Section 4

Insulin

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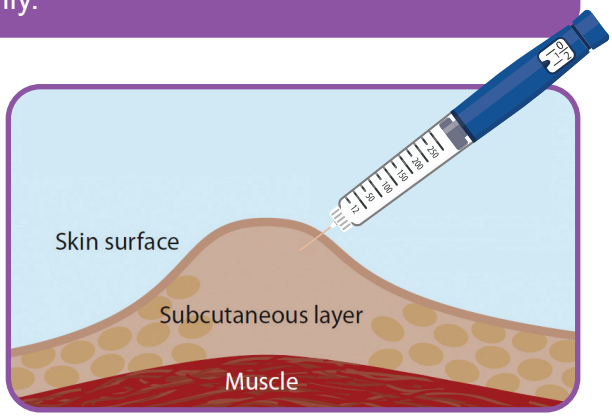
Sometimes when a person has type 2 diabetes, insulin is needed to help bring the blood glucose levels down. The decision to start insulin will be made by your team and may be taken once per day and/or with meals as well.

Sometimes insulin injections will be temporary and once your blood glucose levels are under control you may go back to being on tablets only.

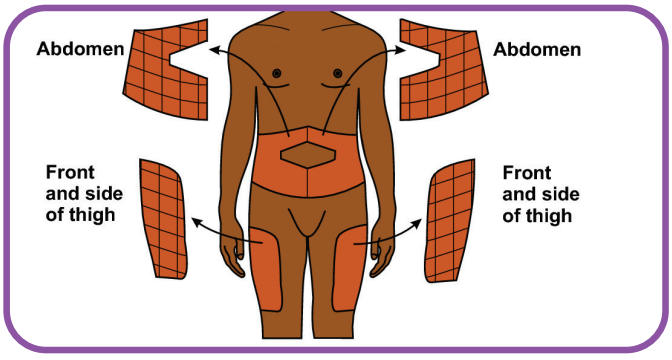
Insulin injections

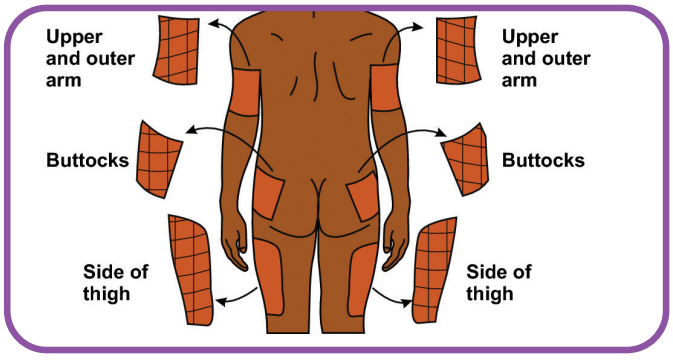
Insulin is injected under the skin, into the fat (known as the subcutaneous layer), where it is absorbed into the bloodstream.



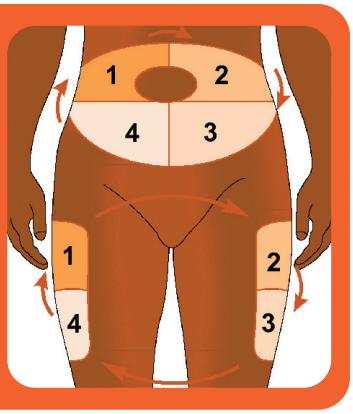
The three main sites for injection used in children are the:

- abdomen
- thighs (top, outer area of the upper leg)
- buttocks (upper outer quadrant).





It is very important to rotate between injection sites and within previous injection sites. Fatty lumps (called lipohypertrophy) can occur when insulin is repeatedly injected into the same area. This will affect insulin absorption. If lipohypertrophy occurs, stop injecting into these areas immediately, they should go away over a period of a few months.



Insulin pens

Insulin pens are either disposable or non-disposable. Disposable pens are prefilled with insulin. They can be disposed of into the household rubbish (with needle detached) when either the insulin has run out or if it has been out of the fridge longer than a month, whichever occurs first.

Non-disposable pens require you to load a ‘penfill cartridge’ into the pen before use. The pen should not be thrown out. The penfill needs to be removed and thrown into a sharps container once empty and a new cartridge loaded. Your diabetes educator can provide you with non-disposable pens.

Whether you use a disposable or non-disposable pen is your choice and the diabetes team can help you decide which option is better for you.

Insulin is measured in units. One millilitre (mL) of insulin usually contains 100 units.
The penfill cartridges and disposable pens hold 3mL of insulin (300 units).

How to inject insulin

- Wash and dry hands.
- Collect equipment (insulin pen, alcohol swab, needle, sharps container, penfill cartridge for non-disposable pen).
- Check the expiry date and ensure there is enough insulin left in the pen for the injection.
- Wipe end of pen with alcohol swab to disinfect rubber tip.
- Attach needle, and pull off outer and inner caps. Ensure a new needle is used with each injection.
- Prime the pen by dialling up two units of insulin and press the injection button fully. Continue to repeat this procedure until you see drops of insulin at the tip of the pen needle. Ensure a successful prime has occurred before proceeding with the injection.
- Use the dose selector to dial up the number of units you need to inject. If a larger dose is accidentally dialled up, do not inject the dose. The pen can be dialled backwards.
- Place pen in preferred hand and curl fingers around pen barrel, with your thumb near injection button and needle pointing towards the injection point.
- Bunch up the skin using your index finger and thumb at the chosen site if required.
- Insert needle through the skin at a 90 degree angle, firmly but gently.
- Fully depress the injection button and release thumb.
- Relax the skin and count to 10.
- Remove the pen needle by placing the outer cap over the needle and unscrew.
- Never store an insulin pen with a pen needle attached.
- Dispose of pen needle into sharps container and store pen in case.

Please refer to picture guides for specific pen manufacturer instructions. This will be given to you by your diabetes educator.

- Occasionally an area will bleed slightly or bruise, and this is not harmful. A tense area will bruise more readily, so it is best to relax the area.
- Insulin sometimes leaks out when the needle is withdrawn from the skin. If this happens, ensure you are counting to 10 before withdrawing the needle, or try injecting more slowly.
- Insulin is best injected at room temperature for comfort.
- If your child is experiencing any difficulties with the injections, for example refusal or pain, speak to your diabetes team so they can help address the issue as soon as possible.

Storage

Insulin that is in use can be kept out of the refrigerator in a cool, dark place. Ensure you note the date you open each pen/cartridge because it is only valid for one month once opened. It is important that the insulin is not exposed to extreme conditions (too hot or too cold), as this can affect its effectiveness.

Insulin that is not in use, or is spare, will last until the expiry date and should be stored in the refrigerator (2 - 8 degrees Celsius).

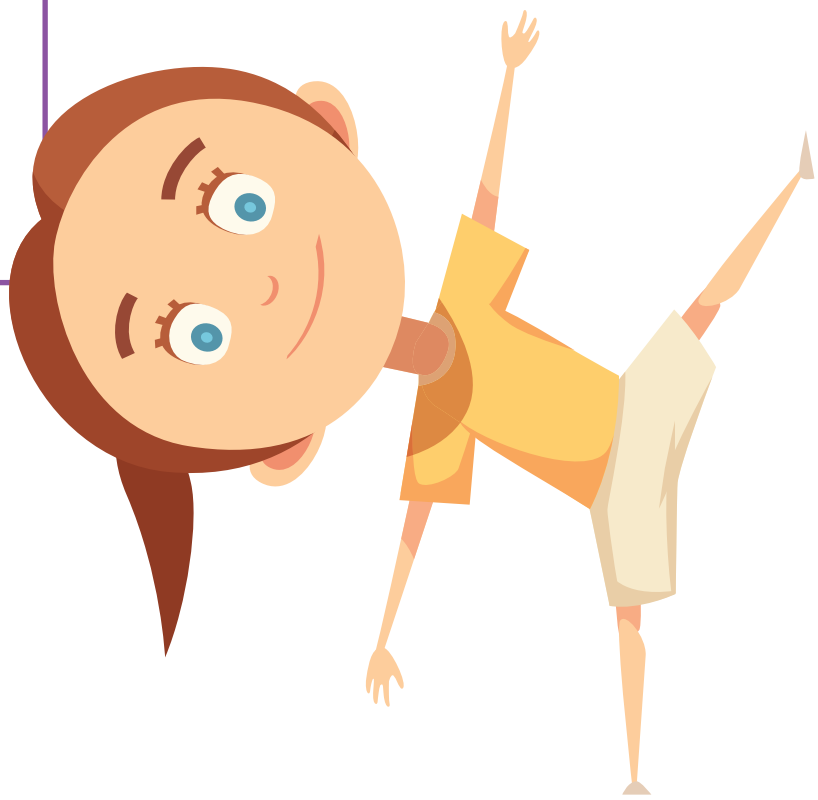
Unopened insulin must not be used past its expiry date!

Insulin should never be:

1. frozen
2. shaken vigorously
3. exposed to direct heat or sunlight.

Do not use insulin if:

- the clear insulin has turned cloudy
- it is discoloured
- it contains lumps or flakes
- it is past its expiry date.



Insulin action

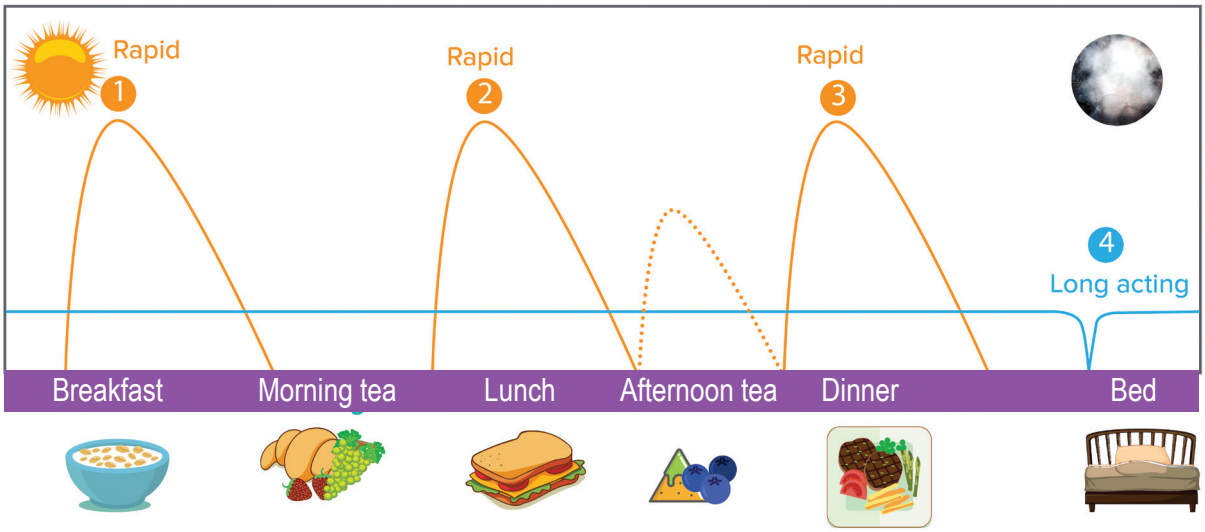
There are various brands and types of insulin available. They are all identical in structure to human insulin despite being made synthetically. Below is a table of commonly used insulin at Perth Children's Hospital.

The type of insulin used depends on the insulin regimen prescribed.

Insulin type	Preparations	Onset of action	Peak of action	Duration of action
Rapid acting (clear)	Humalog NovoRapid Fiasp	0-15 mins	1-1½ hrs	3-5 hrs
Mixed insulin	Ryzodeg	0-15 mins	0-15 mins (short acting) and No peak (long acting)	24 hrs
Long acting (clear)	Optisulin	2-4 hrs	No peak	24 hrs

Once daily insulin

- One long acting insulin before bed
- May be needed if medication of BG levels not in target
- May be only needed for a period of time

Multiple daily Injections (MDI)

- A rapid-acting insulin prior to all main meals
- A long-acting insulin at night before bed
- The preferred insulin injection regimen to achieve BGL targets but does require a lunch time insulin injection to be facilitated. Allows for greater flexibility.