

Treating Diabetes Mellitus & High Blood Sugar

Although there is currently no cure for diabetes, there are many effective drug treatments to control your blood sugar, reduce risk of complications and enjoy your life to the fullest. Pharmacists Ms Foo Lic Yong and Ms Lee Yee Ming from Pharmaceutical Society of Singapore report.

There are many types of insulins available and are differentiated by their duration of action as shown in table 1. Your doctor will select the type and dose of insulin according to your needs based on your diabetes control and lifestyle.

I. Insulin injection

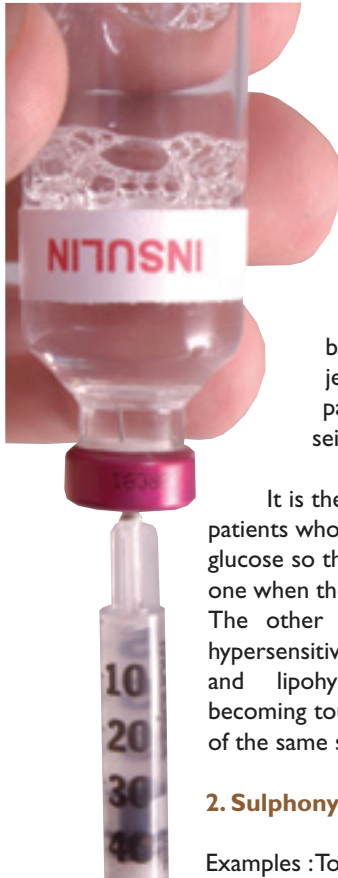
Your insulin is to be injected subcutaneously into the fatty tissue, such as the abdomen area. It is important to rotate the site of injection, as repeated injections at the same place will result in tough or lumpy tissue and less effective absorption of insulin.

The timing of injection depends on the type of insulin you are on. Please consult your doctor or pharmacist to verify the timing of the insulin injection and whether some of your insulins can be mixed.

It is important to store your insulin in the fridge (do not freeze). Once it has been opened, your insulin is stable for up to four weeks. Make sure you indicate the date of opening on each opened insulin bottle. Do not use expired insulins. Always inspect your insulin and if lumps are present, do not continue to use it as the lumps indicate the insulin may be damaged.

Table 1

Insulin Preparation	Brand
<u>Ultrashort acting</u> Insulin Lispro Insulin Aspart Insulin Glulisine	Humalog® Novorapid® Adipra®
<u>Short Acting</u> Recombinant DNA Origin Regular human insulin	Humulin® R Actrapid®
<u>Intermediate Acting Insulin</u> Recombinant DNA Origin NPH Isophane suspension	Humulin® N
<u>Long Acting Insulin</u> Human Insulin Analogues Insulin Glargine Insulin Detemir	Lantus® Levemir®
<u>Combination Preparations</u> 30% Reg Insulin + 70% NPH 50% Reg Insulin + 50% NPH Insulin Lispro 25% + Lispro Protamine 75% Insulin Aspart 30% + Aspart Protamine 70%	Humulin® 30/70 Mixtard® 30 Mixtard® 50 Humalog® Mix 25 Novomix® 30



The most common side effect of insulin is low blood glucose level (also known as hypoglycaemia). The signs and symptoms of hypoglycaemia include dizziness, rapid heart beat, hand tremors, pale skin colour, sweating, hunger, sudden moodiness or behaviour changes, clumsy or jerky movement, difficulty in paying attention, confusion and seizure.

It is therefore very important for all patients who are on insulin to carry some glucose so that they can immediately take one when they experience hypoglycaemia. The other side effects of insulin are hypersensitivity reaction (such as rashes) and lipohypertrophy (injection site becoming tough or lumpy due to overuse of the same site).

2. Sulphonylureas tablets

Examples :Tolbutamide, glipizide, gliclazide, glimepiride, glibenclamide

Sulphonylureas stimulate the release of insulin from the pancreas. Thus it only used in type 2 diabetes whereby the pancreas is still able to secrete insulin. This medication is to be taken before meals.

The most common side effects are hypoglycaemia and weight gain. People allergic to sulphur may develop an allergic reaction to sulphonylureas and hence, need to use other kinds of oral antidiabetic drugs instead.

3. Metformin

Metformin reduces glucose production from the liver and increase the utilisation of blood glucose by the muscle.

The most common side effects of metformin are nausea, vomiting and diarrhea. Loss of appetite or a metallic taste is also frequently reported. This side effect can be reduced if metformin is to be taken with or after meal. Metformin should not be used in patients with severe kidney disease and heart failure.

4. Short acting secretagogues (Repaglinide, nateglinide)

These secretagogues lowers blood glucose by stimulating

pancreatic insulin secretion in a manner dependent on the glucose level. Both repaglinide and nateglinide should be administered before each meal. If you skip a meal, you should also skip your dose for that meal. The main side effect of the secretagogues is hypoglycaemia.

5. Thiazolidinediones (Rosiglitazone, pioglitazone)

The thiazolidinediones increase your body cell's sensitivity to insulin.

Rosiglitazone has been associated with the side effect of fluid retention leading to weight gain. There are reported cases of liver toxicity in patients taking this group of drugs, thus routine tests to monitor your liver are needed.

6. Alpha-Glucosidase Inhibitors (Acarbose)

The alpha-glucosidase inhibitors delay the breakdown of carbohydrates and hence, delay the rise in blood glucose after a meal. Acarbose is to be taken with meal. The common side effects are wind, bloating and diarrhoea.

If you experience hypoglycaemia and are on acarbose, you must use simple sugar and not complex sugar, as acarbose will delay the breakdown of complex sugar to simple sugar that is necessary to correct the hypoglycaemia.

7. Other new anti-diabetic drugs coming up in the market

Exubera® inhaled insulin

Exubera® is a new inhaled human insulin developed by Pfizer, approved by USA FDA in January 2006 to be used in type 1 or type 2 diabetes. It is currently awaiting approval in Singapore.

Exubera® should not be used in patients with lung disease such as asthma, as there is insufficient data to support its safe use in this group of patients.

Patients must not smoke during the therapy with Exubera® and must have stopped smoking at least six months before starting Exubera therapy. Therapy should be discontinued immediately if a patient starts or resumes smoking due to the increased risk of hypoglycaemia and the patient should seek alternative treatment.

Incretin mimetic (Exenatide injection)

Exenatide (Byetta®) is an incretin-mimetic that was first approved by FDA in April 2005. It is manufactured by Amylin Pharmaceutical. Exenatide is injected within one hour before your breakfast and dinner. It stimulates insulin release according to the glucose level and slows stomach emptying (you feel full easily) and reduces glucose produced by the liver.

Exenatide is indicated as an add-on therapy for patients with type 2 diabetes who are taking metformin, a sulphonylurea, a thiazolidinedione and a combination of metformin and a sulphonylurea, or a combination of metformin and a thiazolidinedione, but have not achieved adequate glycaemic control.

Sitagliptin Phosphate (Javunia®) tablet

Sitagliptin phosphate is an orally-active inhibitor of the dipeptidyl peptidase-4 (DPP-4) enzyme. It is manufactured by Merck Co. and approved for use in USA by FDA on October 2006 as an adjunct to diet and exercise to improve glycaemic control in patients with type 2 DM.

Sitagliptin blocks the DPP-4 enzyme from breaking down the incretin hormone that stimulates the release of insulin. Because of its long duration of action, it is taken only once a day. The most common side effects reported are upper respiratory tract infection, sore throat and headache.

These three new drugs - Sitagliptin Phosphate (Javunia®) tablet, Incretin mimetic (Exenatide injection) and Exubera® inhaled insulin - are not yet available in Singapore. For more information about the new drugs, please approach your doctor or pharmacist.

Lifestyle modification

In general, most diabetics will benefit from increased physical activity. The common health goal should be to achieve at least 150 minutes of moderate-intensity physical activity per week. People with diabetes who undertake regular physical activity have been shown to have substantially lower mortality rates over 12 to 14 years.



For underweight individuals with type 1 diabetes, a high carbohydrate (with modest simple sugar intake), low fat (especially low in saturated fat), and low cholesterol diet is appropriate in most situations. Most patients with type 2 diabetes will need caloric restriction. For more details, please consult your dietitian.



Are you or your loved ones taking more than five medicines per day?

Do you have any questions about the medicines you are taking?

Visit your pharmacists with all your medicines for a medicine review or check.

Your pharmacist will:

- Review all your medicines, vitamins and herbal supplements
- Provide personalised advice and information on your medicine therapy
- Assess risks of drug interactions and medicine-related problems

Talk to your pharmacist who can help you take charge of your medicines!

