## **MEDICAL CONVERSATION**



Left to right: Associate Professor Sum Chee Fang, Senior Staff Nurse Heng Boon Ling and Staff Nurse Josephine Tan

#### Who needs insulin treatment?

Insulin can improve blood glucose control. It can prevent or delay the complications of diabetes. Insulin therapy may be needed in the following circumstances:

- Patients with type I diabetes
- Patients with type 2 diabetes who are not able to achieve appropriate HbAIc target in spite of oral medications and appropriate lifestyle habits
- Patients with type 2 diabetes previously on oral medications who are planning pregnancy and during pregnancy
- Patients with gestational diabetes who are not able to achieve blood glucose targets with appropriate diet and lifestyle

# **Insights**

Treatment of diabetes has come a long way since insulin was discovered in 1920 by Dr Frederick Banting. Associate Professor Sum Chee Fang. Senior Consultnat, Endocrinologist, Alexandra Hospital, Senior Staff Nurse Heng Boon Ling and Staff Nurse Josephine Tan give an update on the latest insulin therapies to control blood glucose levels.

#### What are the different types of insulin?

Currently, insulin is usually injected by patients subcutaneously (just under the skin). Insulin formulations can be divided into different categories based on:

- How fast they start to work (Onset)
- When they reach the peak of action (Peak)
- How long they stay effective in your body (Duration)
- Due to its onset of action, a meal should be taken immediately after a shot of rapid acting insulin or an insulin mixture containing rapid acting insulin e.g. aspart, Novomix 30/70 insulin.
- Due to its onset of action, a meal should be taken about half an hour after a shot of short acting insulin or an insulin mixture containing short acting insulin e.g. regular insulin, Mixtard 30/70 insulin.

Types of Insulin	Names of Insulin	Onset	Peak	Duration
Rapid Acting	Lispro/ Aspart	5-15 mins	l hour	3-5 hours
Short Acting	Humulin R/ Actrapid	0.5-1 hour	2-3 hours	3-6 hours
Intermediate Acting	Humulin N/ Insulatard	2-4 hours	7-8 hours	10-12 hours
Long Acting	Glargine/ Levemir	I-2 hours	No peak	Up to 24 hours
Pre Mixed Insulin	Mixtard 30/70, Mixtard 50/50, Humalog 25/75	30 mins	2-8 hours	10-12 hours
Pre Mixed Analogue	Novomix 30/70	10-20 mins	I-4 hours	10-12 Hours

#### What are the various insulin devices available?

Currently, insulin is usually injected subcutaneously using different patient-friendly devices. There is the conventional method of using the disposable syringe and vial.

Other convenient devices are pre-filled disposable insulin pen, which allows easy handling and dialing of units without the hassle of withdrawing insulin from the vial. The insulin pen comes with replaceable cartridges or in the form of disposable pens. With medical and technological advancement, insulin pumps for delivering of insulin continuously and precisely are also available.

Inhaled insulin is another latest development. It provides insulin in a form of spray or dry powder inhaled through the mouth directly into the lung and passes to the blood stream. It can be used to provide meal insulin boluses.

Insulin cannot be taken by mouth because it gets inactivated by the digestive enzymes in the gut. It is therefore most commonly given as an injection under the skin, usually into the thigh, buttocks, abdomen or upper arm.

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#### Which is the best site to inject?

Insulin is to be injected into the subcutaneous tissue of the body. Intramuscular injection is not recommended for routine use, as the rate of absorption is faster. Site selection is important as it affects absorption:

The more common site of insulin injections is:

Abdomen (this is the fastest and most consistent)
 Allow two inches away from navel

Other sites are also sometimes used:

- Upper arms (slower)
  - Outer back area of the upper arm
- Anterior and lateral aspects of thigh (slowest)
  Outer mid lateral of thigh
- Buttocks (slowest)
  - Outer quadrant of the buttock

Rotation of injection site is essential to prevent fat deposit as repeated shot in the same spot can cause lipohypertrophy. This can lead to slower and inconsistent absorption of insulin.

Rotating within abdomen is recommended rather than rotating to a different region with each injection as this increases absorption variability.

#### How should insulin be stored?

There are specific storage guidelines provided by different manufacturers. As a general rule, vial insulin should be refrigerated at two to eight degrees Celsius. Insulin (vials and pens) should be kept at the lower part of refrigerator, away from the freezer. Extreme temperature (<2 or >30 degrees Celsius) should be avoided to prevent loss of potency, clumping, frosting or precipitation.

Unopened insulin vials and pens should be kept in the refrigerator. Open vials of insulin (vials and pens) should be used within a month. When travelling, insulin should always be hand carried and not checked in with luggage. Insulin pens in use can be stored in room temperature (less than 30 degrees Celsius).

# What the different kinds of insulin syringes and needles available?

Insulin syringes comes in different capacity of 30cc, 50cc and 100cc. Length of needles are also available in 6mm, 8mm and 12.7mm. There are also smaller gauge needles – 30G and 31G to help those who are fearful of pain when injecting.

For the finer and thinner 31G needles, caution is required when injecting, as the needle- end can bend into a hook and cause laceration to the tissue or skin.

It is advisable to all clients that syringes or needles should not be reused. Do not wipe or clean needles with alcohol, too. Choosing the appropriate length of insulin needle is essential as it can vary insulin absorption.



It is important to dispose of used needles appropriately (e.g. into a bottle or container) instead of throwing into the waste bin with the needles exposed, to minimise injury.

#### What are the causes of hypoglycaemia?

- Too little carbohydrates
- Too much exercise
- Too much insulin
- Delayed/ missed meal
- Taking alcohol without food

#### What are the signs and symptoms of hypoglycaemia?

- Sweating
- Trembling of hands/ nervousness
- Hunger
- Dizziness/ headache
- · Change in behaviour/ moody/ confused
- Tiredness
- Unconsciousness

#### How do we treat hypoglycaemia?

In the patient who is conscious and able to take orally, apply the 15-15 rule:

Take 15gm of fast digesting carbohydrates e.g. three teaspoons of glucose powder in 120mls of water or three to five candies. Than check glucose 15 minutes later. If blood sugar increases above 4mmol/L, a slow digesting carbohydrate or snack can be taken. If you do not feel any better, repeat the above or consult your doctor.

Symptoms of hypoglycaemia include paleness, shaking, shivering, perspiration, rapid heartbeat, hunger, anxiety and blurred vision.