

# Insulin

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## What is this medication used for?

Insulin is used to treat diabetes. The insulin preparations that are available in Singapore are mostly human insulin that is made from biotechnological methods. Porcine (pig) or bovine (cow) insulin preparations are rarely used nowadays.

Insulin cannot be taken orally (by mouth) as it will be broken down when it reaches the stomach. Hence, the only way to receive insulin is by injection.

There are a few types of insulin preparations available. The main differences between the preparations are:

- How soon the insulin works once you inject it.
- How long the insulin effect lasts in your body.

The rapid and short-acting insulins are used mainly to control blood sugar levels after each meal. The intermediate and long-acting insulins are used to control blood sugar levels throughout the whole day.

Types of Insulin Preparations	How Soon the Insulin Works Once Injected	How Long the Insulin Effect Lasts in Your Body
Rapid-acting	15 minutes	4 hours
Short-acting	30 minutes – 1 hour	6 -8 hours
Intermediate-acting	2 – 4 hours	16 – 18 hours
Long-acting	4 – 8 hours	24 hours
Premixed insulin (contains a mixture of a rapid or short-acting insulin with an intermediate-acting insulin)	30 minutes – 1 hour	16 – 18 hours

## Dosage and How to Use

- Do not stop insulin without checking with your doctors.
- Insulin should be used as instructed by the nurse or the pharmacist. The insulin preparations are available in vials, cartridges or pen fills and disposable pens.

### How to Select an Injection Site

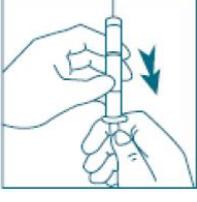
- Insulin should be injected into the fatty tissue that is between the skin and muscle layer.



- Where you inject is important as the absorption of insulin is different depending on where it is injected
  - Abdomen – Fastest absorption rate
  - Arm – Intermediate absorption rate
  - Thigh and buttock – Slowest absorption rate
- Choose an injection site as recommended by your doctor, nurse or pharmacist and do not change sites.
- You should rotate the injection site within the same area to prevent your body from forming “fatty lumps” or “hollow areas”.
- Do not inject insulin in the areas that are actively used during exercise. For example, you should not inject insulin in your arms or thighs when you play tennis.

### How to Withdraw a Single Type of Insulin from an Insulin Vial

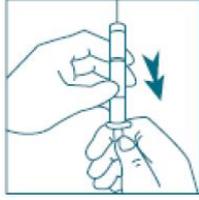
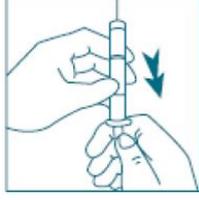
1.	Wash and dry your hands.	
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2.	Roll the insulin vial gently between the palms of your hand. This mixes the insulin and warms it to body temperature to reduce the pain when you inject.	
3.	If you're using a new vial of insulin, remove the coloured cap. Clean the rubber stopper on the insulin vial with an alcohol swab.	
4.	Remove the cap from the syringe.	
5.	Draw air into the syringe by pulling the plunger down. The amount of air you draw in should be equal to the amount of insulin you are prescribed with.	
6.	Place the insulin vial upright and insert the needle into the rubber stopper on the vial. Push the plunger down. This pushes air into the vial and makes it easier to withdraw insulin out of the vial.	

7.	<p>Turn the vial and syringe upside down. Slowly pull the plunger down to about 5 units more than the dose you need. Look for any bubbles in the syringe.</p> <p>a. If there are no bubbles, push the top of the plunger tip up to the line which shows the dose you need to inject.</p> <p>b. If you see air bubbles in the syringe, remove them by flicking or tapping the syringe at the bubble with your finger.</p> <p>c. When the air bubbles rise to the top of the syringe, push the plunger tip up to the line which shows the dose you need to inject.</p> <p>d. It is important to get the air bubbles out of the syringe so that you have a correct amount of insulin.</p>	
8.	<p>Remove the syringe from the vial. You are now ready to give the injection.</p>	

### How to Withdraw Two Types of Insulin from an Insulin Vial

1.	<p>Wash and dry your hands.</p>	
2.	<p>Roll the insulin vial gently between the palms of your hand. This mixes the insulin and warms it to body temperature to reduce the pain when you inject.</p>	

3.	Remove the coloured cap of a new vial. Clean the rubber stopper on the insulin vial with an alcohol swab.	
4.	Remove the cap from the syringe.	
5.	Draw air into the syringe by pulling the plunger down. The amount of air you draw in should be equal to the amount of <b>cloudy insulin</b> you are prescribed with.	
6.	Insert the needle into the <b>cloudy insulin</b> and inject the air into the <b>cloudy insulin</b> vial. Do not draw out the cloudy insulin yet. Take the empty syringe out of <b>cloudy insulin</b> vial.	
7.	Using the same syringe, draw in air equal to the amount of <b>clear insulin</b> you need.	
8.	Insert the needle into the <b>clear insulin</b> vial and inject the air into the <b>clear insulin</b> vial.	

9.	<p>Without removing the syringe from the <b>clear insulin</b> vial, withdraw the amount of clear insulin you need. Turn the vial and syringe upside down. Slowly pull the plunger down to about 5 units more than the dose you require. Look for any bubbles in the syringe.</p> <p>a. If there are no bubbles, push the top of the plunger tip up to the line which shows the dose you need to inject.</p> <p>b. If you see air bubbles in the syringe, remove them by flicking or tapping the syringe at the bubble with your finger. When the air bubbles rise to the top of the syringe, push the plunger tip up to the line which shows the dose you need to inject.</p> <p>c. It is important to get the air bubbles out of the syringe so that you have a correct amount of insulin.</p>	
10.	<p>Remove the needle and insert the needle into the vial of cloudy insulin.</p> <ul style="list-style-type: none"> <li>• Do not push in the plunger as this would inject clear insulin into the cloudy insulin vial.</li> <li>• Add up the amount of clear and cloudy insulin you need. This is the total number of insulin units you need for your injection. Take note of this amount.</li> <li>• To prevent air bubbles from forming, slowly pull back the plunger to the <b>total number</b> of insulin units you need.</li> </ul>	
11.	<p>Remove the syringe from the vial. You are now ready to give the injection.</p>	

## Giving an Injection with a Syringe

1.	Select a clean site to inject and clean the injection site with soap and water.	
2.	Firmly pinch up a large area of skin in the abdomen with your thumb and index finger. Hold the syringe with your other hand. Push the needle all the way in, at an angle of 90 degrees to the skin.	
3.	Inject the insulin by pushing the plunger all the way down slowly with your index finger. Wait for a few seconds before removing the needle and releasing the pinched skin.	
4.	If slight bleeding occurs, gently press over the injection site for a few seconds.	
5.	Do not rub the injected area as this may cause the insulin to be absorbed too quickly.	
6.	Throw the syringe away properly in a container that cannot be punctured.	

## Side Effects, Precautions, Contraindication

### What are the possible side effects of the medicine?

#### Low Blood Sugar

The most common side effect with the use of insulin is low blood sugar. If you inject insulin but do not eat on time, your blood sugar may become too low. Low blood sugar levels might also happen if you do not eat well or if you drink alcohol on an empty stomach while injecting insulin.

Symptoms of low blood sugar are weakness, dizziness, hunger, sweating, trembling, blurred vision, unsteady walk or fast heartbeat.

If you experience any of these low blood sugar symptoms, do the following immediately:

- Step 1: Take 15 grams of sugar. The following are examples of 15 grams of sugar.

- 3 glucose tablets or
- Half a glass of fruit juice or
- 2 – 4 teaspoons of sugar, honey or syrup
- Step 2: You should feel better in about 15 minutes. If you have a home blood sugar meter, you should check your blood sugar level.
- Step 3: If your blood sugar level is less than 4mmol/L or you still have symptoms of low blood sugar, you should repeat step 1 from above.

If your symptoms still do not get better, see a doctor or go to the hospital immediately.

### **Other Side Effects**

- Weight gain
- “Fatty lumps” or “hollow areas” from injecting at the same site without rotation
- Redness, itching or swelling at the injection site

### **How do I know if I am allergic to this medicine?**

The symptoms of a drug allergy include one or more of the following:

- Swollen face/eyes/lips
- Difficulty in breathing
- Itchy skin rashes over your whole body

If you experience any of these symptoms, you should stop your medicine immediately and see your doctor.

### **What precautions should I follow when taking the medicine?**

- Insulin should only be used when prescribed by a doctor and any changes in your insulin dose should be advised by your doctor.
- If your doctor informed you that you need to do a fasting blood test, do not inject insulin until after you have had your blood taken and are ready to eat.

### **Handling and Storage**

- Unopened insulin vials should be stored in the lower compartment of the refrigerator, away from the freezer. Frozen insulin should never be used.

- The vial that you are currently using can be kept at room temperature for up to 4 weeks.
- Do not keep insulin in a hot place (e.g. in a hot, closed vehicle, on top of a television set) or expose it to heat or sunlight. Insulin that is exposed to direct sunlight for too long might slowly affect the insulin and give it a yellow-brown colour. Do not use the insulin if this happens.
- Keep the medicine out of reach of children.
- Throw away all expired medicines.

This medicine has been proven to be safe and effective, but it can cause serious injury if a mistake happens while taking it. This means that it is very important for you to know about this medicine and take it exactly as directed.

*This article answers some common questions about this medicine. It does not contain all the available information. It also does not take the place of talking to your doctor or pharmacist.*

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