UW Medicine

Using Insulin

Basic facts about insulin and self-injection

This handout explains what insulin is, the different types, how to store it, how to give an injection with an insulin syringe, and other important information.

What is insulin?

Insulin is a hormone that the pancreas makes. It helps your body use the glucose (sugar) in the food you eat.

Insulin is needed to move glucose from your blood into your body's cells. Your cells either use the glucose for energy right away or store it to be used later. Insulin helps keep your blood glucose level from getting too high (*hyperglycemia*) or too low (*hypoglycemia*).

How does diabetes affect the body?

- The pancreas of a person with **type 1 diabetes** makes little or no insulin. These people must take insulin injections (shots) every day.
- The liver, muscles, and pancreas of people with **type 2 diabetes** do not work together correctly. The muscles and liver do not use insulin as they should. This causes the pancreas to make more insulin to overcome this "resistance." These people may also need to take insulin injections to control their blood glucose.

Kinds of Insulin

There are several kinds of insulin. All insulins used for injection are *synthetic* (man-made) human insulin. They differ in:

- *Onset* (how soon they start to work after they are injected)
- *Peak* (when they reach their greatest effect in the body)
- *Duration* (how long they work after they are injected)

There are 2 basic types of insulin: *basal* and *prandial*. Many people

Ask your diabetes care provider if you have questions about insulin or any other aspect of self-care.

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with diabetes need both basal and prandial insulin to control their blood glucose. Insulin cannot be taken as a pill because the acids in the stomach would destroy it.

Basal Insulin

Basal insulin is **long-acting insulin.** It controls your blood glucose overnight and when you are not eating during the day.

This table shows a common number of basal injections per day that most people with diabetes take. Your provider may advise you to take your basal insulin more or less often.

Type of Insulin	How It Looks	Onset (hours)	Peak (hours)	Duration (hours)	Injections per Day
Deguldec (Tresiba)	Clear	1 to 2	None	Over 24	1
Detemir (Levemir)	Clear	1 to 2	None	Up to 24	1 or 2
Glargine (Lantus)	Clear	1 to 2	None	About 24	1 or 2
NPH	Cloudy	2 to 3	4 to 5	8 to 12	2 or 3

Prandial Insulin

Prandial insulin is **rapid-acting insulin**. It helps to control your blood glucose after you eat (*prandial* means "related to a meal"). It can also help to "correct" a blood glucose level that is above your target range.

Prandial insulin works more quickly than basal insulin but does not last as long.

This table shows a common number of prandial injections per day that most people with diabetes take. Your provider may advise you to take your prandial insulin more or less often.

Type of Insulin	Onset (minutes)	Peak (hours)	Duration (hours)	Injections per Day
Regular	30 to 60	2 to 3	6 to 8	2 or 3
Lispro (Humalog)	less than 15	1 to 1.5	4	3 or 4
Aspart (Novolog)	less than 15	1 to 1.5	less than 5	3 or 4
Glulisine (Apidra)	less than 15	1.5	5	3 or 4

You must take prandial insulin before eating so that it is ready to do its job when you eat. Ask your diabetes care provider about the timing for your type of prandial insulin. The onset of your prandial insulin will determine how soon before eating you should take it.

Other important facts you should know about prandial insulin:

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- If you skip a meal, do **not** take your prandial insulin.
- If you have a large snack, you may need to take some prandial insulin. Ask your diabetes care provider what to do when you eat a large snack.
- All prandial insulin should be clear. Check your insulin before using it to make sure it is clear and not cloudy.

How do I store insulin?

- All **unopened** insulin containers should be kept in the refrigerator **(do not freeze)**. This includes:
  - Vials (bottles)
  - Disposable pens
  - Insulin pen cartridges
- Insulin is good to use until the expiration date marked on the vial, pen, or pen cartridge.
- Once you are using it, all insulin should be stored at room temperature (less than 85° F or 29.4° C).
- Check with your pharmacist or diabetes care provider about how long you should use an open bottle, disposable pen, or pen cartridge.
- Each time you use your insulin, make sure clear insulin is still clear, and cloudy insulin is evenly cloudy. Throw away any insulin that doesn't look right and use a fresh vial, cartridge, or pen.
- For emergencies, always keep handy an extra vial, cartridge, or pen of each kind of insulin you use.

About Insulin Syringes

Insulin syringes come in 3 sizes:

- 3/10 mL (holds 30 units)
- ½ mL (holds 50 units)
- 1 mL (holds 100 units)

The size you use depends on how much insulin you take at one time.

Insulin syringes come with needles attached. Insulin pen cartridges and disposable pen devices do **not** come with needles attached. If you use an insulin pen, you will need to put a new needle on it each time you use it.

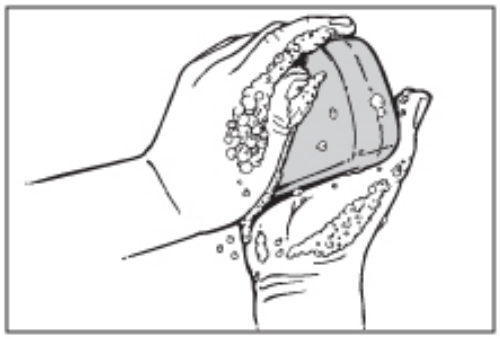
Types of Needles

The diameter, or thickness, of the needle is called its *gauge*. A needle with a smaller diameter has a larger gauge number.

Figure 1

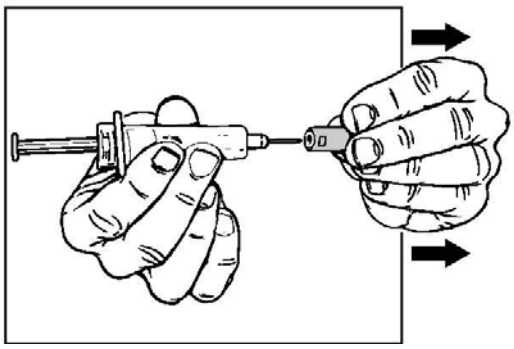
Sites for insulin injections are in black.

Figure 2



Wash hands with soap and water.

Figure 3



Remove the cap from the needle.

Needles also come in shorter or longer lengths. These are:

- Original: 12.7 mm
- Short: 8 mm
- Mini: 6 mm

Can I mix more than 1 type of insulin in a syringe?

- NPH insulin can be mixed with regular, Lispro (Humalog), Aspart (Novolog), and Glulisine (Apidra) just before you inject it. Ask your diabetes care provider for details.
- If you mix your insulin, **always add the faster onset insulin to your syringe first.** For example: Lispro, Aspart, or Glulisine; **then** Regular; **then** NPH.
- **DO NOT** mix Glargine (Lantus) or Detemir (Levemir) with any other insulin.

Where should I inject my insulin?

Insulin is injected into the *subcutaneous tissue* (fat layer just under the skin). Here are some sites to use (see Figure 1 at the top of this page on the left):

- Back of your upper arms
- Your abdomen, staying 2 inches away from your navel
- Front and side area of your thighs
- In your back, just above your waist
- Your buttocks

Injection Tips

- Always stay 2 inches away from your navel or scars.
- Do **not** use sites that are bruised, tender, or swollen.

Giving an Insulin Injection

How do I draw up the insulin into a syringe?

1. Gather your supplies:
   - Insulin
   - Syringe
2. Wash your hands with soap and water (see Figure 2). Dry your hands well.

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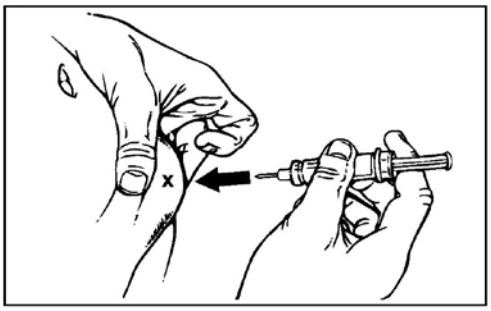
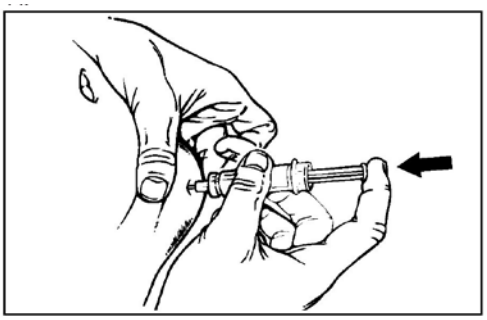
Figure 4



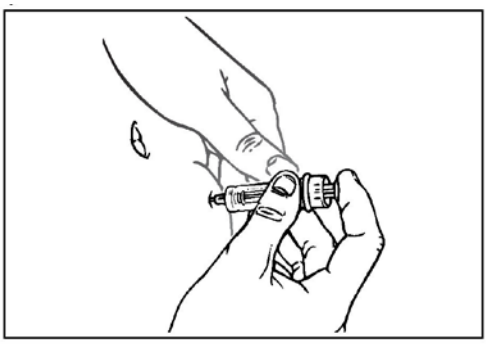
Gently pinch the skin and fat tissue between your thumb and middle finger.

Figure 5



Put the needle straight into the pinched tissue at a 90° angle. ***The needle should be perpendicular (at a right angle) to the injection site.*** *Push the needle all the way in.*

Figure 6



Let go of the pinched tissue. Inject the insulin by slowly pushing the plunger down. Leave the needle in and slowly count to 5.

3. If you are using NPH insulin, make sure it is evenly cloudy (mixed) by rubbing the bottle between the palms of your hands and by turning it end to end. **Do not shake the insulin vial.**
4. If you are using a new bottle, remove the colored plastic cap. Clean the rubber stopper on the top with an alcohol pad, whether the vial is new or used.
5. Remove the cap from the needle (see Figure 3 on page 4). Pull the plunger on the syringe back to the number of units you will be injecting.
6. Hold the insulin vial upright on a table. Put the needle straight into the bottle through the rubber stopper. Push the plunger down to inject air into the vial. (This prevents a vacuum from forming in the vial, which can make it hard to draw up insulin into the syringe.)
7. With the needle still in the vial, turn the vial and syringe upside down.
8. Slowly pull the plunger back to your dose of insulin.
9. Check for air bubbles in the syringe. If you see bubbles in the syringe, inject the insulin back into the vial and repeat step 8 above.
10. Remove the needle from the bottle and inject. Follow the steps below.

How do I inject insulin?

Inject insulin into the *subcutaneous tissue* (fat layer just under the skin). See the injection sites in Figure 1 on page 4.

1. Gently pinch the skin and fat tissue between your thumb and middle finger (see Figure 4 on the left side of this page). *If you are using a mini needle, you do not need to pinch your skin, unless you are very thin.*
2. Put the needle straight into the pinched tissue. **The needle should be perpendicular (at a right angle) to the injection site.** Push the needle all the way in (see Figure 5 on the left side of this page).
3. Let go of the pinched tissue. Inject the insulin by slowly pushing the plunger down (see Figure 6 on the left side of this page). Leave the needle in and slowly count to 5. This prevents insulin from leaking out of the injection site.

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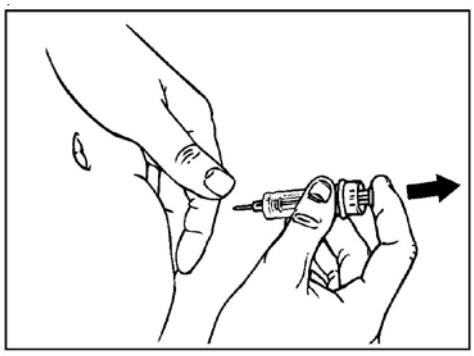
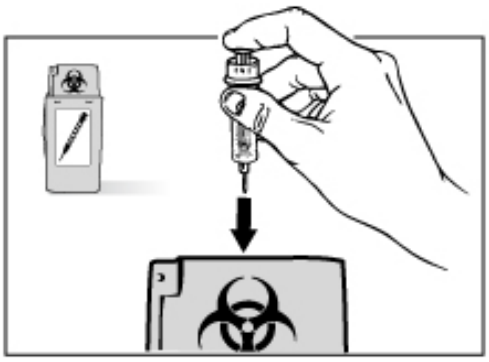
Figure 7



Remove the needle.

Figure 8



Put needles and/or syringes in a "sharps" container.

4. Remove the needle (see Figure 7 on the left side of this page).
5. Dispose of needles and/or syringes in a "sharps" container (see Figure 8 on page 6).

Tips to Reduce Injection Pain

- Inject insulin that is at room temperature. If you are starting a new vial or insulin pen that has been in the refrigerator, you can warm it by gently rolling it between the palms of your hand.
- Do not change the angle of the needle as you are inserting or removing it.
- Use each syringe **only once**.
- Do not pinch your skin too tightly.

Questions?

Your questions are important. Call your doctor or healthcare provider if you have questions or concerns.

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