Understanding Insulin: A Basic Guide

- Planning Where to Give Your Shot
- How to Give an Insulin Injection
- Insulin: Action Times and Storage
- When Your Blood Sugar is Too Low (Hypoglycemia)
Diabetes: Planning Where to Give Your Shots

Key points to know about giving yourself shots

• There are four areas of the body most often used for shots – the abdomen, thighs, arms and buttocks. Each of these areas has many places for giving shots.

• Your doctor or diabetes educator will discuss which areas will work best for you, how often to rotate areas and how often to change where you give your shot. They will talk with you about your lifestyle and how it can affect how your body uses medicines.

• Your abdomen is the recommended place to give your shots. It is the easiest place to reach and uses the medicine the fastest.

• It is necessary to rotate (change) sites within one area before moving to a different part of the body. Give your shot at least 1 inch away from where you gave the last one. Your doctor or diabetes educator will give you specific instructions for your type of injection.

• Using the same site over and over can cause scar tissue to form. Injecting into scar tissue can affect the way the medicine works in your body.

• The pictures below show the four areas for injections and how each of them can be divided into many sites. Use these pictures when planning the schedule for where to give your shots.

Areas and sites for injecting your insulin

Abdomen
Use an area where fatty tissue is present. Stay at least 2 inches away from the navel and any scars.

Thigh
Use the top and outer surface of the thigh. Stay 3 to 4 inches (about the width of the palm of your hand) above the knee and below the groin. Stay away from the inner thigh.

Arms
You may need help from another person in this area. Use the area between the shoulder and the elbow on the outside of the arm. Stay 3 to 4 inches (about the width of the palm of your hand) above the elbow. Stay below the level of the armpit.

Buttocks
You may need help from another person for this area. Use the fatty tissue below the waistline and in back of the hip bone (the wallet or pocket area).
How to Give an Insulin Injection

Insulin pens

Getting started
• Gather the equipment (insulin pen and pen needles, alcohol pad if you use one).
• Wash hands with soap and water.
• If NPH or NPH-mix insulin (cloudy insulin), roll insulin pen between hands to mix.

Basic steps for an insulin pen
• Remove the pen cap.
• Remove paper protective tab from the pen needle and screw the pen needle onto the pen.
• Remove the outer plastic pen needle cap and the inner needle cap.
• You may throw the inner needle cap away.
• Dial the pen to 2 units of insulin.
• With the needle tip pointing up, press the button on the end of the pen until some insulin appears. This is called an “air shot.”
• If no drops of insulin appear, repeat the “air shot” until a drop of insulin appears. If you do not see any insulin, do not use the pen.
• Set your insulin dose: Be sure the dial is set at “0,” then dial to the number of units you need.
• The pen can be dialed either up or down to the correct dose.
• If the dose is for more than the number of units left in the pen, you cannot set the dose.

Giving the injection
• It is important to give the injection correctly so you make sure you get the right amount of insulin. It also will be less painful.
• Clean skin with soap and water (or wipe with alcohol pad) and let dry.
• Pick up pen and do not let the needle touch anything.
• Pinch up your skin at the injection site.
• Push the needle into your skin fold.
• Push the button on the end of the pen down as far as it will go.
• Keep the button pressed and count slowly to 5 before taking the needle out (to make sure you get all of the insulin).
• Pull the needle out.
• Replace the outer needle cap.
• Twist off the capped pen needle and put it in a “sharps” container.
• Replace the pen cap on the pen for storage.
• Don’t worry if there is a tiny amount of bleeding. Just put pressure on the injection site for about 30 seconds.
• You should not have a lump on your skin after you give your insulin. If this is happening, you might need a longer needle or might need to change how you give your insulin.

Syringes and needles that are used in the hospital might be different from the ones you use at home. Be sure to learn how to use your injection device correctly so you get the right amount of medicine. Your nurse, doctor or diabetes educator can help you learn how to use your equipment.
How to Give an Insulin Injection

Insulin bottle and syringe

Getting started
• Gather the equipment (insulin pen and pen needles, alcohol pad if you use one).
• Wash hands with soap and water.
• If NPH or NPH-mix insulin (cloudy insulin), roll insulin bottle between hands to mix.

Basic steps for syringe/bottle (filling a syringe from an insulin bottle)
• Remove the cap from the syringe.
• Pull the plunger down to let air in (equal to the amount of insulin you will take).
• Push needle through the top of the insulin bottle.
• Push the air in the syringe into the bottle. Leave the needle in the bottle.
• Turn the bottle and syringe upside down so the needle tip is covered by insulin.
• Pull the syringe plunger back slowly to get insulin in the syringe.
• Look for air bubbles in your syringe (air bubbles mean you will get less insulin).
• If you see air bubbles, push the insulin back in and pull back out. Do this until you have no bubbles.
• Measure the exact amounts of insulin (units) ordered.
• Pull needle out of bottle.

Giving the injection
• It is important to give the injection correctly so you make sure you get the right amount of insulin. It also will be less painful.
• Clean skin with soap and water (or wipe with alcohol pad) and let dry.
• Pick up syringe like a pencil and do not let the needle touch anything.
• Pinch up your skin at the injection site.
• Push the needle into your skin fold.
• Push the insulin in with the plunger. Count slowly to 5 before taking the needle out (to make sure you get all of the insulin).
• Pull the needle out.
• Put the syringe in a “sharps” container.
• Don’t worry if there is a tiny amount of bleeding. Just put pressure on the injection site for about 30 seconds.
• You should not have a lump on your skin after you give your insulin. If this is happening, you might need a longer needle or might need to change how you give your insulin.

Syringes and needles that are used in the hospital might be different from the ones you use at home. Be sure to learn how to use your injection device correctly so you get the right amount of medicine. Your nurse, doctor or diabetes educator can help you learn how to use your equipment.

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The information presented is intended for general information and educational purposes. It is not intended to replace the advice of your health care provider. Contact your health care provider if you believe you have a health problem.
There are several different kinds of insulin. Your doctor has chosen the insulin that will work best for you. It is very important to know the name of your insulin and how it works.

First, you need to know the meaning of some words used to describe how insulin works:

**Onset:** This is the length of time it takes for your insulin to start lowering your blood sugar once you have injected it.

**Peak:** This is when your insulin has the strongest effect on lowering your blood sugar.

**Duration:** This is the length of time the insulin you have injected is expected to be working.

The actual onset, peak and duration may vary depending on factors such as injection site.

Your doctor and diabetes educator will help you plan your meals and snacks during your insulin’s peak time(s).

<table>
<thead>
<tr>
<th>Insulin Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lispro (Humalog) or (Humalog U200)</td>
<td>5 to 15 minutes</td>
<td>1 to 2.5 hours</td>
<td>3 to 5 hours</td>
</tr>
<tr>
<td>Aspart (Novolog)</td>
<td>5 to 15 minutes</td>
<td>45 to 90 minutes</td>
<td>3 to 5 hours</td>
</tr>
<tr>
<td>Glulisine (Apidra)</td>
<td>5 to 15 minutes</td>
<td>45 to 90 minutes</td>
<td>2 to 4 hours</td>
</tr>
<tr>
<td>Regular</td>
<td>30 to 60 minutes</td>
<td>2 to 3 hours</td>
<td>5 to 8 hours</td>
</tr>
<tr>
<td>NPH</td>
<td>2 to 4 hours</td>
<td>4 to 10 hours</td>
<td>14 to 18 hours</td>
</tr>
<tr>
<td>NPH/Regular 70/30</td>
<td>30 to 60 minutes</td>
<td>2 to 8 hours</td>
<td>14 to 18 hours</td>
</tr>
<tr>
<td>Humalog Mix 75/25 or 50/50</td>
<td>5 to 15 minutes</td>
<td>1 to 2.5 hours</td>
<td>12 to 16 hours</td>
</tr>
<tr>
<td>Novolog Mix 70/30</td>
<td>5 to 15 minutes</td>
<td>1 to 3 hours</td>
<td>12 to 16 hours</td>
</tr>
<tr>
<td>Detemir (Levemir)</td>
<td>0.8 to 2 hours</td>
<td>3 or more hours</td>
<td>14 to 24 hours</td>
</tr>
<tr>
<td>Glargine (Lantus)</td>
<td>1.5 to 2 hours</td>
<td>4 or more hours</td>
<td>20 to 24 hours</td>
</tr>
<tr>
<td>Glargine (Toujeo U300)</td>
<td>1 to 2 hours</td>
<td>6 or more hours</td>
<td>24 to 36 hours</td>
</tr>
</tbody>
</table>

Rapid-acting

Regular insulin

NPH

Detemir

Glargine

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Insulin and action times not documented on Plasma Insulin Levels and Time table on Page 1.

<table>
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<th>Insulin Name</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afrezza, is an inhaled insulin. A cartridge holds this powder form of insulin.</td>
<td>5 to 10 minutes</td>
<td>12 to 15 minutes</td>
<td>2 to 3 hours</td>
</tr>
<tr>
<td>Insulin degludec (Tresiba U100 or U200) is an ultra long acting insulin.</td>
<td>30 to 90 minutes</td>
<td>6 to 12 hours</td>
<td>24 to 42 hours</td>
</tr>
<tr>
<td>Regular U500 is a highly concentrated insulin.</td>
<td>30 to 60 minutes</td>
<td>2 to 4 hours</td>
<td>6 to 10 hours</td>
</tr>
</tbody>
</table>

Store your insulin properly so it will not lose its ability to lower your blood sugar. Talk to your doctor, diabetes educator or pharmacist about how to properly care for your insulin product. Here are some general guidelines:

1. Insulin vials that are opened/in use may be stored in a refrigerator or kept at room temperature (below 86º F).
2. Insulin pens that are opened/in use should generally be kept at room temperature (below 86º F).
3. Unopened insulin products should be stored in a refrigerator (36º F to 46º F).
4. Do not freeze insulin. Insulin that has been frozen must be thrown away.
5. Do not expose to direct sunlight or high temperatures.
6. Unopened insulin that is stored in a refrigerator (36º F to 46º F) can be kept until the expiration date printed on the vial.
7. An insulin vial that is opened and in use should be thrown away after 28 days. Detemir (Levemir) can be used up to 42 days after opening the vial. After opening, insulin degludec (Tresiba) can be used up to 56 days. Pens can be used anywhere from 10 to 28 days. Be sure to read your package insert for guidelines on storing and discarding your insulin.
When Your Blood Sugar Is Too Low (Hypoglycemia)

Causes
- Taking too much insulin or too many diabetes pills
- Missing a meal, a delay in eating, or not eating all the food planned in your diet
- Increased amount of exercise
- Alcohol

Onset
- Sudden (usually within a few minutes)

Symptoms you may feel:
- Dizziness
- Anxiousness
- Confusion
- Lightheadedness
- Weakness
- Irritability
- Hunger
- Shakiness
- Sweaty
- Blurred vision
- Your heart pounding or beating fast
- Numbness or tingling in your mouth or lips

Symptoms may progress to:
- Loss of concentration
- Poor coordination
- Slurred speech
- Unconsciousness

Treatment
At the first sign of low blood sugar, eat or drink a “fast sugar source,” such as:
- 1/2 cup regular soda or juice (not sugar free)
- 1 cup milk
- Candy (4 to 5 Lifesavers® or small gumdrops, 2 to 3 pieces of hard candy)
- Honey (2 teaspoons)
- Sugar (2 to 3 cubes or 2 teaspoons of granulated sugar)
- Glucose tablets or gels, which can be bought in your pharmacy; take as directed on the package (as a general rule, take 3 tablets or 1 tube gel)

Repeat the fast sugar source in 15 minutes if symptoms remain or blood sugar is still low. Do not force food or drink if you cannot swallow easily. Your blood sugar may go low again if food is not eaten within the next hour. Repeat treatment if this happens.

If symptoms do not go away, call your doctor or have someone take you to the Emergency Department, or call 911.

Points to keep in mind
- Wear identification stating that you have diabetes.
- Carry at all times – candy, sugar cubes or glucose tablets.
- Tell your family, friends and co-workers what to do if you have symptoms of low blood sugar.
- Keep a written record of symptoms (date and time) and show them to your doctor. If they happen often or you do not know why they occur, call your doctor.
- Eat something before doing more than your usual amount of exercise, or plan exercise 1 to 2 hours after your meal.
- Test your blood sugar before driving. Do not drive when your blood sugar is low. Make sure your blood sugar is back up before you drive.