

Patient information from BMJ

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Diabetes type 1: what are the treatment options?

Type 1 diabetes is a long-term condition that usually starts in childhood or young adulthood, but it can also occur later in life. Taking insulin, eating healthily, and staying active can help you, or your child, live a long and healthy life with type 1 diabetes.

You can use our information to talk with your doctor and decide which treatments are right for you or your child.

What is it?

If you have diabetes, you have too much **glucose** in your blood. Glucose is a kind of sugar that your body uses for energy. But if too much of it builds up in your blood it can make you ill.

There are two main types of diabetes: type 1 and type 2. This information is for adults with type 1 diabetes and parents of children with this condition. Type 1 diabetes usually starts in childhood, adolescence, or early adulthood, but it may also start later in adult life.

Everyone needs a hormone called **insulin** to keep their blood glucose at a healthy level. But when you have type 1 diabetes, your body stops making insulin or makes very little of it.

This kind of diabetes used to be called insulin-dependent diabetes, because it can be controlled by taking insulin.

Usually, type 1 diabetes is what's called an **autoimmune** disease. This means that the cells in your immune system, which normally fight infection, attack some of your own cells by mistake. In type 1 diabetes, the immune system attacks the cells that make insulin.

Doctors don't know why this happens. It may be triggered by viruses, or by your genes, or by a combination of things. Some people get type 1 diabetes without having an autoimmune problem, but this isn't common.

What treatments are available?

There isn't a cure for type 1 diabetes. But treatment can help you, or your child, stay healthy. The main treatment is **taking insulin**, probably several times a day.

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People with type 1 diabetes take insulin because it helps to keep their **blood glucose level** (the amount of glucose in their blood) as close to normal as possible. Blood glucose that's too high or too low can cause serious problems.

If you have type 1 diabetes it's also important to:

- **check** your blood glucose regularly
- eat a **healthy diet**, and
- **exercise** regularly.

If your child has type 1 diabetes, staff members at their **school** should be trained to help them manage their diabetes, including their insulin. Your child should usually be able to do all the same activities as other children their age.

Checking your blood glucose level

As well as taking insulin, you will need to **check your blood glucose level** several times a day.

This can be a bit complicated and can take time to get used to. But the staff treating you will help you to get used to how it works.

They should also explain things like why a 'normal' level of blood glucose can vary at different times of the day. For example, 'normal' might be quite low first thing in the morning, when you haven't eaten for 12 hours or so, or when you're exercising and using a lot of energy.

Your doctor should also help you to work out a testing routine that works with your own (or your child's) personal needs and situation.

For example, most people need to keep their blood glucose as close to normal as possible, all the time. But this can be hard to do in people who find the constant tests distressing, such as very young children, or older people. If issues like these affect you, you and your doctor can work out an approach that's a bit more relaxed.

Ways of checking blood glucose

For many years, people with diabetes have checked their blood glucose with a finger-prick test. This involves drawing a tiny drop of blood and for testing. Many people still use this method.

But in recent years new testing methods have become available. These are often useful for people who find constant finger-rick testing distressing such as young children, or for people who have trouble remembering to do the testing.

One of these methods is called **Continuous Glucose Monitoring or CGM**. To use this method you need special equipment, which consists of:

- a **sensor** that attaches to your abdomen (tummy). It measures the amount of glucose that's just under your skin, and
- a **transmitter** attached to the sensor. This sends your blood glucose information to a receiver or to your smartphone.

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You can get a CGM device that works with an insulin pump, if you use one, or one that works by itself. As the name suggests, this system sends continuous readings to your receiver or phone, so that you always know your blood glucose level.

A similar method is called **Flash monitoring**. With the Flash system, the sensor attaches to your arm instead of your tummy. It sends information to your receiver in the same way as CGM, but only when you scan the sensor.

The Flash system is much cheaper than the CGM system. But, depending on where you live, you might be able to get one of these systems for free.

For example, in the UK, many people with type 1 diabetes, including pregnant women and most children, should be able to get free CGM or Flash systems. You can talk to your doctor about whether you can get this type of equipment without having to pay.

Insulin

Insulin is a hormone that helps move glucose from your blood into your body's cells. Your cells then use the glucose as energy. Insulin keeps the level of glucose in your blood steady.

The insulin used for diabetes is made in a laboratory. It is designed to be as much like natural human insulin as possible. It works in the same way to keep blood glucose under control.

There are different types of insulin. They vary in:

- how quickly they work
- when they peak, and
- how long they last.

For example, you might hear your doctor use terms like **basal insulin** and **bolus insulin**.

- **Basal** insulin is the normal scheduled dose that you take several times a day, while
- **bolus** insulin is a dose that you take at mealtimes, to help deal with the glucose that enters your blood when you eat.

Your doctor will help you work out which are best for you or your child, and decide on a dosing schedule.

Ways to take insulin

You can't take insulin as tablets, because the digestive juices in your stomach would destroy the insulin. Most people take it as **injections**, several times a day.

You might not like the idea of giving yourself or your child injections. But there are special devices made for people with diabetes that make giving injections much easier. The needles in these devices are very thin and you will probably find you soon get used to them.

Another way to take insulin is with an **insulin pump**. This is a device that gives the body a constant supply of insulin. The pump is about the same size and shape as a pack of cards.

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Inside the pump is a store of insulin. It is pumped out through a long tube and into the body through a special kind of needle that stays in the skin. However, you can disconnect it for short periods (for example, while showering or bathing, going swimming, or getting dressed).

Dosing schedule

It might take some time to work out a dosing schedule that fits well with how you or your child lives. The amount of insulin people with type 1 diabetes need changes according to what they eat and drink, and how much exercise they take.

It can also change for other reasons, including if:

- they have an infection
- they're stressed, or
- their body is having hormone changes from puberty or pregnancy.

You will need to be extra careful during these times.

If you are a woman and would like to become pregnant, talk to your doctor about steps you can take to prepare for a healthy pregnancy.

Checking blood glucose levels regularly is key to getting a good balance between your insulin dose and your eating and activity. This is true whether you are injecting insulin or using an insulin pump.

Regularly monitoring blood glucose and carefully managing insulin doses can help you avoid two potentially serious problems: **hypoglycaemia** and **hyperglycaemia**.

- If people with type 1 diabetes take too much insulin, they can get **hypoglycaemia**. This happens because their blood glucose drops too low.

Symptoms include feeling very hungry, nervous, shaky, sweaty, dizzy, or confused. You should talk to your doctor about what you should do if you or your child gets these symptoms.

If the symptoms are mild, taking glucose tablets or gels, or drinking milk or juice, may be all the treatment that's needed. However, severe hypoglycaemia is a **medical emergency** and requires prompt medical treatment.

- If people don't take enough insulin, their blood glucose can get too high. This is called **hyperglycaemia**, and it also requires prompt treatment.

Hyperglycaemia can cause blurred vision, thirst, frequent urination, and tiredness.

It can also lead to a potentially serious problem called **diabetic ketoacidosis (DKA)**, which is a build-up of acids in your blood. This can happen when your blood glucose is too high for too long. For more detailed information, see our leaflet *Diabetic ketoacidosis*.

Healthy living

If you or your child has type 1 diabetes, staying healthy doesn't just mean taking insulin. Eating healthily and being active can also help keep your blood glucose levels under control.

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Also, if you smoke, one of the best things you can do is to stop. Your doctor can recommend treatments that can help.

Diet

What people eat and drink plays an important role in how well they control their blood glucose level.

But there isn't a standard diet that you or your child should follow. Instead, doctors recommend meeting with a **dietitian** to work out an approach to nutrition that suits you, based on your lifestyle and food preferences.

Eating regular meals is very important, as skipping meals can affect your glucose levels and insulin dose. Dietitians also often recommend that people with type 1 diabetes keep track of the carbohydrates they eat. You may hear this called **carb counting**.

Carbohydrates supply the body with glucose. Foods high in carbohydrates include pastas, breads, potatoes, fruits, juice, milk, sweets, and snack foods like biscuits and crisps.

Your dietitian can give you advice on how to estimate the carbs you or your child eats at each meal. You can then adjust the insulin dose for that meal if necessary. This can help you better manage blood glucose levels and insulin.

Exercise

Taking regular exercise has many benefits for people with type 1 diabetes. Exercise uses up glucose, so it can help keep down the level of glucose in the blood. It can also help people maintain a healthy weight, and feel happier and more relaxed.

Regular activity is just as important for children with type 1 diabetes as for adults. You should encourage your child to be active every day. This could mean things like:

- walking to and from school
- making regular trips to the playground, and
- encouraging your child to take part in activities such as sport and dance.

For adults, getting regular exercise can sometimes be daunting, especially if they haven't exercised much in the past. Getting started is sometimes the hardest part. Be sure to talk to your doctor before starting or changing an exercise programme.

Your doctor will be able to advise you on what kinds of exercise would be best for you. Doctors usually advise people with type 1 diabetes to do some kind of exercise most days.

This doesn't need to be strenuous. Walking for 30 minutes each day might be all you need to do. If you haven't been very active, you should build up your level of exercise slowly.

Both adults and children may need to take less insulin or eat a snack before exercising, and check their blood glucose before and after. You should discuss this with your doctor.

Pregnancy

Having diabetes while pregnant can increase your chance of a miscarriage and of birth defects in your baby.

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But you can help to ensure the best outcomes for you and your baby by talking to your doctor if you plan to become pregnant. You can then plan the treatment that you will need before and during pregnancy.

Diabetes care for women planning to become pregnant includes:

- counselling about the treatment you will need before and during pregnancy
- controlling your blood glucose before and during pregnancy, and
- monitoring you for any complications of diabetes that can happen during pregnancy.

All pregnant women need to have regular tests and scans. But if you have diabetes you will probably need a few more than most women. And you might need to do things like:

- stopping taking some medicines - your doctor should ask you about any medicines you are taking for any reason, and
- possibly starting other diabetes medicines during pregnancy.

For more background information on diabetes see our leaflet *Diabetes type 1: what is it?*

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