

Long Term Complications and Conditions associated with diabetes

Information for young people
and their parents



An important part of your education is to learn about the potential long term complications and conditions that are associated with diabetes. As part of the management of your diabetes, screening for these will commence from diagnosis.

This leaflet will give you some more information regarding complications, associated conditions and the screening process. We understand that this information may be distressing and cause you and your family concern. If you have any worries, or would like to discuss this information further, please do not hesitate to contact your diabetes team.

If any of these complications or conditions are detected you will receive further information, advice and support.

1. Complications

What causes complications?

The reasons why complications may develop in people with diabetes are not known for certain. However, it is known that high blood glucose level, high HbA1c values and a long duration of diabetes will increase the risk.

The reason for this may be that some cells in the body do not need insulin to let glucose into them. These are known as

“insulin independent cells”. They absorb glucose depending on how much is present in the blood. Cells like these can be found in the brain, nerves, retina (in the back of the eyes), the kidneys, the blood vessels and the red blood cells.

If you have diabetes and your blood glucose level is often high, these special cells will absorb large amounts of glucose, which will eventually poison them and result in damage to those areas.

The important message is that there is less chance of developing complications in later years, in people with good blood glucose control and a good HbA1c.

Areas which can be affected by poor blood glucose control are:

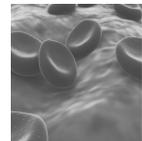
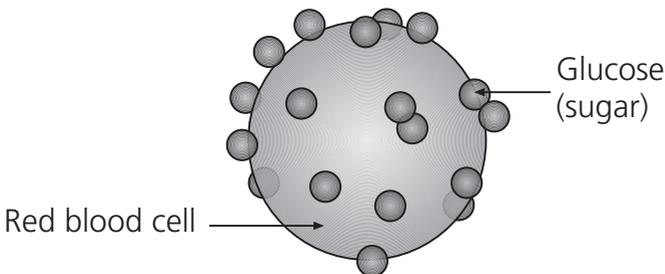
The small blood vessels

Why? When you have poorly controlled diabetes with high blood glucose levels most of the time, the glucose sticks to the wall of the red blood cells. This makes them stiff. These stiffened cells then have difficulty passing through the smaller blood vessels (capillaries) which supply oxygen to the tissues of the body. If they cannot get through, the tissues will be starved of oxygen and will become damaged.

General advice and screening:

- Try to maintain blood glucose levels within the normal range (normal blood glucose levels for 24 hours restore the normal texture of the blood cell walls)
- Aim to keep HbA1c below 48mmol/mol
- Avoid smoking

Glucose attached to a red blood cell:



Red blood cells

The heart and large blood vessels

Why? In people with diabetes, the larger blood vessels in the body are at greater risk of becoming hard, narrowing and eventually blocking. This increases the work the heart has to do in order to pump blood around the body. This problem is thought to be caused in part by high blood glucose levels.



General advice and screening:

- Good blood glucose control
- Aim to keep HbA1c below 48mmol/mol
- Exercise regularly
- Increase fruit and vegetable intake
- Eat foods high in fibre and low in fat content*
- Avoid putting on excess weight*
- Avoid smoking*
- Avoid drinking too much alcohol

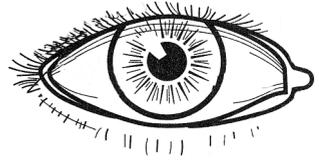
Screening for heart and large blood vessel disease includes checking your blood pressure and the pulses in the feet and lower legs, which is done as part of your annual assessment.

* The increased risk of diseases of the heart and blood vessels is the main reason that people with diabetes are recommended not to smoke and to keep fat levels in their diet low.

The eyes (retinopathy)

Why? After many years of high blood glucose levels, the blood vessels of the retina (the back part of the eye which is responsible for sight) can become

damaged. High blood glucose levels cause small swellings on the blood vessels. These are early signs and do not affect the sight. They can get better if blood glucose is improved.



If, however, blood glucose control does not improve, the swellings worsen and new blood vessels form (a bit like a detour). The new blood vessels are fragile and small. They can easily burst causing bleeding and temporary damage to vision. Small bleeds are not usually a problem. The blood is re-absorbed and normal sight restored. Large or repeated episodes of bleeding which are not treated can result in permanent damage to your vision and in the worst case blindness.

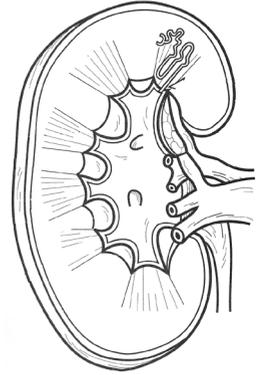
General advice and screening:

- Maintain good blood glucose control
- Avoid smoking*
- All children aged 12 years and above will be invited to attend for annual retinal screening

* Again, because of the risk of damage to the blood vessels, smoking should be avoided in people with diabetes.

The kidneys (nephropathy)

Why? The blood vessels of the kidneys are formed into small clusters where waste products in the blood are filtered out into the urine. Having high blood glucose levels most of the time causes damage to the walls of these small blood vessels which leads to leakage of protein into the urine.



A tiny amount of protein present in the urine is called microalbuminuria. However, if the leakage of protein into the urine persists (proteinuria), the person is at risk of developing high blood pressure. If left untreated, the kidneys will become damaged. This will cause high levels of waste products to build up in the bloodstream, which could eventually result in the need for dialysis.

General advice and screening:

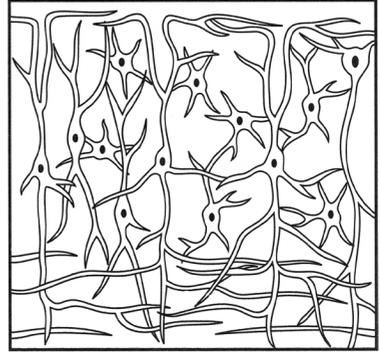
- Maintain good blood glucose control
- Avoid smoking
- Avoid excessive weight gain
- Go for immediate treatment of urinary tract infections
- Have an annual blood pressure check
- Annual urine screen for microalbuminuria (protein in the urine)*

* After exercise (within 24 hours), infection, fever, smoking, menstrual periods, a very high blood glucose level or blood in the urine may also cause an increase in the level of protein in the urine. Therefore an abnormal value should be repeated.

It is best to use an early morning sample of urine for this test.

The nerves (neuropathy)

Why? Having high blood glucose levels most of the time decreases the blood supply to the nerves in the body and therefore decreases the supply of oxygen. This results in damage to the nerves and will eventually affect how well they work, causing a decrease in sensation. This can result in a feeling of numbness or tingling in certain areas such as the fingers, feet or the lower parts of the legs.



Pain may not be felt from small injuries, blisters etc. which, if left untreated, may then become worse as healing will be slow due to the decrease in blood supply to the area.

Special care must be given to your feet. Poor foot care may lead to ulcers, gangrene and in the worst case amputation.

General advice and screening:

- Maintain good blood glucose control
- Report any tingling, numbness or loss of sensation to your diabetes team
- Maintain good foot care
- Ensure cuts and wounds are tended to properly to prevent infection
- Avoid smoking
- Feet will be examined at the annual assessment.

2. Other conditions associated with diabetes

There is a link with developing diabetes and autoimmune disease. This is when the immune system (the body's defence system) for some reason sees certain organs as foreign to the body, so it attacks and destroys or damages the organ involved (such as the pancreas in diabetes).

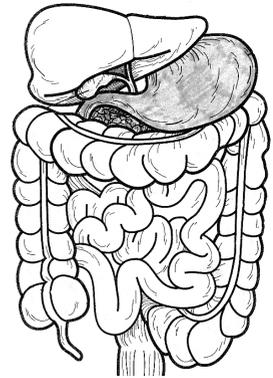
There is a risk that people with diabetes can also develop other autoimmune diseases. The most common are **coeliac disease** and **thyroid disease**. These conditions are screened for as part of the annual assessment.

Coeliac disease

This is caused by the immune system attacking the lining of the gut. It leads to an intolerance to gluten in the diet. Gluten is found in foods such as cereal and bread which contain wheat and oats.

If untreated it causes damage to the lining of the bowel. The body will then have difficulty absorbing food. This can then cause problems with blood glucose control. Some people may have other symptoms such as generalised abdominal pain, constipation or diarrhoea.

It is ten times more common in children and adults with diabetes than in those who don't have diabetes.

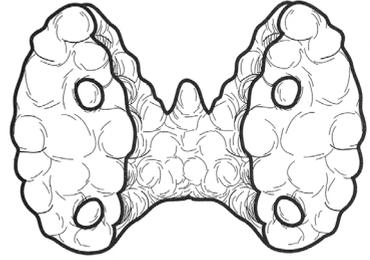


Screening is recommended every year – by way of a blood test as part of the annual review clinic assessment.

Treatment and management of coeliac disease is by avoidance of gluten in the diet. This will only be necessary if we make a diagnosis of coeliac disease.

Thyroid disease

Hypothyroidism: This condition happens as a result of the immune system attacking the thyroid gland which is situated in the front of the neck. As a result, it becomes damaged which leads to a decrease in the production of an important hormone called thyroxine.



Thyroxine plays a big part in almost all of the functions of the body. If you have insufficient levels of thyroxine, you may have symptoms such as tiredness, feeling cold, dry skin, constipation or weight gain.

You may also develop a goitre, which is a swelling of the thyroid gland in the neck as it tries to work harder to make thyroxine and becomes enlarged.

Hypoglycaemia may be more common in children with hypothyroidism and diabetes, however there are often no symptoms.

Screening for hypothyroidism is by way of a blood test once a year as part of the annual clinic assessment.

Treatment for hypothyroidism is by replacement of the hormone thyroxine, as a tablet which is taken daily. you will need to have a blood test every six months or so in order to monitor the level of thyroid hormone, as the dose may need to be adjusted depending on this. This will only be necessary if we make a diagnosis of thyroid disease.

Glossary of terms

Annual assessment - Yearly check at your clinic appointment. This will be slightly longer than your usual appointment. You will have a blood test and a physical examination by the doctor.

Dialysis - An artificial process in which waste products are removed from the blood.

Good footcare - General hygiene, keep skin moisturised, keep nails short, wear shoes that fit properly. Don't walk around barefoot, wear shoes outdoors to prevent injuries and see a podiatrist for any problems, eg. persistent verrucas, in-growing toenails, etc.

HbA1c - The name of the test used to assess blood glucose control over the past 2-3 months. Hb stands for haemoglobin. This is found in the red cells of our blood which carry oxygen from the lungs and nutrients to all parts of the body. A red cell lives for about 120 days. During this time glucose attaches itself to the haemoglobin. HbA1c is the measurement of the amount of glucose that is attached to the haemoglobin. The higher the amount of glucose that is present, the higher the HbA1c will be. The aim for good control is for your HbA1c to be between 42mmol/mol and 48mmol/mol.

Podiatrist - Foot specialist. Your diabetes team can refer you to see a podiatrist if you have any problems such as in-growing toenails or large / persistent veruccas.

Retinal screening - Examination and photograph of the retina and its blood supply (the part at the back of the eye which is responsible for sight). In order to do this, eye-drops will be administered to widen the pupil and allow closer examination. This may cause temporary blurring of the vision.

Patient Experience

South Tees Hospitals NHS Foundation Trust would like your feedback. If you wish to share your experience about your care and treatment or on behalf of a patient, please contact The Patient Experience Department who will advise you on how best to do this.

This service is based at The James Cook University Hospital but also covers the Friarage Hospital In Northallerton, our community hospitals and community health services.

To ensure we meet your communication needs please inform the Patient Experience Department of any special requirements, i.e. Braille/ Large Print.

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