

Balancing eating, exercise and insulin

Common situations that can affect dosage and timing

When you're new to using insulin, there's a bit of a learning curve you've got to practice how to administer it, remember to rotate your injection sites and figure out where to store and how to carry your insulin and supplies. That's all-important stuff, but the toughest part may come later, out in the real world, when you'll need to balance your dosage and timing with your carbohydrate intake and exercise.

There are two main types of insulin doses: background and mealtime. Background insulin is administered once or twice a day and works to steady blood sugar (blood glucose) levels for about 24 hours. Mealtime insulin works fast but lasts only two to six hours. Its job is to make sure the carbohydrates (carbs) you eat don't spike your blood sugar too high.

Figuring out how to balance the carbs you eat, the exercise you do and the amount of insulin you need is a skill you'll learn from your diabetes educator or doctor and through a lot of practice.

How do you use insulin when you're planning to eat...

... in 30 minutes to an hour?

If you take rapid-acting insulin (such as Humalog, NovoLog or Apidra), you'll administer your dose no more than 10 to 15 minutes before you eat. Regular insulin and a mix including regular should be taken 30 minutes before a meal.

... at a restaurant, where you have no clue how long your meal will take to arrive?

If you're using regular insulin, Depending on whether the restaurant likes to set a leisurely pace (as is the case in many upscale spots) and how busy the place is, it could take anywhere from five minutes to an hour for your food to arrive.

If you've already dosed but your meal is slow to arrive and your blood sugar levels are starting to drop, don't be afraid to ask for some bread. In a pinch, check the door. Many restaurants provide mints or other candies at the exit, and they can be useful for treating low blood sugar. But it's smart to carry your own source of fast-acting carbs.

... after morning exercise?

People with diabetes can work out before the first meal of the day, but they need to take morning blood sugar readings into account.

When you're done exercising, and if your blood sugar is normal, dose for breakfast as usual. If you tend to go low after exercise, take a smaller mealtime dose. How much smaller varies per person, but a good rule of thumb is to cut it by half the first time and then test to check the result.

How do you use insulin when you're having a snack...

... but plan to exercise shortly after?

If your reading is on the lower side of normal and you cover a snack with insulin, you might go even lower or experience hypoglycemia.

What if your levels are normal? If exercising, don't take any insulin for the snack until after exercising and you've had a chance to check your blood sugar. That's because exercise can drop your blood sugar level. That snack may prevent you from going low during a workout.

If your blood sugar is high before you eat the snack, cover with insulin. How much to administer—a full dose or only a portion—depends on you, the snack and how you respond to it, as well as how exercise affects your levels. Your doctor or diabetes educator can help you learn what works best for you.

... but plan to eat again in an hour or so?

Many diabetes educators don't advise administering insulin for snacks that contain 15 grams of carbs or less.

If you're eating a larger snack, look to your insulin-to-carb ratio from your health care provider for help. Someone who takes one unit of insulin for every 30 grams of carbs, for example, wouldn't dose for a snack with less than 30 grams of carbs.

... right before bed but your blood sugar isn't low?

Dosing mealtime insulin before bed is tricky since it raises the very real risk of nighttime hypoglycemia. If you can avoid eating before bed, do it.

Some people with type 2 diabetes who take only long-acting insulin include a nighttime snack in their meal plan. The goal is to reduce any drop in blood sugar that may occur during the night.

However, people with type 2 who take both long-acting and rapid-acting insulin as well as those with type 1 diabetes need to dose for a snack with more than 15 grams of carbs. Someone who took one unit of insulin to cover 15 grams of carbs during the day might take one unit to cover 20 grams at night.

How do you use insulin when you just ate...

... but forgot to take your insulin beforehand?

Don't beat yourself up if you missed a dose. It happens, especially to people who are new to diabetes and haven't yet established a routine.

If it takes you an hour or less to realize you missed a dose, administer the dose that you would have taken before that meal based on its carb content and your blood sugar before you ate—if you checked it. Then keep an eye on your level.

Didn't realize you missed a dose until your next meal came around? Chances are your premeal reading will be higher than normal. That's OK. At the time you would normally take your insulin, dose for the meal plus a correction to cover the higher level.

... but want to have dessert in an hour?

If you test and your reading is high, just cover the carbs in the dessert—not your high blood sugar. But you still need to cover the carbs in all meals or snacks regardless of how long it's been since you last ate.

How do you use insulin when you just exercised...

... and your blood sugar is low but you're about to have a big lunch?

Anytime your level is low—whether you've exercised or not—it's important to treat immediately, even if you're about to eat.

After you treat the low and once your level has returned to normal, dose enough insulin for the carbs in your meal (but don't count the carbs you just ate to treat the low blood sugar).

After you eat, keep a close eye on your blood sugar for the rest of the day.

... but your blood sugar is high, and you plan to eat in an hour?

While exercise usually lowers blood sugar, sometimes it can raise it temporarily. And intense exercise, such as an all-out sprint, can release hormones like adrenaline and cortisol that cause spikes.

The same is true if you're about to eat. And while it might seem smart to correct your high when you take your mealtime dose, don't. That rise in blood sugar will soon subside—and the exercise may also cause it to drop—so correcting it with insulin may make you go too low.

How do you use insulin when you aren't eating...

... but your blood sugar is high?

If you only take background (long-acting) insulin, don't do anything. Note each test result so you and your doctor can review the numbers. If your levels are consistently high, you may need a higher background insulin dose.

If you take rapid-acting insulin, use a correction dose to lower high blood sugar levels outside of mealtime. Your doctor or diabetes educator will help you determine the right

"correction scale" (also called "sliding scale") so you'll know how many units of insulin to dose to bring your level down a certain number of points.

If you correct high blood sugar too soon after a previous correction, you could have too much insulin in the body, increasing the risk for low blood sugar.

... but your blood sugar is high, and you want to exercise?

Exercise is a great way to lower your blood sugar naturally, but you want to make sure it's safe. If your blood sugar is at 250 mg/dl or above, especially if you have type 1 diabetes, test for ketones in your urine. If you have ketones, don't exercise and give yourself a correction dose to lower your level.

How do you use insulin when you're sick...

... and eating nothing but clear liquids?

Managing your insulin when you're ill can be tricky. That's why you and your doctor should come up with a sick-day plan—a list of dos and don'ts for when you're under the weather. Blood sugar tends to be higher when you're sick, so you'll be advised to keep taking insulin or even increase the dose.

But what if you're barely eating? Whatever you do, don't assume you can skip your dose, particularly if you have type 1. That can put you at risk for diabetic ketoacidosis (DKA), which can lead to coma or death. If you can't get carbs from food, sip on a sugary (not diet) soda. Test your levels often and use correction doses for high blood sugar. If your readings continue to be too high, or if you have lows, call your doctor.

... and vomiting?

The first step is to determine whether you're vomiting from a virus or whether you're experiencing DKA. Ketones can cause vomiting, so the first step is to do a test to check for them. If your blood sugar is high, you have ketones and you're vomiting, administer insulin using your correction dose schedule. Keep testing and correcting with insulin until you're free of ketones. If you keep vomiting for two hours or more, call your doctor or seek emergency care.

Vomiting that's not caused by ketones may be from a virus (like the flu) or bacteria (as in food poisoning). In any case, monitor your blood sugar and ketones often and stay hydrated to prevent DKA. Following your sick-day plan is the best thing you can do to stay safe when you're ill.

Understanding Insulin [chart]

Knowing how long it takes your insulin to act, when it peaks and how long it lasts can help you prepare for a dose and avoid "stacking" doses on top of one another.

Type of Insulin	Time to Onset	Peak	Duration (how long it lasts)
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	(when it starts working in the body)	(when it is at its highest strength)	
Rapid-acting* Lispro (Humalog), aspart (NovoLog), glulisine (Apidra)	5 to 15 min	40 min to 2 hours	3 to 5.5 hours
Regular* Humulin R, Novolin R	30 to 60 min	2 to 5 hours	3 to 6 hours
NPH** Humulin N, Novolin N	2 to 4 hours	4 to 10 hours	10 to 16 hours
Long-acting** Glargine (Lantus), detemir (Levemir)	2 hours	No real peak	

*These are considered mealtime insulins.

**These are considered background insulins.