Gestational diabetes, like "regular" diabetes, is a disorder that disrupts the way your body uses sugar.

All the cells in your body need sugar to work normally. Sugar gets into the cells with the help of a hormone called insulin.

Insulin is a hormone whose job is to enable glucose (sugar) in the bloodstream to enter the cells of the body, where sugar is the source of energy. All fetuses (babies) and placentas (afterbirths) produce hormones that make the mother resistant to her own insulin. Most pregnant women produce more insulin to compensate and keep their blood sugar level normal. Some pregnant women cannot produce enough extra insulin and their blood sugar level rises, a condition called gestational diabetes. Gestational diabetes affects between 5 and 18 percent of women during pregnancy, and usually goes away after delivery.

WHO IS AT RISK OF DEVELOPING GESTATIONAL DIABETES DURING PREGNANCY?

It is hard to predict which women will get gestational diabetes. But some women are more likely to get it than others. You are more likely to get gestational diabetes if you:

- Had it before
- Are overweight
- Have diabetes in your family
- Are older than 25
- Are from a high risk ethnic group (Aboriginal, Hispanic, South Asian, Asian or African descent)

WHAT ARE SOME POSSIBLE COMPLICATIONS OF GESTATIONAL DIABETES?

- Having a large baby (weighing more than 9 lbs or 4.1 kg), which can increase the risk of injury to the mother or baby during delivery and increase the chance of needing a caesarean section (surgery to get the baby out).
- Stillbirth (a baby who dies before being born), a complication which fortunately is now rare in women with gestational diabetes because of good control of blood sugars and careful monitoring of mothers and babies during pregnancy.
- Neonatal hypoglycemia (low blood sugar in the newborn).
- Preeclampsia. (Preeclampsia causes high blood pressure, among other things.)

WHAT TESTING IS REQUIRED FOR GESTATIONAL DIABETES?

Timing of test: -Testing for gestational diabetes is usually done between 24 and 28 weeks of pregnancy. However, testing may be done earlier in the pregnancy if you have risk factors for gestational diabetes, such as:

- A history of gestational diabetes in a previous pregnancy
- Obesity
- Excess glucose (sugar) in your urine
- A strong family history of diabetes

Test procedure: - At least one of the following tests are done to determine if you have gestational diabetes:

Screening test for GDM: - On the day of the screening test, you can eat and drink normally. You will be given a 50 gram glucose drink. One hour later, you will have a blood test to measure your blood sugar level.

If your blood sugar level is normal (<7.8 mmol/L), no other tests are done.

If your blood sugar is over 11.0 mmol/L, GDM is diagnosed.

If your blood sugar level is 7.8-11.0 mmol/L, you will need another test to know for sure if you have gestational diabetes. This test is called an oral glucose tolerance test (GTT).

Oral Glucose Tolerance Test - The test is done by measuring your blood sugar level before you eat anything in the morning (fasting), then again one and two hours after you drink a glucose drink that contains 75 grams of glucose. It is important to not limit your diet in the two to three days before the GTT, since low food intake may cause the test results to be falsely high. Gestational diabetes is diagnosed if you have **one or more** elevated blood sugar values during the GTT.

HOW IS GESTATIONAL DIABETES MANAGED?

After you are diagnosed with gestational diabetes, you will need to make changes in what you eat, and you will need to learn to check your blood sugar level. In some cases, you will also need to learn how to give yourself insulin injections.

The main goal of treatment for gestational diabetes is to reduce the risk of complications such as those mentioned above. One of the main complications is an overly large baby (weighs greater than 9 to 10 lbs at birth). A large baby can be difficult to deliver through the pelvis (called "shoulder dystocia"). A vaginal delivery increases the risk of injuring a large baby (eg, broken bones or nerve injury). A large baby is also more likely to cause injury to the mother during the delivery. You are more likely to have a large baby if your blood sugar levels are higher than normal during pregnancy.

Eating plan: - The first treatment for gestational diabetes is eating right. To help you achieve the changes you should make in your diet, you will meet with a dietitian or diabetes educator. The general guidelines below will help you until you receive your individualized food advice:

- Continue to eat a healthy pregnancy diet.
- Eat three small meals and 1 to 3 healthy snacks if needed.
- Eat every two to three hours to space food evenly throughout your day.
- Don't skip meals or snacks. The bedtime snack maybe especially important.
- Avoid sweet desserts and sweetened beverages. This includes candy, cake, cookies, ice cream, donuts, jams and jellies, syrups, and sweet sauces. Also, avoid adding sugar to your food or drinks, sweetened soda, punch, sweet tea, and other fruity beverages.
- You may use the alternative sweeteners aspartame (Nutrasweet), sucralose (Splenda), stevioside (Stevia), or acesulfame potassium. Moderation is suggested. These sweeteners have not been linked to an increased risk of birth defects.
- Include protein with limited saturated fat, such as trimmed red meat and pork, chicken, and fish (limit types and amounts of fish due to mercury concerns). Other protein foods like cheese, eggs, nuts, seeds, and peanut butter are also good for you and your baby.
- Eat moderate portions of carbohydrate (natural starches and sugars) containing foods.
- Starchy foods (eg, breads, rice, pasta, potato, corn, cereals)- Choose whole grains over refined grains when possible.
- Fruits and fruit juices - Limit fruit servings to a small piece of fruit or about 1 cup at a time. Avoid fruit juice.
- Milk and yogurt- Skim or 1 percent milk is healthiest. Choose low-fat yogurt.
- Many vegetables are low in sugar and carbohydrates. Include plenty of salads, greens (spinach, collards, kale), broccoli, carrots, green beans, tomatoes, onions, mushrooms, and other vegetables you enjoy. Half of the plate at your meals can be non-starchy vegetables.
- Use healthy fats, example olive oil, avocado, nuts, seeds, salmon.

Blood sugar monitoring: - You will learn how to check your blood sugar level and record the results. Instructions for checking blood sugar levels at home, and ways to record the results are discussed separately.

Initially, most women should check their blood sugar level four times per day:

- Before eating in the morning (target glucose reading is **<5.3 mmol/L**)
- One hour after meals (target glucose is **<7.8 mmol/L)**
- Or two hours after meals (target glucose is **<6.7 mmol/L)**

This information can help to determine whether your blood sugar levels are on target. If your levels stay higher than they should be, your healthcare provider will probably recommend that you start using insulin.

Physical Activity: - Physical activity is a great way to help control blood sugars. Going for a 20-25-minute walk after meals allows your insulin to work better. Other good activity choices are stationary bicycle, water aerobics, swimming, or light weights.

Insulin: - Insulin is a medicine that helps to reduce blood sugar levels and can reduce the risk of gestational diabetes-related complications.

You must give insulin by injection because it does not work when it is taken by mouth. Most women start by giving one injection of insulin per day. If your blood sugar levels are high after eating, you may need to give an injection two or three times per day. Instructions for giving insulin injections will be provided.

If you take insulin, you should check your blood sugar level at least four times per day. You also need to write down your results and how much insulin you give and review these records at each prenatal visit. Keeping accurate records helps to adjust insulin doses and can decrease the risk of complications.

WHAT CARE IS NECESSARY AFTER DELIVERY?

After delivery, most women with gestational diabetes have normal blood sugar levels and do not require further treatment with insulin. You can return to your pre-pregnancy diet, and you are encouraged to breastfeed.

However, it is important to check your blood sugar level the day after delivery to be sure that it is normal or near normal. Pregnancy itself does not increase the risk of developing type 2 diabetes. However, having gestational diabetes does increase your risk of developing type 2 diabetes later in life.

If your blood sugar level is normal after delivery, you should have testing for type 2 diabetes at around six weeks to six months postpartum. Testing usually includes a two-hour glucose tolerance test (GTT).

Risk of gestational diabetes: One-third to two-thirds of women who have gestational diabetes in one pregnancy will have it again in a later pregnancy. Weight reduction through diet and exercise can reduce this risk.

Risk of type 2 diabetes: Women with gestational diabetes have an increased risk of developing type 2 diabetes later in life, especially if the woman has other risk factors (eg, obesity, family history of type 2 diabetes).

The risk of developing type 2 diabetes is greatly affected by body weight. Women who are obese have a 50 to 75 percent risk of type 2 diabetes, while women who are a normal weight have a less-than-25 percent risk. If you are overweight or obese, you can reduce your risk of type 2 diabetes by losing weight and exercising regularly.

The Canadian Diabetes Association (CDA) recommends that all women with a history of gestational diabetes have testing for type 2 diabetes at least every three years after their initial post-pregnancy test. Women who have gestational diabetes after age 45 should have testing once per year.

References:

Up-To-Date

Canadian Diabetes Association

How to write a food Diary:

1. **Eat the way you would normally eat. Do not change your eating habits. Write down everything that you eat and drink.**
2. **Write things down right after you eat**
3. **Write down the amount of food you ate. Be specific such as 1 cup or 250 mL of Honey Nut Cheerios with ½ cup or 125 mL of 2% Milk.**
4. **Details Count! Describe the food in as much detail as you can.**
    a. **Include brand names as appropriate**
    b. **Describe the cooking method**
    c. **Use measuring cups and spoons or a scale whenever possible**
    d. **Include the extra items added to the food such as sugar, cream, salt or sauces**

Helpful Tools

- **Set of dry measuring cups and spoons for solid items such as cereal**
- **Liquid measuring cup for liquids such as milk**
- **Food labels**
- **Restaurant guides**

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Fasting	4.9	5.1	5.6	4.8	4.3	5.8	4.9
BREAKFAST	1 Cup Cheerios ½ cup Milk 1 Banana	2 Cups Cheerios 1 cup Milk 2 Toast(whole wheat)	1 Cup Cheerios ½ cup Milk 1 Banana	2 Cups Cheerios 1 cup Milk 2 Toast(whole wheat)	1 Cup Cheerios ½ cup Milk 1 Banana	1 Cup Cheerios 1 cup Milk 1 Toast(whole wheat)	1 Cup Cheerios ½ cup Milk 1 Banana
1 Hr. after eating	7.7	8.2		6.8	7.5		7.0
2 Hr. after eating			6.5			7.4	
SNACKS	1 Cup Yogurt	1 Apple	Crackers 6	1 Cup Yogurt	Crackers 6	10 Nuts	Almonds 15
LUNCH							
1 Hr. after eating							
2 Hr. after eating							
SNACKS							
SUPPER							
1 Hr. after eating							
2 Hr. after eating							
SNACKS							

GESTATIONAL DIABETES FOOD AND BLOOD SUGAR LOG

	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Fasting							
BREAKFAST							
1 Hr after Eating							
2 Hr after Eating							
SNACKS							
LUNCH							
1 Hr after Eating							
2 Hr after Eating							
SNACKS							
SUPPER							
1 Hr after Eating							
2 Hr after Eating							
SNACKS							

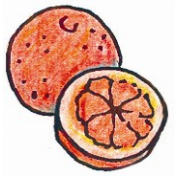
Fasting Target: **<5.3mmol/L** 1 Hour After Meal Target: **<7.8mmol/L** 2 Hours after Meal Target: **<6.7mmol/L**

Sample meal plan

This is a sample meal plan to show you how to apply Canada's Food Guide. It is about 2100 calories. The amount you eat may be smaller or larger depending on your pre-pregnant weight, activity level and how many babies you are having.

Breakfast

1-2 slices whole grain toast
1 boiled egg
1 medium orange
Decaffeinated coffee or tea



Morning Snack

1 small banana
1 cup (250 mL) skim or 1% milk
1 Tbsp. (15 mL) nuts

Lunch

1-2 slices whole grain bread
3 oz. (90 g) chicken (3 thin slices) Lettuce/tomato slices
Mustard
½ cup (125 mL) or 15 grapes
1 cup (250 mL) skim or 1% milk
Water

Afternoon Snack

1 apple
1 Tbsp. natural peanut butter

Supper

1 cup (250 mL) potato
1 cup (250 mL) carrots
3 oz. (75 g) lean roast beef
2 Tbsp. (30 mL) gravy
Green salad
2 Tbsp. (30 mL) vinaigrette dressing
½ cup (125 mL) unsweetened canned fruit Water or decaffeinated tea or coffee

Evening Snack

½ whole grain muffin
30g cheddar cheese

Healthy snack ideas

The following examples shown are 1 serving.

Vegetables and Fruit

- 1 piece of fresh fruit
- 1 cup (250 mL) baby carrots
- ½ cup (125 mL) unsweetened applesauce
- 4 dried apricots or 3 prunes

Grain Products

- 2 - 3 low fat crackers like melba toast, Ryvita® or Stoned Wheat Thins®
- 1 slice of whole grain bread
- ½ cup (125 mL) of a high fiber cereal (ex: Shredded Wheat, Bran Buds)
- ½ medium whole grain muffin

Milk and Alternatives

- 1 cup (250 mL) milk, skim or 1%
- ½ cup (125 mL) Plain Greek or Regular Plain Yogurt.

Canada's food guide

Eat well. Live well.

Eat a variety of healthy foods each day

Discover your food guide at

Canada.ca/FoodGuide

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Canada's food guide

Eat well. Live well.

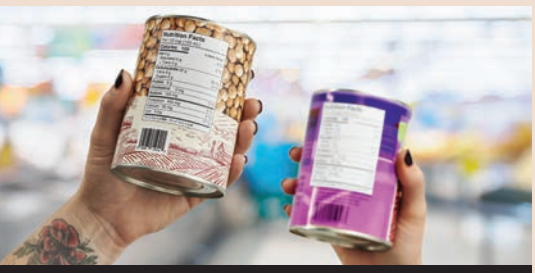
Healthy eating is more than the foods you eat

Be mindful of your eating habits

Cook more often

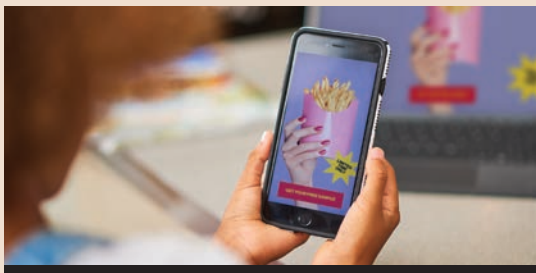
Enjoy your food

Eat meals with others



Use food labels

Limit foods high in sodium, sugars or saturated fat



Be aware of food marketing

Discover your food guide at

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Canada's food guide

Healthy eating recommendations




Healthy eating is more than the foods you eat. It is also about where, when, why and how you eat.

Be mindful of your eating habits

- Take time to eat
- Notice when you are hungry and when you are full

Cook more often

- Plan what you eat
- Involve others in planning and preparing meals

Enjoy your food

- Culture and food traditions can be a part of healthy eating

Eat meals with others

Make it a habit to eat a variety of healthy foods each day.

Eat plenty of vegetables and fruits, whole grain foods and protein foods. Choose protein foods that come from plants more often.

- Choose foods with healthy fats instead of saturated fat

Limit highly processed foods. If you choose these foods, eat them less often and in small amounts.

- Prepare meals and snacks using ingredients that have little to no added sodium, sugars or saturated fat
- Choose healthier menu options when eating out

Make water your drink of choice

- Replace sugary drinks with water

Use food labels

Be aware that food marketing can influence your choices

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Questions and Answers about Gestational Diabetes and insulin

Gestational diabetes is a roller coaster ride from start to finish. There is a lot of information to navigate and often at a session with your PCN team you don't know what questions to ask. So, we pulled together an extensive list of questions about insulin for gestational diabetes. We wanted to highlight the positives and to bust the myths. We hope that after reading this you'll feel more informed and less anxious about insulin treatment.

Do many women with GDM have to take insulin?
It tends to depend on your treatment guides established by Diabetes Canada and which timing and targets your health practitioners are using. For example, you may be advised to check your blood glucose level at 1 hour or 2 hours after the meal. There may also be some variation in the target level of glucose that your doctor/diabetes educator uses i.e may be < 7.8 at 1hr or <6.7 for 2hr time point.

Have I failed if I end up having to take insulin?
Absolutely not. The need for insulin is related to how much insulin your body is able to make and whether this is enough to process the amount of carbohydrate food you and baby need to stay well. In most cases it is not a reflection of the effort you are making with your diet.

Is the insulin going to harm my baby in any way?
Insulin will not harm your baby, but high glucose levels may. Insulin is used because it only crosses the placenta in very small amounts (compared with oral agents) and therefore is considered the safest way to control your blood glucose levels if diet and exercise alone are not enough.

Are there any long-term effects from taking insulin?
No. Taking injected insulin is just increasing the total available amount of insulin (adds to what you are already secreting) in order to better process the carbohydrates, you are eating.

Will my body get used to taking it and will I have to keep taking it after my baby is born?
No. Your body doesn't get used to the insulin and it doesn't affect the amount of insulin your body is still making. The majority of women who need insulin to manage their gestational diabetes will stop it at delivery or even perhaps a little before this. The need for insulin is related to the effect of the placental hormones, so once the placenta is delivered blood glucose control rapidly returns to normal for most women.

Do the needles hurt?

Insulin is injected with an extremely fine and short needle into fat tissue just under the skin. Compared to checking your blood glucose levels with fingerprick device (which is not pleasant) most women can't believe once they try insulin that they can't feel it as much as they anticipated. It is normal to be scared about 'injections' as most injections are felt – but remember those injections are needles going (deeper) into veins or muscle tissue. With insulin, you should use a new needle each time to ensure it remains super sharp. 4mm needles are the standard used these days. You will be shown how to use insulin and should have a practice go while you are with your PCN team.

Where do I inject the insulin?

Insulin is injected into your belly region. This is the preferred area as there is good fat coverage (even if you are slim) and it is not an area subject to variation in blood flow. If you were to inject into your leg then get up and walk around it may affect the action of the insulin, making it more unpredictable. Many women worry about the needle hurting the baby. The needle is not going to go near your baby- even towards the end of a pregnancy when you can feel a foot or elbow, the needle is going just below the skin. You have fat, then layers of muscle, then the uterine wall and amniotic fluid still below which keeps the baby quite some distance from the needle.

Isn't there a non-injectable alternative to insulin?

No, not yet. There is ongoing research into the possibility of inhaled insulin however there is considerable way to go with this before it might be a useful option.

Why can't I take an oral medication instead of injecting insulin?

There are a couple of oral medications that are used by some doctors to manage glucose levels in pregnancy. These are Metformin and Glyburide. Many doctors don't feel comfortable using these as treatment options due to the potential risks to mother and/or baby for example hypoglycemia in the baby or simply not knowing enough about the long term impact on the child (as these drugs cross the placenta in greater quantity). It is important to discuss use of any medication with your doctor.

What is insulin made from? Is it synthetic drug?

These days insulin is made synthetically from DNA material in the laboratory. It is very close in structure to human insulin and less likely to cause problems with allergy compared with when insulin was derived from animal sources.

How do I know if I'm taking the right amount? Can I overdose on insulin?

Your insulin doses are determined by reviewing your blood glucose levels. We base your insulin dose/s on the overall pattern of your results. Your results should be reviewed regularly, and doses adjusted as needed. There is no 'right amount' in the sense that you should not worry if you are taking 30 units when your friend may only need 4 units. The right amount is the amount to keep your blood glucose level to target. Everyone's body is different.

It is possible to take too much insulin and it is important that if you are using insulin that you keep your carbohydrate intake consistent. The difference between the injected insulin and your own is that the injected insulin can't tell what you are eating or doing so if you eat less than usual but take your usual insulin dose, your blood glucose level may drop too low.

Likewise, if you don't usually do much activity after your meal but one day spend hours walking around the shops, you also may find you end up with a low blood glucose level. Low blood glucose levels are avoidable in most circumstances but it is important you are taught about the causes and management for them should they occur.

If I'm taking insulin, does that mean I can go back to eating what I want, when I want? Won't the insulin take care of my blood glucose levels for me?

If only! Insulin is an additional therapy on top of your diet and exercise. Unfortunately, the placental hormones make it difficult to eat freely and merely 'match' your insulin dose to your carbohydrate intake. Keeping a consistent carbohydrate intake and activity level will make your diabetes much easier to manage.

Is it dangerous to exercise if I'm taking insulin? Can it bring on a hypo?

It isn't dangerous to exercise but as exercise can reduce your blood glucose level it is important to be aware of the potential for a low blood glucose level (a hypo). It is useful to try and keep your activity regular or otherwise take any extra activity into account and perhaps discuss a lower insulin dose for those occasions. Eating a little extra carbohydrate to cover activity is also something you could discuss with your health care provider.

Do I have to wake up in the night to re-inject insulin?

No. Insulin is usually given at mealtimes (before you eat) or in the evening (ideally 9:30-10pm). You shouldn't need to alter your routine in order to manage insulin. If you have a much earlier bedtime than 10pm then your PCN team may prescribe a different form of insulin to ensure it is still working at the right time overnight to control your fasting glucose level.

What happens during labor if I'm on insulin?

For most women insulin is stopped for labor though it depends on the amounts and types being used. It is recommended that your treating doctor/educator discuss management for induction/caesarean section/ labor, as doses may be continued or altered depending on current blood glucose level results.

Does taking insulin increase the chance of my baby being diabetic?

Taking insulin is not related to your baby's risk of developing diabetes. In fact, having GDM doesn't mean your baby will get diabetes. However, the fact that you've developed GDM means you are high risk of developing diabetes in the future and studies do show that if you need insulin while pregnant you are more likely to develop impaired glucose tolerance. This is not due to using insulin but rather the other way around i.e. there is more disturbance to your glucose levels hence you need insulin in the first place.

If I'm taking insulin this pregnancy, will I automatically have to take it if I get GDM again?

Every pregnancy is different and if there are modifiable risk factors for why you developed GDM that you address (such as losing excess weight) then you may even avoid developing GDM at all. However, if you do get GDM again it is not automatic that you will again need insulin just because you did the last time.

Have I damaged my pancreas and my body's ability to naturally process the glucose in my blood? Will my body be able to function normally again even after the GDM has gone away?

No, you definitely haven't irreparably damaged your body. For most women gestational diabetes is a temporary form of diabetes and therefore the pancreas is not permanently damaged. In fact, the pancreas is not damaged at all – it is the effect of the placental hormones on your muscle and liver cells causing insulin resistance that is the main problem in gestational diabetes. Around 80% of women will have normal glucose tolerance after a pregnancy. It is worth remembering that of the 20% where glucose tolerance does not return to normal some would have had undiagnosed diabetes or impaired glucose tolerance prior to their pregnancy.

Where do I get my needles and insulin? Is it expensive?

Your family doctor or PCN team will issue you a prescription so you obtain insulin and supplies at your local pharmacy.

Is there anything I need to know about storing insulin?

Insulin should be kept refrigerated prior to your obtaining it. Once you are using your device it shouldn't remain in the fridge, however the others you are not yet using should be kept in the fridge. Insulin should not be kept in hot places i.e. in the car or in direct sunlight etc.