

# Type 1 Diabetes

Type 1 diabetes is the type of diabetes that typically develops in children and young adults. In Type 1 diabetes the body stops making insulin and the blood glucose level goes very high. Treatment to control the blood glucose level is with insulin injections and a healthy diet. Other treatments aim to reduce the risk of complications and include reducing blood pressure if it is high, and to lead a healthy lifestyle.

## What is diabetes?

Diabetes mellitus (just called diabetes from now on) occurs when the level of glucose (sugar) in the blood becomes higher than normal. There are two main types of diabetes. These are called Type 1 diabetes and Type 2 diabetes.

## Understanding blood glucose and insulin

After we eat, various foods are broken down in the gut into sugars. The main sugar is called glucose. This is absorbed through the gut wall into the bloodstream. Glucose is like a 'fuel' which is used by the cells in the body for energy. To remain healthy, your blood glucose level should not go too high or too low.

So, when your blood glucose begins to rise (after eating), the level of a hormone called insulin should also rise. Insulin acts on the cells of your body and makes them take glucose into the cells from the bloodstream. Some of the glucose is used by the cells for energy, and some is converted into glycogen or fat (which are stores of energy). When the blood glucose level begins to fall (between meals, or when we have no food), the level of insulin falls. Some glycogen or fat is then broken down back into glucose and some is released back into the bloodstream to keep the blood glucose level normal.

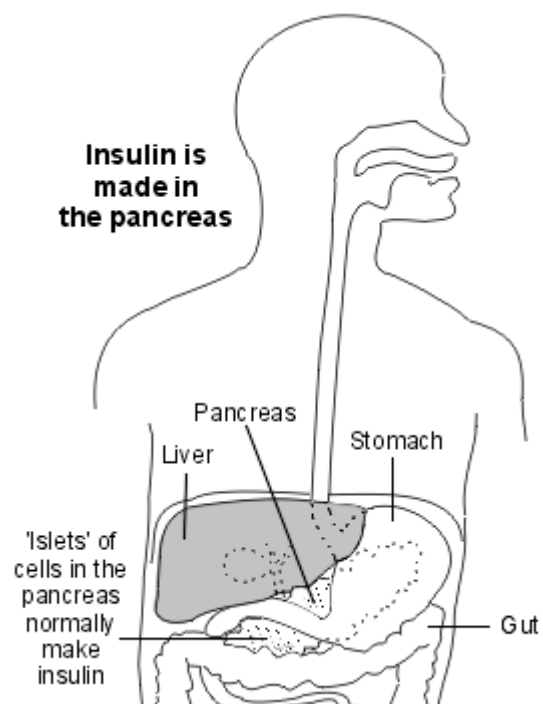
Hormones such as insulin are chemicals that are released into the bloodstream and have an action on certain parts of the body. Insulin is made by special cells called beta cells which are part of little 'islands' of cells (islets) within the pancreas.

Diabetes develops if you do not make enough insulin, or if the insulin that you do make does not work properly on the body's cells.

## What is Type 1 diabetes?

This is also known as juvenile, early onset, or insulin dependent diabetes. It usually first develops in children or young adults. In the UK about 1 in 250 people develop Type 1 diabetes at some stage.

With Type 1 diabetes the illness usually develops quite quickly, over days or weeks, as the pancreas stops making insulin. It is treated with insulin injections and a healthy diet (see below).



### **Why does the pancreas stop making insulin?**

In most cases, Type 1 diabetes is thought to be an 'auto-immune' disease. The immune system normally makes antibodies to attack bacteria, viruses, and other 'germs'. In auto-immune diseases the immune system makes antibodies against part or parts of the body. If you have Type 1 diabetes you make antibodies that attach to the beta cells in the pancreas. These are thought to destroy the cells that make insulin. It is thought that something triggers the immune system to make these antibodies. The 'trigger' is not known but a popular theory is that a virus triggers the immune system to make these antibodies.

Rarely, Type 1 diabetes is due to other causes. For example, severe inflammation of the pancreas, or surgical removal of the pancreas for various reasons.

## **Type 2 diabetes**

This is also known as maturity onset, or non-insulin dependent diabetes. Type 2 diabetes usually develops after the age of 40 (but sometimes occurs in younger people). It is more common in people who are overweight or obese.

With Type 2 diabetes, the illness and symptoms tend to develop gradually (over weeks or months). This is because in Type 2 diabetes you still make insulin (unlike Type 1 diabetes). However, you either do not make enough for your body's needs, and/or the cells in your body are not able to use it properly. This is called 'insulin resistance'.

**The rest of this leaflet deals only with Type 1 diabetes.**

## **What are the symptoms of Type 1 diabetes?**

The symptoms that usually occur when you first develop Type 1 diabetes are:

- you are very thirsty a lot of the time.
- you pass a lot of urine.
- tiredness, weight loss, and feeling generally unwell.

The above symptoms tend to develop quite quickly, over a few days or weeks. After treatment is started the symptoms soon settle and go. However, *without treatment*, the blood glucose level becomes very high and acids form in the bloodstream ('ketosis'). If this persists you will become dehydrated, and are likely to lapse into a coma and die. (The reason you make a lot of urine and become thirsty is because glucose leaks into your urine which 'pulls out' extra water through the kidneys.)

## **How is diabetes diagnosed?**

A simple 'dipstick' test can detect glucose in a sample of urine. If you have glucose in your urine, it is likely that you have diabetes. (Urine does not normally contain glucose. If the blood glucose level goes above a certain level, then some glucose 'spills' through the kidneys into the urine.)

However, some people have kidneys that are more 'leaky' than usual, and glucose may leak into urine with a normal blood level. Therefore, if your urine contains any glucose you should have a blood test. The blood test measures the blood level of glucose to confirm, or rule out, diabetes.

## **Is Type 1 diabetes inherited?**

There is some genetic factor. A first degree relative (sister, brother, son, daughter) of someone with Type 1 diabetes has about a 6 in 100 chance of developing Type 1 diabetes. (This is higher than the chance of the general population which is about 1 in 250.) This is probably because certain people are more prone to develop auto-immune diseases such as diabetes, and this is due to their genetic make-up which is inherited.

## What are the possible complications of diabetes?

### Very high blood glucose level

If you do not have treatment, or use too little insulin, a very high level of glucose can develop quite quickly - over several days. If left untreated this causes dehydration, drowsiness, and serious illness which can be life-threatening. A very high blood glucose level sometimes develops if you have other illnesses such as flu. In these situations you may need to adjust the dose of insulin to keep your blood glucose level normal.

### Long-term complications

If the blood glucose level is higher than normal, over a long period of time, it can have a damaging effect on the blood vessels. Even a mildly raised glucose level which does not cause any symptoms in the short-term can affect the blood vessels in the long-term. This may lead to some of the following complications (often years after diabetes is first diagnosed).

- Atheroma ('furring or hardening of the arteries') which can cause problems such as angina, heart attacks, stroke, and poor circulation.
- Eye problems which can affect vision (due to damage to the small arteries of the retina at the back of the eye).
- Kidney damage which sometimes develops into kidney failure.
- Nerve damage.
- Foot problems (due to poor circulation and nerve damage).
- Impotence.
- Other rare problems.

The type and severity of long-term complications varies from case to case. You may not develop any at all. In general, the risk of developing complications is reduced if the blood glucose level is well controlled, and other risk factors such as high blood pressure are dealt with.

### Treatment complications

Too much insulin can make the blood glucose level go too low (hypoglycaemia, sometimes called a 'hypo'). This can cause you to feel sweaty, confused, and unwell, and you may lapse into a coma. Emergency treatment of hypoglycaemia is with sugar, sweet drinks, or a glucagon injection (a hormone which has the opposite effect to insulin). Then eat a starchy snack such as a sandwich.

## What are the aims of treatment?

Symptoms will ease, and you will feel well again, if a high blood glucose level is reduced below a certain level with some insulin. However, you still have some risk of developing complications in the long-term if your blood glucose level remains mildly high.

**Therefore, the main long-term aims of treatment are:**

1. To keep your blood glucose level as near normal as possible.
2. To reduce any other 'risk factors' which may increase your risk of developing complications. In particular, to reduce your blood pressure if it is high, and to lead a healthy lifestyle.
3. To detect any complications as early as possible. Treatment can prevent or delay some complications from getting worse.

## Treatment aim 1 - keeping your blood glucose level near normal

### Insulin

To stay alive and healthy you will need insulin injections for the rest of your life. Insulin is not absorbed in the gut so it needs to be injected rather than taken as tablets. Most people take 2-4 injections of insulin each day. Your doctor or diabetes nurse will give a lot of advice and instruction on how and when to take the insulin. There are various types of insulin and the type advised will be tailored to your needs.

### **Healthy diet**

The healthy diet is the same that is recommended for everyone. The idea that you need special foods if you have diabetes is a myth. Like everyone else, you should aim to eat a low fat, high fibre diet with plenty of starchy foods, fruit and vegetables. However, you will need to know how to balance the right amount of insulin for the amount of food that you eat. Therefore, you will normally be referred to a dietician for detailed advice.

### **Balancing insulin and diet, and monitoring blood glucose levels**

Many people with Type 1 diabetes are shown how to do blood tests at home to monitor the blood glucose level. This helps you to adjust the amount of insulin and food according to the blood glucose level and your daily routine.

### **What is the level of blood glucose to aim for?**

If you check your blood glucose level, ideally you should aim to keep the level between 4 and 7 mmol/l before meals, and less than 10 mmol/l two hours after meals.

Another blood test is called HBA1c. This test measures a part of the red blood cells. Glucose in the blood attaches to part of the red blood cells. This part can be measured and gives a good indication of your blood glucose control over the last 2-3 months. This test may be done once or twice a year by your doctor or nurse. A level of HBA1c of 7% or less is usually the target to aim for.

## **Treatment aim 2 - to reduce other risk factors**

You are less likely to develop complications of diabetes if you reduce any other 'risk factors'. These are briefly mentioned below, but are discussed more fully in another leaflet called *Preventing Cardiovascular Disease*. Everyone should aim to cut out preventable risk factors, but people with diabetes have even more of a reason to do so.

### **Keep your blood pressure down**

Have your blood pressure checked regularly. The combination of high blood pressure and diabetes is a particularly high risk factor. Even mildly raised blood pressure should be treated if you have diabetes. Medication may be needed to keep your blood pressure down. See separate leaflet called '*Diabetes and High Blood Pressure*'.

### **You should not smoke**

Smoking is a high risk factor. See a practice nurse if you smoke and have difficulty stopping. If necessary, medication or nicotine replacement therapy (nicotine gum, etc) may help you to stop.

### **Do some physical activity regularly**

Regular physical activity also reduces the risk of some complications such as heart and blood vessel disease. If you are able, a minimum of 30 minutes brisk walking at least five times a week is advised. Anything more vigorous is even better. For example, swimming, cycling, jogging, dancing. Ideally you should do an activity that gets you at least mildly out of breath and mildly sweaty. You can spread the activity over the day. (For example, two fifteen minute spells per day of brisk walking, cycling, dancing, etc.)

### **Other medication**

Depending on your age and how long you have had diabetes, you may be advised to take a drug to lower your cholesterol level, and to take a daily aspirin. These help to lower the risk of developing some complications such as heart disease and stroke.

### **Try to lose weight if you are overweight or obese**

Excess weight is also a risk factor for heart and blood vessel disease. Getting to a 'perfect weight' for many people is unrealistic. However, if you are overweight, losing some weight will help.

Some of these lifestyle issues may not seem to be relevant at first to young children who are diagnosed as having diabetes. However, as children grow, a healthy lifestyle should be greatly encouraged for the long-term benefits.

## Treatment aim 3 - to detect and treat any complications

Most GP's surgeries and hospitals have special diabetes clinics. Doctors, nurses, dieticians, chiropodists, optometrists, and other health care workers all play a role in giving advice and checking on progress. Activities in diabetes clinics include:

- Checking levels of blood glucose, HbA1c, cholesterol, and blood pressure.
- Ongoing advice on diet and lifestyle.
- Checking for early signs of complications. For example:
  - eye checks - to detect problems with the retina (a possible complication of diabetes) which can often be prevented from getting worse. Glaucoma is also more common in people with diabetes, and can usually be treated.
  - urine tests - these include testing for protein in the urine which may indicate early kidney problems.
  - foot checks - to help to prevent foot ulcers.
  - blood tests - these include checks on kidney function and other general tests. They also include checks for some auto-immune diseases which are more common in people with diabetes. For example, coeliac disease and thyroid disorders are more common than average in people with Type 1 diabetes.

Some complications can be treated much easier if they are detected early. So, regular checks are important.

## Immunisation

You should be immunised against 'flu (each autumn) and against the pneumococcus bacteria (just given once). These infections can be particularly unpleasant if you have diabetes.

## Diabetes UK

This leaflet gives only a brief account of diabetes. For further information on diabetes, contact Diabetes UK (formerly the British Diabetic Association). There are numerous branches throughout the country. They produce information leaflets on various topics related to diabetes and their careline answers enquiries on all aspects of diabetes.

### Diabetes UK

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Web: [www.diabetes.org.uk](http://www.diabetes.org.uk)

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