# DRUGS USED IN DIABETES

The body obtains most of its energy from glucose, a simple form of sugar made in the intestine from the breakdown of starch and other sugars. Insulin, one of the hormones produced in the pancreas, enables body tissues to take up glucose from the blood, either to use it for energy or to store it. In diabetes mellitus (or sugar diabetes), there is either a complete lack of insulin or too little is produced. This results in reduced uptake of glucose by the tissues and therefore the glucose level in the blood rises abnormally. A high blood glucose level is medically known as hyperglycaemia.

There are two main types of diabetes mellitus. Type 1 (insulin-dependent) diabetes usually appears in young people, 50 per cent of cases occurring around the time of puberty. The insulin-secreting cells in the pancreas are gradually destroyed. An autoimmune condition (where the body recognizes its pancreas as "foreign" and tries to eliminate it) or a childhood viral infection is the most likely cause. Although the decline in insulin production is slow, the condition often appears suddenly, brought on by periods of stress (for example, infection or puberty) when the body's insulin requirements are high. Symptoms of Type 1 diabetes include extreme thirst, increased urination, lethargy, and weight loss. This type of diabetes is fatal if it is left untreated.

In Type 1 diabetes, insulin treatment is the only treatment option. It has to be continued for the rest of the patient's life. Several types of insulin are available, which are broadly classified by their duration of action (short-, medium-, and long-acting).

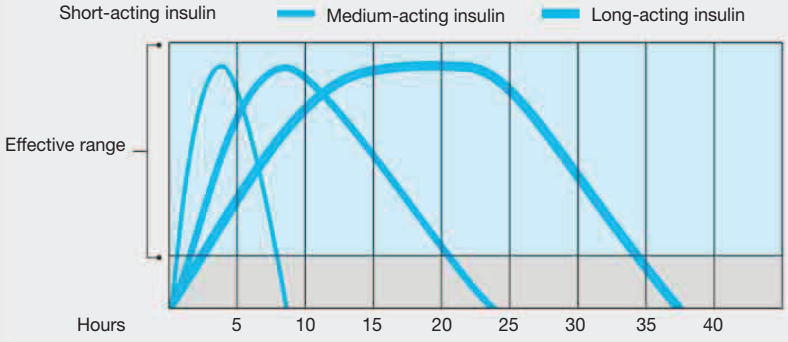
Type 2 diabetes, formerly known as non-insulin-dependent diabetes mellitus (NIDDM) or maturity-onset diabetes, tends to appear at an older age (usually over 40, although it has become increasingly common in younger age groups) and to come on much more gradually – there may be a delay in its diagnosis for several years because of the gradual onset of symptoms. In this type of diabetes, the levels of insulin in the blood are usually high. However, the cells of the body are resistant to the effects of insulin and have a reduced glucose uptake despite the high insulin levels. This results in hyperglycaemia. Obesity is the most common cause of Type 2 diabetes.

In both types of diabetes, an alteration in diet is vital. A healthy diet consisting of a low-fat, high-fibre, low simple sugar (cakes, sweets) and high complex sugar (pasta, rice, potatoes) intake is advised. In Type 2 diabetes, a reduction in weight alone may be sufficient to lower the body's energy requirements and restore blood glucose to normal levels. If an alteration in diet fails, oral antidiabetic drugs, such as metformin, acarbose, or sulphonylureas, are prescribed. Insulin may need to be given to people with Type 2 diabetes if the above treatments fail, or in pregnancy, during severe illness, and before the patient undergoes any surgery requiring a general anaesthetic.

## ADMINISTRATION OF INSULIN

The non-diabetic body produces a background level of insulin, with additional insulin being produced as required during meals. The insulin delivery systems currently available cannot mimic this precisely. In people with Type 1 diabetes, short-acting insulin is usually given before meals, and medium-acting insulin is given either before the evening meal or at bedtime. Insulin pen injectors are particularly useful for administration during the day because they are discreet and easy to carry and use. In patients with Type 2 diabetes who require insulin, a mixture of short- and medium-acting insulin may be given twice a day. Special pumps that deliver continuous subcutaneous insulin appear to have no advantage over multiple subcutaneous injections. Some new types of insulins called insulin analogues (e.g. Insulin lispro) may be better at mimicking the insulin-producing behaviour of the normal pancreas.

**Duration of action of types of insulin**




## ACTION OF SULPHONYLUREA DRUGS


**Before drug treatment**
In Type 2 diabetes, the islet cells of the pancreas secrete insufficient insulin to meet the body's needs.


**After drug treatment**
The drug stimulates the islet cells to release increased amounts of insulin.

### Importance of treating diabetes

If diabetes is left untreated, the continuous high blood glucose levels damage various parts of the body. The major problems are caused by atherosclerosis, in which a build-up of fatty deposits in the arteries narrows them, reducing the flow of blood. This can result in heart attacks, blindness, kidney failure, reduced circulation in the legs, and even gangrene. The risk of these conditions is greatly reduced with treatment. Careful control of diabetes in young people, during puberty and afterwards, is of great importance in reducing possible long-term complications. Good diabetic control before conception reduces the chance of miscarriage or abnormalities in the baby.

### How antidiabetic drugs work

Insulin treatment directly replaces the natural hormone that is deficient in diabetes mellitus. Human and pork insulins are the most widely available. When transferring between animal and human insulin, alteration of the dose may be required.

Insulin cannot be taken by mouth because it is broken down in the digestive tract before it reaches the bloodstream. Regular injections are therefore necessary (see Administration of insulin, above).