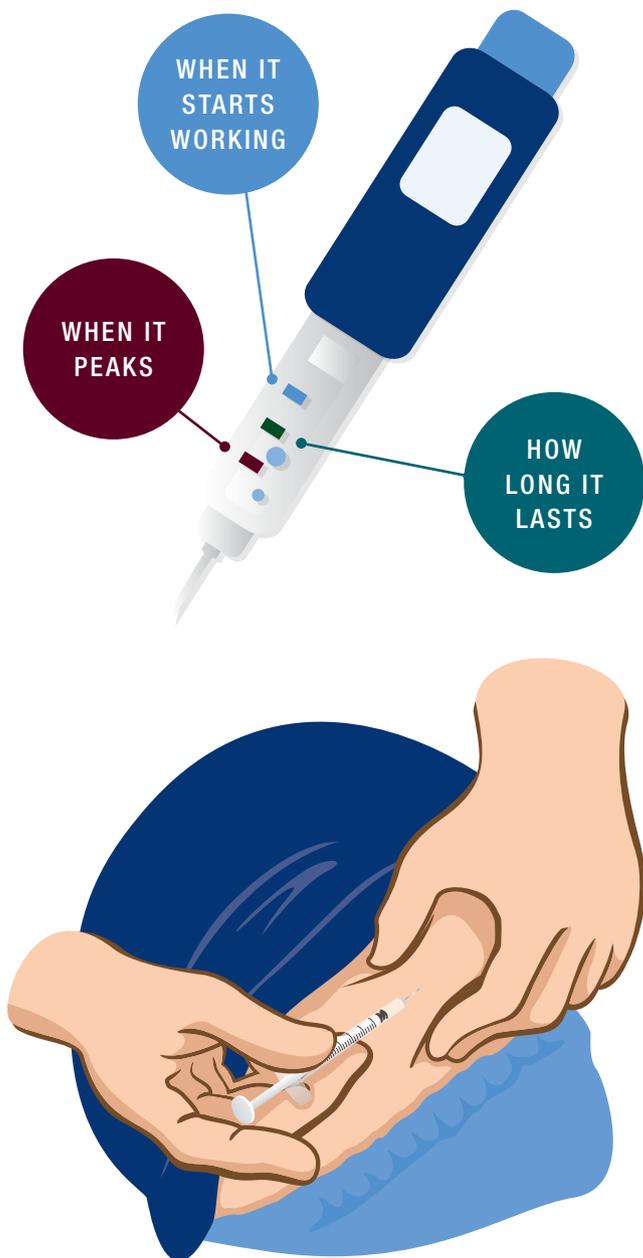


MEALTIME INSULIN: TAMING THE SPIKES



THERE ARE THREE THINGS TO CONSIDER WITH EACH TYPE OF INSULIN:



MEALTIME INSULIN:

Insulin that you take just before you eat a meal. It is a rapid-acting (bolus, or mealtime) type of insulin and is usually taken in addition to a long-acting (basal, or background) insulin.

BASAL/BACKGROUND INSULIN COMES IN TWO FORMS:

Long-acting insulin and intermediate-acting insulin.

BOLUS/MEALTIME INSULIN COMES IN TWO FORMS, AS WELL:

Rapid-acting insulin and short-acting insulin.

Also, some types of insulin come premixed, as a combination of two types of insulin—either rapid-acting insulin or short-acting insulin mixed with intermediate insulin.

RAPID-ACTING INSULIN:

-  **Starts working** about 15 minutes after injection
-  **Peaks** about 1 hour after injection
-  **Duration** 2 to 4 hours after injection

SHORT-ACTING INSULIN:

-  **Starts working** about 30 minutes after injection
-  **Peaks** about 2 to 3 hours after injection
-  **Duration** 3 to 6 hours after injection

Visit endocrine.org for more information.

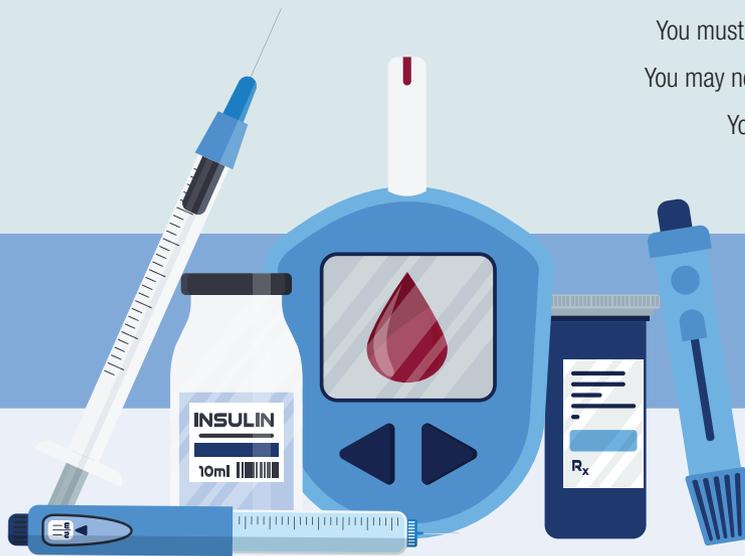
Editor: Christine Burt Solorzano, MD

TWO APPROACHES TO COMBINING BACKGROUND INSULIN AND MEALTIME INSULIN

Often, a doctor will add a mealtime insulin to a background insulin in order to better control after-meal blood glucose (sugar) spikes and give better control of blood sugar throughout the day. Or, a premixed insulin will be prescribed to achieve the same result. There are pros and cons to either approach. Your doctor will decide which one makes the most sense for you.

ADD RAPID-ACTING INSULIN TO BACKGROUND INSULIN

2-5 INJECTIONS PER DAY



PROS

- Works well with less regular eating schedules—don't have to eat at certain times
- Easier transition for people already taking background insulin
- Can be used alone or with oral medicines
- Can vary the types and quantities of food you eat

CONS

- You must take your mealtime insulin with you, so you can take it before you eat
- You may need to take 2-5 injections per day, depending on your eating schedule
- You pay for two types of insulin—one for background, one for mealtime

PROS

- Only one copay
- Fewer shots (typically 1-2 per day)
- Can be used alone or with oral medicines
- May need to eat extra food/snacks to avoid hypoglycemia (low blood sugar)

CONS

- You must eat regular meals or you will get hypoglycemia (low blood sugar)
- You are more likely to get hypoglycemia at night
- Both types of insulin are in one bottle, so you can't adjust one without adjusting the other

PREMIXED INSULIN

1-2 INJECTIONS PER DAY

Patients have questions. We have answers.

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Our free, online resources are available at endocrine.org/patient-engagement



MEALTIME INSULIN

WHAT YOU NEED TO KNOW

Insulin is an important hormone that is secreted by the pancreas to control your blood glucose (sugar). Diabetes is a health condition in which your body does not make enough insulin or the available insulin is not able to do its job properly. Carbohydrates in the foods you eat are broken down into blood glucose for the energy your body needs.

In order to use the glucose in your bloodstream, your body needs insulin to “unlock” the cells so glucose can enter them. Unless your body can use the glucose, it can build up in the bloodstream and cause other serious health problems.



DIABETES AND INSULIN

There are three main types of diabetes. In people with type 1 diabetes, also known as insulin-dependent diabetes, the immune system attacks the insulin-producing cells in the pancreas and their bodies can no longer produce insulin. They must take insulin the rest of their lives.

People with type 2 diabetes, which is the most common type of diabetes, usually still make some (but not enough) insulin, and often also have what is known as insulin resistance—where their bodies require more insulin to allow glucose to properly enter into their cells.

Another important type of diabetes is called gestational diabetes—when the condition starts during pregnancy and may improve after delivery. Keeping mom’s blood sugars normal is very important for the mom and her baby. Other conditions, like persistent inflammation of the pancreas, cystic fibrosis or disorders requiring steroid therapy, may also have diabetes associated with them.

Typically, people with diabetes, in addition to eating right and staying fit through regular exercise, must take medicines to keep their blood sugar from rising too high. For patients with type 1 diabetes, only insulin therapy will work.

For patients with type 2 diabetes, there are several types of oral and non-insulin injectable medicine available to help keep blood glucose in a healthy range. For some type 2 patients, a healthy lifestyle with oral or non-insulin injectable medications is enough to achieve this goal. But many people need more help to do this. For them, a form of insulin is the answer.

People who take insulin must inject it into the fatty tissue under the skin (or inhale it) because it would break down in the stomach if taken orally. The most popular places to inject insulin are the abdomen, upper arm, thigh, lower back, hips, or upper buttocks. Insulin can be injected with a syringe or pen, or delivered through an insulin pump. Many people with diabetes use a pen to administer insulin. Insulin pen is a small injection device that makes injecting insulin easier and more convenient for the patient compare to using a syringe.

TYPES OF INSULIN

Insulin is classified according to three factors: how long it takes to start working (onset), when it peaks, and how long it it continues to work in the body (duration). There are two main categories: Background (basal) insulin, which tends to last longer and delivers a steady dose of insulin to maintain

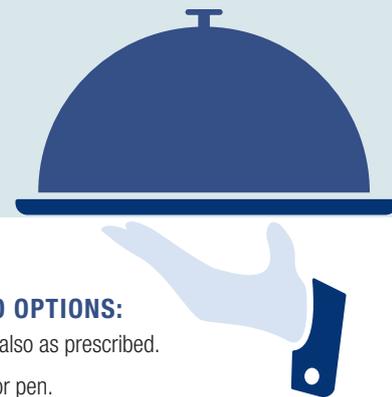
the blood sugar at a stable level during periods of not eating; and mealtime (bolus) insulin, which tends to have a shorter duration but delivers a greater amount of insulin to handle spikes in blood glucose after mealtimes.

CATEGORY	TYPE	NAMES	ONSET	PEAK	DURATION
Background (basal) insulin	Long-acting insulin	Insulin detemir (Levemir) Insulin glargine (Lantus, Basaglar, Toujeo) Insulin degludec (Tresiba)	About 30 to 90 minutes	N/A	About 18 to 26 hours (up to 42 hours in Degludec)
	Intermediate-acting insulin	NPH (Humulin N, Novolin N)	About 2 to 4 hours	About 4 to 12 hours	About 12 to 18 hours
Mealtime (bolus) insulin	Short-acting (regular) insulin	Regular (Humulin R, Novolin R)	About 30 minutes	About 2 to 3 hours	About 3 to 6 hours
	Rapid-acting insulin	Insulin glulisine (Apidra) Insulin lispro (Humalog) Insulin aspart (NovoLog)	About 15 minutes	About 1 hour	About 2 to 4 hours
		Insulin Lispro-aabc (Lyumjev)	About 15 minutes	About 2 to 3 hours	About 4 to 7 hours
		Inhaled insulin human (Afrezza)	About 12 minutes	About 30-60 minutes	About 1.5 to 4.5 hours
	Fast-acting insulin	Faster-acting insulin aspart (Flasp)	About 3 minutes	About 30-60 minutes	About 3 to 5 hours

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TWO APPROACHES TO COMBINING BACKGROUND AND MEALTIME INSULIN



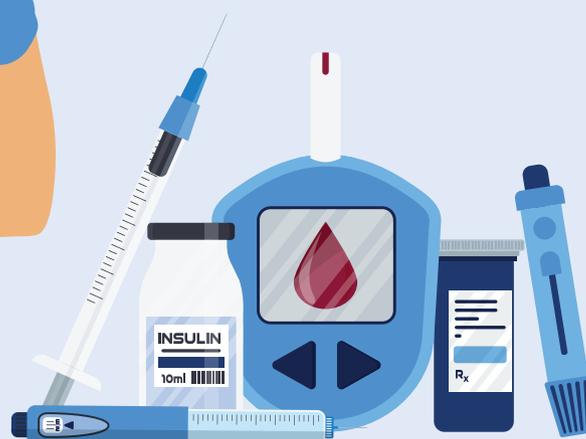
PEOPLE WHO TAKE A BACKGROUND INSULIN ALONG WITH A MEALTIME INSULIN HAVE TWO OPTIONS:

1. Take the background insulin once or twice a day, as prescribed, and take the mealtime insulin just before eating a meal, also as prescribed.
2. Take a premixed insulin, which, as the name implies, combines a background insulin with a mealtime insulin in one vial or pen.

APPROACH	PROS	CONS
Add rapid-acting insulin to background insulin	<ul style="list-style-type: none"> • Works well with less regular eating schedules—don't have to eat at certain times • Easier transition for patients already taking background insulin • Can be used alone or with oral medicines • Can vary the types and quantities of food you eat • Gives you flexibility as you 	<ul style="list-style-type: none"> • You must take your mealtime insulin with you, so you can take it before you eat • You may need to take 2-5 injections per day, depending on your eating schedule • You pay for two types of insulin—one for background, one for mealtime
Premixed insulin	<ul style="list-style-type: none"> • Only one copay • Fewer shots (typically 1-2 per day) • Can be used alone or with oral medicines • May need to eat extra food/snacks to avoid hypoglycemia (low blood sugar) 	<ul style="list-style-type: none"> • You must eat regular meals or you will get hypoglycemia (low blood sugar) • You are more likely to get hypoglycemia at night • Both types of insulin are in one bottle, so you can't adjust one without adjusting the other

WHICH APPROACH MAKES THE MOST SENSE FOR YOU?

That depends on a number of factors, such as how high your blood glucose spikes after a meal, how high it is between meals, and other considerations. Work with your doctor to decide upon the right treatment plan for you.



**2-5 VS. 1-2
INJECTIONS PER DAY**

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