?

- DKA is caused by a severe shortage of insulin. This can happen when type 1 diabetes is first diagnosed and has not yet been treated. People with type 1 diabetes need to take insulin every day.
- DKA can also happen if insulin is not given or if sick days are not managed well.
- DKA is a serious medical emergency, but it can be prevented.

THERE ARE MANY THINGS YOU CAN DO TO PREVENT DKA:

- Do not miss any insulin.
- Keep up with changing insulin needs as your child grows. Your child will need more insulin when going through growth spurts.
- Check for ketones when blood glucose levels are 15 mmol/l or higher two checks in a row at least 3 hours apart, or 20 mmol/L or higher for one check, and during illness. High blood glucose levels with ketones is a warning sign that extra insulin is needed. Giving fast-acting insulin quickly can help clear ketones and prevent DKA.
- Learn what to do when your child is ill. Illness can cause high blood glucose and ketones. Your diabetes educator can teach you about the 5-10-15-20 rule for giving extra insulin during illness. <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/sickdaysmdi.pdf>

Call your diabetes emergency contact number if you do not know what to do.

TIPS

BLOOD GLUCOSE:

- When you are new to diabetes, your diabetes team will help you with insulin doses. It will take a while to bring your child's blood glucose levels into the goal range.
- Later, you can learn to adjust insulin doses. This will help keep blood glucose levels in a healthy range most of the time. To learn more about adjusting insulin see: <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/insadjgl.pdf>

KETONES:

- Learn how to check for ketones. Your nurse, doctor or pharmacist can show you how.
- Don't exercise when you have ketones. Exercise can make ketones worse.
- Ketones are not caused by eating too much. Eating more food than usual can cause high blood glucose but this will not cause ketones. Lack of insulin causes ketones in type 1 diabetes.



Notes:

SICK DAYS

Sick days and type 1 diabetes



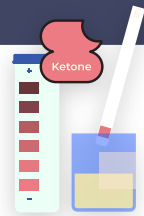
- Children with diabetes do not get sick more often than other children.
- When they do get sick, it can affect blood glucose levels and a few extra steps are needed to safely manage your diabetes.
 - » Blood glucose levels can be **high** during illness, even if a child is not eating.
 - » Blood glucose levels can be **low** if there is vomiting or diarrhea.

There are three key points to remember during illness:

1. monitoring blood glucose levels
2. managing ketones
3. getting enough fluids

What do I need to do when my child is sick?

- **Check blood glucose levels and ketones every 2-3 hours.** This will help warn you early of possible problems.
 - » Check more often if your child is vomiting, as this could be a sign of ketones.
 - » Make sure ketone testing strips are not expired. Throw away strips 6 months after you open them.
- **Give extra rapid-acting insulin every 3 hours as needed if blood glucose is higher than 15 mmol/L AND you have ketones.** Use the “5-10-15-20 rule” (see chart later) to prevent diabetes ketoacidosis, or DKA, which is a medical emergency.
- **Never skip an insulin dose.** Give some rapid-acting insulin to match the carbohydrates you are eating or drinking. Even if you are not eating, you always need to take your basal insulin.
 - » If you don’t know how much insulin to give, call the doctor-on-call before giving the next dose.
- **Eat or drink carbohydrates to maintain blood glucose levels.** If the blood glucose is low, give fast-acting sugar right away. Maple syrup or sips of juice or ginger ale may be more easily tolerated.





- **Drink lots of fluids to prevent dehydration.** This helps prevent dehydration. Use the following table for suggested amounts of fluids for every hour. It is better to offer small amounts of fluid more often than to give a large amount at one time.

- » If blood glucose is above 10 mmol/L, give sugar-free fluids.
- » If blood glucose is under 10 mmol/L and your child isn't eating, give sweetened fluids.

Weight of Child	Suggested Fluid Amounts
under 10 kg (22 lb)	30–45 mL (1–1.5 oz) per hour
10–20 kg (22–44 lb)	45–60 mL (1.5–2 oz) per hour
20–50 kg (44–110 lb)	60–90 mL (2–3 oz) per hour
50–90 kg (110–198 lb)	90–120 mL (3–4 oz) per hour

- **Make sure your child gets plenty of rest.** Do not exercise during illness or if ketones are present. Exercise will raise glucose levels and cause the body to make more ketones.
- **Treat the illness.** The illness may not be related to diabetes. You may need to see your family doctor for a diagnosis and treatment.

What can my child eat?

- **Make sure your child eats some carbohydrates.** Your child may either eat or drink carbohydrates to maintain glucose levels. Give rapid-acting insulin to match the carbohydrates that your child eats or drinks. If your child has trouble eating, you may need to make substitutions.

Carbohydrate-Containing Foods	
liquids	juice, soft drinks, milk, popsicles, freezies, Jell-O
semi-solid foods	yogurt, ice cream, pudding, milkshakes, chicken noodle soup
solid food	bread, crackers, rice, noodles, roti

- **If the blood sugar is low, you must give fast acting sugar right away.** Try sips of juice or regular ginger ale. Or try some maple syrup.
 - » Under 5 years – 5 grams of fast acting sugar
 - » 5-10 years – 10 grams of fast acting sugar
 - » 10+ years – 15 grams of fast acting sugar

Insulin dose adjustments for managing ketones

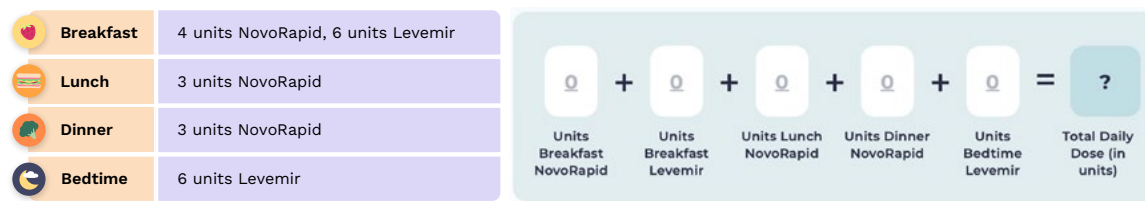
Blood Glucose	Insulin Dose Adjustment
less than 4 mmol/L	Do not give extra insulin (even if ketones are present). You may need to decrease the pre-meal insulin and call the doctor-on-call if vomiting. Consider mini-dose glucagon : see our handout Mini-Dose Glucagon for Preventing Serious Hypoglycemia if not tolerating foods or fluids (http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/minigluc.pdf)
4 to 15 mmol/L	Take the usual insulin dose. No changes needed
15 mmol/L or more*	Check for ketones. Take an extra 5-20% of the total daily dose (TDD) of rapid-acting insulin (see table below) if ketones are present, otherwise usual dose.

***Make sure to check for ketones if the blood glucose reading is higher than 15 mmol/L for two checks in a row measured 3 hours apart.**

- Your child may need a **stronger dose of insulin** during illness.
- Ketones can be a sign that insulin is needed right away!**
- Give a stronger dose of insulin **every 3 hours** as needed when:
 - » the blood sugar is higher than 15 mmol/L, and
 - » ketones are present in urine or blood (using a blood ketone meter).
- The insulin given when ketones are present is always rapid-acting insulin.** The amount is a percentage of the total daily dose (TDD). The TDD of insulin is the total number of units of all the insulin your child takes in a day. Use your usual mealtime insulin dose at each meal to calculate the TDD.

Step 1: Calculate your total daily dose

Take a look at the chart to see what your typical doses of insulin are during the day. Based on the chart, what would be the total daily dose?



Step 2: Use the 5-10-15-20 rule to decide what percentage of insulin to give



5-10-15-20 rules of high blood glucose

If the ketones are:		Give this much rapid-acting insulin:		
Urine Ketones	Blood Ketones	BG 10.1 - 14.9	BG 15.1 - 20	BG OVER 20
negative (-)	less than 0.6 mmol/L	no extra insulin	give 5% of TDD	give 10% of TDD
trace (+)	0.6 - 0.9 mmol/L	give 5% of TDD	give 5% of TDD	give 10% of TDD
small (+)	1.0 - 1.4 mmol/L	give 5% of TDD	give 10% of TDD	give 15% of TDD
moderate (++)	1.5 - 2.9 mmol/L	give 10% of TDD	give 15% of TDD	give 20% of TDD
large (+++/++++)	3.0 mmol/L or more	give 15% of TDD	give 20% of TDD	give 20% of TDD

Step 3: Calculate your illness bolus dose using the percentage of your total daily dose

OPTION 1: CALCULATE USING TABLE



Calculation for illness dose using 5-10-15-20 rule

Total Daily Dose (TDD)	5% of TDD	10% of TDD	15% of TDD	20% of TDD
less than 4 units	-	-	0.5 unit	0.5 unit
4-6 units	-	1/2 unit	1 unit	1 unit
5-15 units	0.5 units	1 unit	1.5 units	2 units
16-25 units	1 units	2 units	3 units	4 units
26-35 units	1.5 units	3 units	4.5 units	6 units
36-45 units	2 units	4 units	6 units	8 units
46-55 units	2.5 units	5 units	7.5 units	10 units
56-65 units	3 units	6 units	9 units	12 units
66-75 units	3.5 units	7 units	10.5 units	14 units
76-85 units	4 units	8 units	12 units	16 units
86-95 units	4.5 units	9 units	13.5 units	18 units
96-105 units	5 units	10 units	15 units	20 units

OPTION 2: CALCULATE BY HAND

$$\begin{array}{ccccc} \% & & \text{Total daily dose} & & \text{Calculated illness dose} \\ \square & \times & \square & = & \square \\ \text{Food dose} & & \text{Calculated illness dose} & & \text{Total dose} \\ \square & + & \square & = & \square \end{array}$$

Step 4: Check BG 3 hours after first calculated illness dose of rapid-acting insulin

- If BG remains over 10 mmol/L and ketones are present, then give a second calculated illness dose.
- Remember to give the illness doses at least 3 hours apart to prevent insulin stacking.

Medications:

Please see BCCH's Medications for Children with Diabetes handout: <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/diabmeds.pdf>

Signs and symptoms of DKA:

- High blood sugar and high ketones in the urine or blood
- Feeling very tired and other signs of high blood sugar
- Dry mouth
- Flushed face (reddish colour)
- Breath that smells fruity or like nail polish remover
- Stomach pain
- Vomiting
- Shortness of breath
- Difficulty breathing

Call the Diabetes Doctor-on-call in these situations:

- You cannot get blood glucose or ketones down with 1–2 doses of extra insulin.
- You need advice on how much insulin to give when your child is vomiting and cannot keep down fluids.
- You have treated a severe low blood glucose.

Go to the hospital in these situations:

- You have used mini-dose glucagon and cannot keep the blood glucose above 4 mmol/L.
- Your child shows signs of dehydration OR becomes drowsy or confused.
- Your child has signs of DKA.

Numbers to call

Diabetes Clinic Phone (non-urgent): 604-875-2868 or toll-free 1-888-300-3088, x2868, Monday to Friday 8:00 AM to 3:00 PM. If you need to leave a message, please state that your child is sick.

Diabetes Clinic Fax: 604-875-3231.

24-hour Emergency Paging: 604-875-2161, evenings and weekends. Ask the operator for the doctor-on-call for pediatric diabetes.

Source: Laffel M, et al. ISPAD Clinical Practice Consensus Guidelines 2018: Sick day management in children and adolescents with diabetes. *Pediatric Diabetes* 2018;19 (Suppl. 27):193-204.

Mini-dose glucagon for preventing serious hypoglycemia

- Caring for a child with diabetes can be very challenging for parents, especially during periods of illness.
- Mini-dose glucagon is glucagon used in small doses during times of illness when your blood glucose level is low, and you are unable to eat or drink enough to bring it up into range. This can occur with stomach illnesses, vomiting and diarrhea.
- Mini-doses of glucagon using an insulin syringe can raise the blood glucose levels approximately 3–5 mmol/L within the first 30 minutes, and the effect lasts approximately one hour.
- Glucagon used in these smaller doses does not increase the nausea or vomiting that is commonly associated with the larger dose.

***It is important to note that while this option works well during stomach illnesses, it is NOT effective for a severe low, which requires the full dose of glucagon.**

See also our handout Glucagon for Severe Hypoglycemic Reactions: <http://www.bcchildrens.ca/endocrinology-diabetes-site/documents/glucagon.pdf>

You will need:

- glucagon for injection
- a regular 30-, 50- or 100-unit insulin syringe
- blood glucose meter and strips

How to administer:



1. Remove the cap from the vial of dry powdered glucagon.



2. Remove needle protector and inject the liquid from the syringe into the dry powder vial. Remove the syringe from the vial.



3. Swirl the vial gently to dissolve the powder. **Do not shake.**



4. **Use the glucagon solution as soon as it is mixed.** Insert the same syringe back into the glucagon vial. Turn the vial upside down and draw the fluid back into the syringe.

Age	Usual dose
2 years and under	2 units
3–15 years	1 unit per year of age
15+ years	15 units

5. Inject the mini-dose glucagon like you would inject insulin.
6. Check the blood glucose every 30 minutes. If after 30 minutes the blood glucose is under 4.5 mmol/L, give a double dose of mini dose of glucagon.

Age	Double dose
2 years and under	4 units
3–15 years	2 unit per year of age
15+ years	30 units

7. The effective dose may be repeated every 30–60 minutes as needed to keep blood glucose levels above 4.5 mmol/L.

- Give the standard full dose of glucagon if your child has any of the following:
 - » seizure
 - » loss of consciousness
- Page the diabetes doctor on call if you are unable to maintain the blood glucose above 4.5 mmol/L with foods and liquids, or after giving the second dose of mini-dose glucagon.
- Once mixed, glucagon can be kept in the fridge for up to 24 hours.
- Remember to replenish the glucagon as soon as possible! Many pharmacies do not keep glucagon in stock. It may take up to a week to order, so let your pharmacist know when your supply is nearly out.

Quick reference guide for sick days

Sick days with LOW blood glucose

1. If your child is vomiting or has diarrhea, check blood glucose every 2-3 hours.

- There may be a higher chance of low blood glucose if vomiting or diarrhea are present.



Sick days with HIGH blood glucose

1. Check blood glucose and ketones every 2-3 hours.

- This will help warn you early of possible problems. Check more often if your child is vomiting.



2. If blood glucose is low and your child is vomiting, consider mini-dose glucagon. This can be used if someone is not able to have any juice or fast-acting sugar by mouth.



2. If ketones are present, you will require a dose of rapid acting insulin.

- This dose will be determined by the 5-10-15-20 rule. When calling the doctor on-call they will discuss this rule.



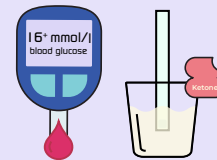
3. Call the doctor-on call if your child is vomiting and you need advice on insulin doses.

- The dose of long-lasting and rapid-acting insulin doses may need to be decreased during a time of illness.
- **NOTE:** you should never stop giving long-lasting insulin as this can lead to DKA.



3. Call the doctor-on-call if your child has high blood glucose and ketones.

- Having ketones notes a severe shortage of insulin.



Notes:

OTHER

Going to school with type 1 diabetes



- Children with diabetes can take part in all classes and school programs.
- Some children with diabetes, like younger ones, need help with diabetes care at school. Tell school staff about your child's diabetes. They may have questions and ideas about how they can help.
- Your diabetes nurse can send a referral to Nursing Support Services. Once the referral has been approved, a Nursing Support Service coordinator will contact you.
- A Nursing Support Service coordinator can help teach school staff about diabetes.
- Nursing Support Services also has a provincially mandated diabetes care plan for children in BC. You will work with your NSS coordinator to individualize certain parameters in the care plan to keep your child safe at school. However, it is important to remember that care at home may be different than care at school.
- Regardless of whether your child is on the NSS program, all children with diabetes in BC schools must also have the 3-page provincial support plan completed annually and given to their school: https://www2.gov.bc.ca/assets/gov/education/administration/kindergarten-to-grade-12/healthyschools/diabetes/diabetes_support_plan.pdf
- We encourage you to review the Diabetes at School website. To note: there are resources which are bilingual which can be printed for schools or daycares. There are also valuable videos to watch. <https://www.diabetesatschool.ca>

Here are some things to do before your child goes back to school.

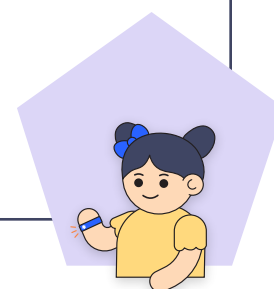
Meet with the principal and your child's teacher:

- Give the school a copy of the Guidelines for the Care of Students Living with Diabetes at School: [https://www.diabetes.ca/DiabetesCanadaWebsite/media/Learn-About-Diabetes/Your%20Rights/Diabetes_Canada_KWDIS_Guidelines-\(ENG\).pdf](https://www.diabetes.ca/DiabetesCanadaWebsite/media/Learn-About-Diabetes/Your%20Rights/Diabetes_Canada_KWDIS_Guidelines-(ENG).pdf)
- Ask if the school has an Education Assistant or someone who can help young children check their blood glucose.
- Ask how the school can help your child check their blood glucose, treat low blood glucose, and make sure lunch and snacks are eaten.
- Find out the times of meals and snacks at school. Some schools have early or reverse lunches.
- Ask the teacher to tell you in advance about any planned events such as field trips, hot lunch days, sports day, and birthday parties.
- If your child changes schools, meet with the new teacher. Also make sure the care plan goes to the new school.



Teach staff about low blood glucose:

- Meet with your child's teachers and other staff such as gym teachers, school monitors, playground supervisors and bus drivers.
- Explain what happens when your child's blood glucose is low and how to treat it. Give them short, written instructions.
- Explain that your child needs to eat all meals and snacks on time. Late or missed food can cause low blood glucose. Your child may need to eat on field trips, on the bus, or during some school events.
- Explain that a low blood glucose must be treated right away so it does not become an emergency! Young children and some older kids need help to treat low blood glucose.
- Keep glucose tablets or juice, and extra snacks, in the classroom, gym, and the office. Older kids need to keep supplies with them, rather than in their lockers.
- Tell the teacher that an adult must stay with your child until all signs of low blood glucose have gone away. Your child can get back to school activities when feeling better.
- Make sure your child wears medical ID at school.





Talk about high blood glucose too:

- Explain that if the blood glucose is high, your child may feel tired and thirsty, and may need to go to the bathroom more often.

For teens:

- Parents and teens can go to the school together to teach staff about diabetes.
- Tell your teachers and principal about your diabetes. Let them know about things you need to do at school such as checking blood glucose, eating snacks, and using insulin pens or a pump. Tell them about low blood glucose, where you keep your treatment supplies and how they can help if needed.
- Give them an information sheet that states what you need to do at school each day, and what they can do to help.
- Find out if there is a trained adult in the school who can help in an emergency.
- It helps if your close friends know you have diabetes and understand your diabetes routine. They can offer support, get food, or help if needed.

Provide contact information:

- Give emergency contact numbers to the teacher. Include home and work numbers, cell or pager numbers, and how you can be reached during the day. Tell the teacher when you want to be called for high or low blood sugar readings.

More information:

- **Diabetes@School:** <https://www.diabetesatschool.ca>
- **Canadian Diabetes Association: Guidelines for the Care of Students Living with Diabetes at School:** https://www.diabetes.ca/DiabetesCanadaWebsite/media/Managing-My-Diabetes/Tools%20and%20Resources/Diabetes_Canada_KWDIS_Guidelines.pdf?ext=.pdf
- **BC Provincial Diabetes in School Website:** <https://www2.gov.bc.ca/gov/content/education-training/k-12/administration/program-management/safe-caring-and-orderly-schools/diabetes>
- **BC Nursing Support Services:** <http://www.bcchildrens.ca/our-services/sunny-hill-health-centre/our-services/nursing-support>
- **Juvenile Diabetes Research Foundation (JDRF):** <https://www.jdrf.ca>

Diabetes review

Circle the answers to these questions to check what you know about diabetes. The correct answers are listed at the end.

1) Does insulin make blood glucose go up or down?

Up

Down

2) Can insulin pills be used to treat diabetes?

Yes

No

3) What is another word for blood glucose? Circle one answer.

sucrose

sugar

ketones

4) Circle the foods that are ok to eat if you have diabetes.



5) What is another word for **low** blood glucose?

carbohydrate

hyperglycemia

hypoglycemia

6) Circle all the blood glucose levels that are too low and need to be treated with fast-acting sugar.

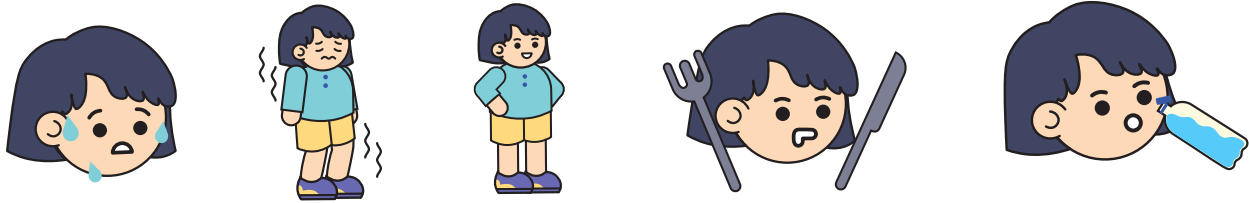
3.0

3.9

4.1

5.6

7) Circle the pictures showing signs of low blood glucose.



8) Circle at least one thing that you can carry with you at all times to treat a low blood glucose.



9) Circle one thing that is important to wear when you have diabetes:



10) Before Tina knew she had diabetes, she was very thirsty and peeing a lot. She also felt tired all the time. Everything got better when she started taking insulin. Why?

Circle one right answer:

- » Insulin helps the body use food for energy.
- » Insulin stops people from peeing.
- » Insulin causes high blood glucose.

11) Sandy always uses her arms for her insulin. What problem can this cause?

Circle the right answer:

Bruising A hard lump No problem

12) Mary's blood glucose has been low before lunch for the past 2 days. Circle all the things that can be causing the low blood glucose.

- » She didn't finish her recess snack.
- » She ran around more than usual at recess.
- » She needs more insulin in the morning.
- » She ate an extra snack on the way to school.

13) Circle all the things that are not fast-acting sugars.



14) John's blood glucose level is 3.2 mmol/L after school today. He is very hungry and wants to eat his snack now. Is this OK?

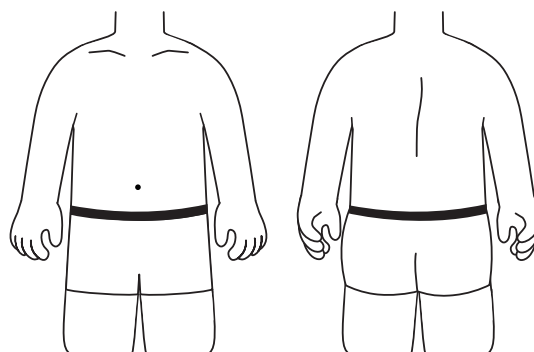
Yes

No

15) Robbie is going to play hockey for the first time since finding out he has diabetes. What should he do? Circle all the right answers.

- » Check his blood glucose before hockey.
- » Eat an extra snack with 15 grams of carbohydrate before hockey.
- » Check his blood glucose levels as usual and eat normal meals and snacks.
- » Check his blood glucose after hockey and again that night.

16) Circle the best area to give insulin if you plan to go for a swim after breakfast.



17) Circle all the foods that do not raise the blood glucose much.



18) Joe wakes up at 3 o'clock in the morning. His blood glucose is low. He treats it right away with fast acting sugar. 15 minutes later his blood glucose is ok. Before he goes back to bed he needs to eat a snack. Circle the snack that would be the best choice.



19) Circle 3 signs of high blood glucose.

feeling thirsty

peeing lots

feeling tired

gaining weight

20) Jack's blood glucose is high and he has ketones. What does he need? Circle one right answer.

insulin

food

juice

21) When should you check for ketones? Circle all the right answers.

- » On sick days.
- » If the blood sugar is 15 or more at both breakfast and lunch.
- » If you ever forget to give your insulin.
- » After physical activity.

22) Janice is sick with the flu. Her blood glucose is 16.9 and she does not feel like eating breakfast. Should she take her morning insulin?

Yes

No

23) Circle 3 things that affect blood glucose.

insulin food toothpaste physical activity

24) Last week, Luke and his family found out he has diabetes. He is in grade 2 and ready to go back to school. Circle all the things his mom or dad should do to make sure he is safe at school.

- » Tell his teachers and other school staff that Luke has diabetes.
- » Supply the school with fast acting sugar and snacks.
- » Explain that Luke needs to have all his snacks and meals on time.
- » Meet with his teacher every day.

BONUS QUESTION:

Blood glucose meters are so cool. They keep all the readings in the memory, so you don't need to write them down in a logbook.

True False

Quiz Answers

- 1) Insulin makes the blood glucose go **down**. It lets your body use the sugar from your food for energy.
- 2) **No**. Insulin pills cannot be used to treat diabetes. Some people with type 2 diabetes take pills for diabetes. These pills are not insulin.
- 3) Another word for glucose is **sugar**.
- 4) All of these foods are OK to eat if you have diabetes.
- 5) Another word for low blood glucose is **hypoglycemia**.
- 6) A blood glucose level lower than 4.0 needs to be treated with fast-acting sugar. 3.0 and 3.9 are too low.
- 7) Sweating, shaking, feeling dizzy or weak are signs of low blood glucose.
- 8) Glucose tablets, juice or pop can all be used to treat low blood glucose. Glucose tablets and juice are smaller and easier to carry with you. A chocolate bar or cookies are not fast acting and cannot be used to treat low blood sugar.
- 9) It is important to wear medical I.D. when you have diabetes.
- 10) Insulin helps the body use food for energy. Before Tina started taking insulin, her body was not able to use food for energy.
- 11) Using the same spot too often for insulin can cause a **hard lump** under the skin. The insulin is not able to work as well if there are lumps.
- 12) If Mary did not finish her recess snack, or ran around more than usual at recess, she could have a low blood glucose before lunch.
- 13) Cookies, nuts, ice cream and chocolate are not fast-acting.
- 14) **No**, it is not OK for John to eat his snack right away. His blood glucose is low. He needs to bring it up with fast-acting sugar before he eats his snack.
- 15) Robbie needs to check his blood glucose before and after he plays hockey and again that night. He also needs to have an extra snack with at least 15g carbohydrate before hockey.
- 16) The best area to give insulin if you plan to go for a swim after breakfast is the **tummy or the backside**.
- 17) Cheese, nuts, chicken, and broccoli do not raise the blood glucose much.
- 18) Half a sandwich would be the best snack for Joe (however some kids won't eat a sandwich in the middle of the night and milk works well for them).
- 19) Feeling thirsty, peeing lots and feeling tired are signs of high blood glucose.
- 20) Jack's blood glucose is high and he has ketones. He needs insulin.
- 21) You should check for ketones if the blood sugar is 15 or more, if you forget to give your insulin, and when you are sick.
- 22) **Yes**, Janice should take her morning insulin.
- 23) Insulin, food and physical activity affect blood glucose.
- 24) To make sure Luke is safe at school, his parents need to let the school know he has diabetes. They also need to supply the school with fast-acting sugar and snacks and explain that he needs to eat on time. They do not need to meet with the teacher every day.

BONUS QUESTION:

This is **false**. You need to be able to see the blood sugar pattern. You can only do this if you write them down or download the meter. Review your blood sugars often.

Continuous glucose monitoring (CGM) and anxiety

It can be exciting when you start using a continuous glucose monitor (CGM).

CGM can make it easier to manage diabetes. A CGM can reduce the number of blood glucose finger checks and help with anxiety about blood glucose values. It also can share your sensor glucose values with your health-care team.

However, some people experience anxiety when they start a CGM.

YOU MAY FEEL:

- Overwhelmed with the constant access to sensor glucose information
- Nervous or upset when the CGM detects fluctuations in glucose values, or
- Frustrated if the CGM does not meet your expectations

It is important to address feelings and concerns that arise when you start CGM.

TO COPE WITH CGM ANXIETY:

- When you set your low and high alarm values, choose levels that will give you time to react. You can find suggestions for alarm values on the BC Children's Hospital website (<http://www.bcchildrens.ca/health-info/coping-support/diabetes>)
- Set the low and high alarms to be numbers that safely provide you with time to react. You can refer to our BCCH resources on the website which outline the recommendations for these settings.
- Build a routine of when you will check your CGM (ie. before meals or before activity) *It is not imperative for you to check blood sugar levels if there is no alert.
- Be patient. Just because your CGM can update every few minutes, remember that it will take a little bit of time for your body to absorb the sugars that you may have treated a low with.
- You are smarter than your sensor. If you don't believe that your sensor is right, double check with a finger check.
- Aim to improve your management, not to perfect it. Taking small steps to reduce the frequency of experiencing low or high sensor glucose values are good places to improve your management.

WHEN TO SPEAK WITH YOUR TEAM:

- Feeling overwhelmed with your sensor or sensor glucose values
- You feel you are not benefiting from the CGM
- You want to take a break from the CGM

If you decide to take a break from wearing a CGM please let your team know, as your physician will need to update PharmaCare for the coverage of your test strips. There currently are limits to the amount of test strips that will be provided with coverage in BC.

Pattern recognition—Intro to insulin adjustment for MDI

- As you begin writing down your blood glucose levels you may start to notice patterns of blood glucose levels.
- It is very valuable to make note of daily information including all blood glucose levels*, all carbohydrate intake**, food boluses, and correction boluses.
 - *Make sure to note any low blood glucose levels.
 - **Make note of snacks even if no insulin is given.
- Additionally, it is helpful to make notes of any differences from day to day. For example, any activities, stress, or illness.
- This information is very valuable for both your family and your medical team to be able to make changes to the insulin dosages.

In the following diagram we can see this individual seems to have a pattern of blood glucose levels above target at lunchtime:

Date:	19	12A	1A	3A	5A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
Glucose (BG)							6.1				15.1					10.7			3.8	6.3		
Carbs in food (g)							45				60					63			15	30		
Food bolus							3				4					4				2		
Correction bolus											3					1.5						
Notes: (exercise, stress, illness, low blood sugar & treatment, specific foods/carbs)																						
Soccer practice after dinner—7pm																						
Date:	20	12A	1A	3A	5A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
Glucose (BG)							6.2		9.8		13.6					9.5					5.2	
Carbs in food (g)							48		10		62					57					30	
Food bolus							3				4					4					2	
Correction bolus											2.5					1						
Date:	21	12A	1A	3A	5A	7A	8A	9A	10A	11A	12N	1P	2P	3P	4P	5P	6P	7P	8P	9P	10P	11P
Glucose (BG)							5.9		10.4		12.2					7.6					5.9	
Carbs in food (g)							46		10		44					60					30	
Food bolus							3				2					4					2	
Correction bolus											2					0.5						
exam in afternoon																						

- These patterns are helpful as it can support making changes to your insulin doses.
- Initially your medical team will be supporting you to make these insulin adjustments. It is helpful to review these changes and learn why and how these adjustments are made.
- To make an insulin dose adjustment there must be a consistent pattern for a minimum of 2-3 days.
- To learn how to do these changes yourself visit the Insulin Dose Adjustment modules on the BCCH website (<http://www.bcchildrens.ca/health-info/coping-support/diabetes/insulin-dose-adjustment>).
- As children get older, they will need adjustments to their insulin dosages to match their body's needs.
- With time and practice you will become independent with making these insulin dose adjustments.

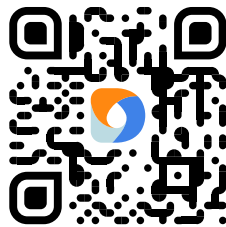


LEARN DIABETES

LearnDiabetes is a virtual education website from BC Children’s Hospital. It has online courses for families of children and youth living with type 1 diabetes, and provides easy-to-understand, interactive education. You can start it any time during your family’s diabetes journey.

The information in this binder is also available as interactive lessons on this virtual education website—you can find these lessons in the ‘Foundations of Diabetes’ modules.

It may be helpful to share LearnDiabetes with others in your family and community who may need to learn about your child’s diabetes, but who may not have access to your copy of this printed binder.



learndiabetes.ca

