PATIENT & CAREGIVER EDUCATION

About Insulin for Diabetes or Treatment-Related Hyperglycemia

This resource explains what insulin is, how it works, and different types of insulin. It also explains what type 1 and type 2 diabetes are and how to manage them. It answers common questions about insulin and diabetes.

About insulin

Insulin is a hormone that lets glucose (sugar) go from your bloodstream into your cells. Your pancreas makes insulin and releases it into the bloodstream. Your cells need glucose for energy. If your body does not have enough insulin, glucose stays in your bloodstream. This causes hyperglycemia (high blood sugar).

Hyperglycemia can make you feel tired or sick. It can also make it harder for your body to fight off infection. Read *About Hyperglycemia (High Blood Sugar)* (www.mskcc.org/pe/high_blood_sugar) to learn more.

About type 1 and type 2 diabetes

Type 1 diabetes mellitus (T1DM) is when the pancreas does not make insulin at all.

Type 2 diabetes mellitus (T2DM) is when your pancreas does not make enough insulin. Your pancreas may make less insulin over time. You may also have insulin resistance. This means your cells do not respond to the insulin your body makes. This causes glucose to stay in your bloodstream instead of entering your cells.

How to manage type 1 and type 2 diabetes

People with T1DM must always take exogenous (ex-AH-jin-us) insulin. Exogenous insulin is medicine that you inject. It acts like insulin and replaces the insulin your body cannot make.

People with T2DM may need oral medicine to help manage blood glucose levels. As your pancreas makes less insulin over time you may also need exogenous insulin.

Some diabetes medicine makes your pancreas release more insulin. But these medicines will not work if your pancreas cannot make any more insulin. If so, you'll need to use exogenous insulin to control your blood glucose levels. Talk with your diabetes healthcare provider about how to manage your blood glucose.

When to take insulin

It's important to take insulin at the right time. Your diabetes healthcare provider will tell you how much to take and when to take it. Taking doses of insulin and other diabetes medicine too close together can raise your risk for hypoglycemia (low blood sugar). Read *About Hypoglycemia (Low Blood Sugar)* (www.mskcc.org/pe/low_blood_sugar) to learn more.

It helps to make a routine for taking insulin. If you miss a dose of insulin, wait until your next scheduled dose. **Do not take a dose to make up for a missed dose unless your diabetes healthcare provider tells you to.**

What to discuss with your diabetes healthcare provider

Share important health information with your diabetes healthcare provider.

Tell them if you:

- Had an allergic reaction to diabetes medicines in the past.
- Have liver or kidney problems.
- Have blurry vision or changes to your vision that make it hard to see clearly.
- Have a severe (very bad) infection.
- Are being treated for heart failure or recently had a heart attack.
- Have problems with your circulation (blood flow). This includes neuropathy (tingling or losing feeling in your fingers and toes).
- Have trouble breathing.
- Drink alcohol.

Types of insulin

Rapid-acting insulin

Rapid-acting insulin starts working within about 15 minutes to lower your blood glucose. It can be used to lower your blood glucose during meals. It can also be used to treat high blood glucose when you're not eating.

A dose of rapid-acting insulin lasts for about 4 hours.

Examples of rapid-acting insulin include:

- Aspart (Novolog®, Fiasp®)
- Lispro (Humalog®, Lyumjev™)
- Glulisine (Apidra®)

Taking insulin doses too close together can cause hypoglycemia. Take doses of rapid-acting insulin at least 4 hours apart. If your diabetes healthcare provider gives you different instructions, follow their directions.

Mealtime insulin dose

When you eat, your blood glucose rises fast. Rapid-acting insulin is often called a mealtime insulin dose because it manages your blood glucose during meals. If you wait too long to eat after taking your mealtime insulin dose, this can cause hypoglycemia.

Take your mealtime insulin dose no more than 15 minutes before a meal. It's best to wait until your meal is in front of you and you're ready to eat. This helps prevent hypoglycemia.

Correctional insulin dose

A correctional insulin dose is when rapid-acting insulin is used to treat high blood glucose levels when you're not eating. This dose is usually lower than a mealtime insulin dose.

Short-acting insulin

Short-acting insulin can take up to 1 hour to start working and lasts for 6 to 8 hours. If you're taking it before a meal, take it 30 minutes before you eat. This gives the insulin enough time to start working.

Examples of short-acting insulin include regular human insulin (Humulin R and Novolin® R).

Intermediate-acting insulin

Intermediate-acting insulin usually takes about 2 hours to start working. It lasts for about 12 hours. Intermediate-acting insulin is often used to manage steroid-induced hyperglycemia. This is hyperglycemia caused by steroids, such as prednisone or dexamethasone.

If you're taking intermediate-acting insulin for steroid-induced hyperglycemia, take them both together. Do not take the insulin without taking the steroid unless your diabetes healthcare provider tells you to.

Tell your diabetes healthcare provider if your steroid dose changes, is held, or stopped suddenly. They may need to stop or adjust your insulin dose.

Examples of intermediate-acting insulin include Neutral Protamine Hagedorn insulin (Humulin N and Novolin® N). Neutral Protamine Hagedorn is also called NPH.

Long-acting insulin

Long-acting insulin is also called basal insulin or background insulin. Long-acting insulin works slowly over a long period of time. It works to keep glucose levels stable when you're not eating, such as between meals or while you sleep. Long-acting insulin is not used to control the quick rise in glucose caused by eating.

Long-acting insulin starts working in about 2 hours. Some insulin lasts 20 to 24 hours. These include glargine (Lantus®, Basaglar®, Semglee®, and Rezvoglar™). Other insulin, such as insulin glargine U-300 (Toujeo®) and insulin degludec (Tresiba®), lasts 36 to 42 hours.

Take long-acting insulin at the same time every day unless your diabetes healthcare provider gives you other instructions. It's helpful to set an alarm or reminder on your smartphone.

Common questions about diabetes and insulin

Will I become addicted to or dependent on exogenous insulin?

No. Taking exogenous insulin injections (shots) does not cause your body to make less insulin. If your body makes insulin, it will keep making it just the way it did before.

You can use exogenous insulin for short periods of time, such as during treatment.

Certain medicine causes hyperglycemia, but only while you're taking them. These include steroids and some chemotherapies. Once you finish the treatment with these medicines, your blood glucose goes back to what it was before.

Tell your diabetes healthcare provider if your dosage of steroids or chemotherapy changes. You may need to change how much insulin you take, too. Follow your diabetes healthcare provider's instructions.

What are the side effects of exogenous insulin?

Exogenous insulin is very similar to the insulin your body makes. This means it does not have many side effects.

The most common side effect of exogenous insulin is hypoglycemia. You can prevent this by taking your insulin as prescribed, knowing your blood glucose levels, and not skipping meals.

Tell your healthcare provider if you develop a rash. This is rare but may be a sign of an allergy.

Why can't I just take a pill?

Oral diabetes medicine will only help your body do the things it usually does better. It cannot make your body do something it cannot already do. For example, if your pancreas cannot make more insulin, you may need to take insulin injections. Read *About Oral and Non-Insulin Injectable Diabetes Medicine* (www.mskcc.org/pe/oral_non_insulin_diabetes_meds) to learn more.

Can taking exogenous insulin cause problems with my eyesight? Can it affect how well my kidneys work? Can it make me lose my fingers, toes, or legs?

Some people do not want to start insulin until they can no longer delay taking it. But waiting too long can cause other health problems. Uncontrolled high blood glucose over long periods of time can cause loss of eyesight. It can affect how well your kidneys work. You may lose your fingers, toes, and legs.

It's best to manage your blood glucose right away, before other health problems start.

You may have changes in your vision as insulin brings your blood glucose under control. Tell your healthcare provider if this happens.

Is it my fault that I need to take insulin? Did I not take good enough care of myself?

Your genetics are one of the main causes of diabetes. Over time, diabetes lowers your body's ability to make enough insulin. This is mostly out of your control. It is not your fault that your body loses cells that make insulin. Eating too much sugar does not cause you to have diabetes.

If you have questions or concerns, contact your healthcare provider. A member of your care team will answer Monday through Friday from 9 a.m. to 5 p.m. Outside those hours, you can leave a message or talk with another MSK provider. There is always a doctor or nurse on call. If you're not sure how to reach your healthcare provider, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

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