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Definition

There are several types of diabetes mellitus, but the two main types are type 1 diabetes and type 2 diabetes (T2DM). In type 1 diabetes (affecting eight percent of people with diabetes), there is an absolute insulin deficiency, and in the more common T2DM (affecting around 90 percent of people with diabetes), there is insulin resistance (where the body is unable to respond to normal levels of insulin) and insulin deficiency (where the pancreas is unable to secrete enough insulin to compensate for this resistance).^{1, 2}

The National Institute of Health and Care Excellence (NICE) Clinical knowledge summary (CKS): [Diabetes – type 2](#) describes diabetes mellitus as ‘a group of metabolic disorders in which persistent hyperglycaemia (random plasma glucose more than 11 mmol/L) is caused by deficient insulin secretion, resistance to the action of insulin, or both.’³ This is commonly referred to as insufficient insulin supply or response to meet the requirements of the body.³

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Prevalence and incidence

There are almost 4.3 million people diagnosed with diabetes in the UK.⁴ The NHS spends around £10 billion a year on diabetes – around 10 percent of its entire budget.⁵ NHS England states:

*‘Being diagnosed with type 2 diabetes can have a devastating impact on people and their families – it is a leading cause of preventable sight loss in people of working age and is a major contributor to kidney failure, heart attack, stroke and many of the common types of cancer’.*⁵

T2DM is on the rise in children and young people, and obesity is thought to cause nearly 80 percent of these cases.⁶ The number of people diagnosed with T2DM and the costs of treating the condition are expected to increase over the coming years.

It is estimated that up to one in four residents in care homes for older people have diabetes. For this reason, [Diabetes UK](#) has developed a range of resources to support good clinical practice for care home residents with diabetes, including a position statement: [Diabetes care for older people resident in care homes](#) (June 2014).

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Signs and symptoms

Common symptoms of T2DM include:

- thirst
- polyuria (increased urine production)
- blurred vision
- weight loss
- recurrent infections
- tiredness.⁷

Diabetes UK states that 1 in 15 people has diabetes in the UK, and around one million of those with T2DM have not yet been diagnosed.⁸ This may be because symptoms do not necessarily make a person feel unwell.⁹

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Causes/risk factors

T2DM is caused by the body being unable to respond to normal levels of insulin, as well as the pancreas being unable to secrete enough insulin to compensate for this resistance. This balance differs from person to person.³

Risk factors include:

- obesity and inactivity
- family history
- ethnicity
- history of gestational diabetes
- poor dietary habits
- the use of certain medicines
- polycystic ovarian syndrome
- low birth weight for gestational age
- metabolic syndrome.¹⁰

Access the NICE CKS for more information about these [risk factors](#).

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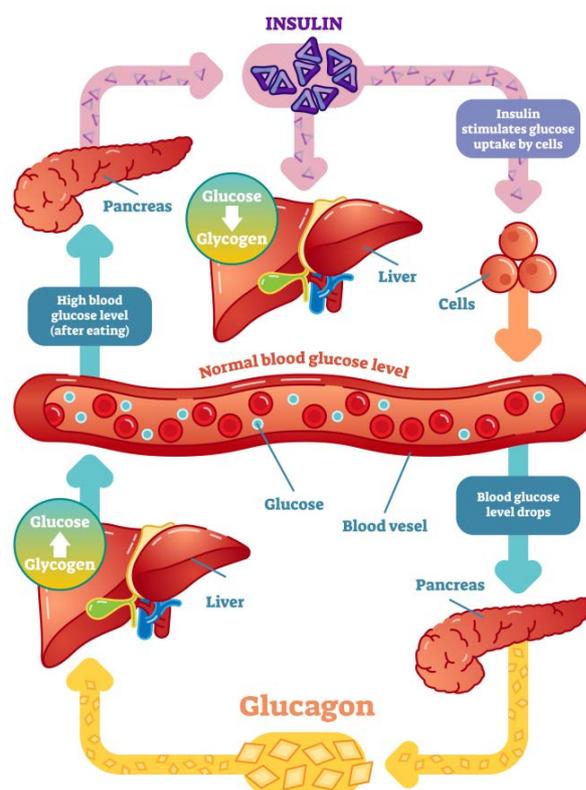
Pathophysiology (mechanism of disease)

In a person without diabetes, glucose is processed as shown in the diagram below. After ingestion of food, glucose passes into the blood stream. This elevation in blood glucose stimulates beta-cells in the pancreas to produce insulin. Insulin has two effects. First, it stimulates the liver to convert glucose into glycogen so that it can be stored. Second, it stimulates cells inside the body's tissues to take up glucose so that it can be used as an energy source.

When blood glucose levels fall, this stimulates the pancreas to produce glucagon. Glucagon stimulates the liver to convert glycogen into glucose to increase blood glucose levels.

Although T2DM is complex and its pathology is not fully defined, it is thought that there are three main mechanisms that are affected:

- reduced cell insulin sensitivity – this means that glucose uptake is affected
- pancreatic beta-cell dysfunction – this is thought to lead to varying levels of insulin deficiency
- hepatic insulin resistance – this leads to the liver producing glucose in the presence of insulin.¹¹



For an in-depth look at beta-cell dysfunction and insulin resistance, access the *Frontiers in Endocrinology* article [Beta cell dysfunction and insulin resistance](#) (March 2013).

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Prognosis and complications

There are multiple complications associated with T2DM. These are macrovascular, microvascular, metabolic and psychological. T2DM can also be linked to reduced quality of life, an increased risk of infection, reduced life expectancy and dementia.¹²

If people with T2DM have optimal diabetes management, they can maintain a good quality of life. Insulin deficiency in T2DM is progressive and it is likely that, although T2DM can be managed with lifestyle modification initially, those with T2DM may over time require antidiabetic medicines.¹³

Macrovascular complications

This includes cardiovascular disease (including myocardial infarction), which accounts for 52 percent of deaths in those with T2DM; cerebrovascular disease (for example, stroke and transient ischaemic attack); and peripheral arterial disease, including intermittent claudication.¹² Peripheral arterial disease is commonly observed as part of the diabetic foot disease process (see section below on [Diabetic foot disease](#)).

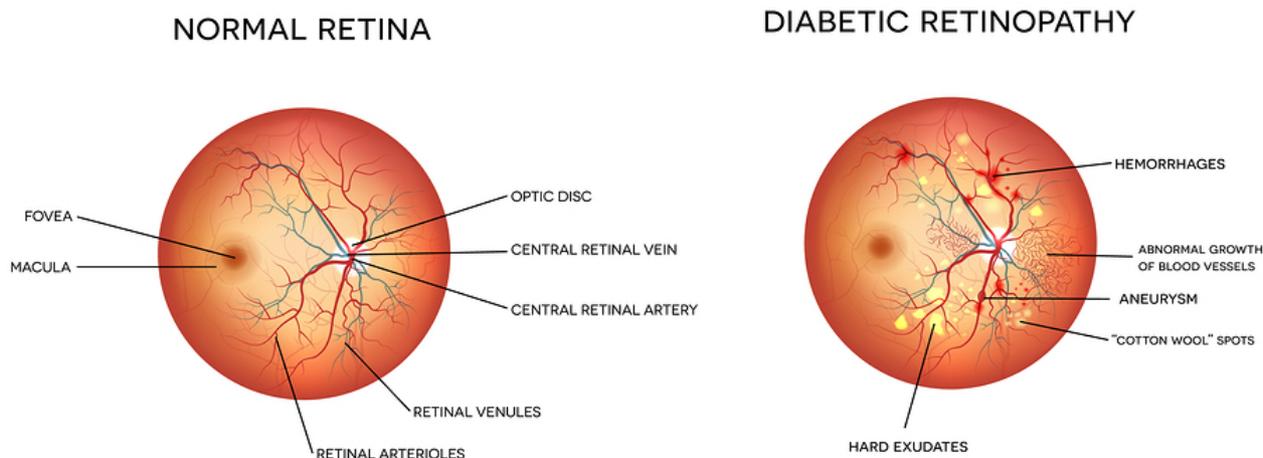
Microvascular complications

Nephropathy occurs when the nephrons of the kidneys malfunction due to small blood vessel damage. This can be tested for, as the kidneys begin to leak proteins which pass into the urine.¹⁴ Kidney disease accounts for 11 percent of deaths in people with T2DM, and about 75 percent of those with diabetes develop chronic kidney disease (CKD).¹²

For more information on nephropathy, visit the Diabetes UK page [Diabetic nephropathy \(Kidney disease\)](#).

Retinopathy occurs when the blood vessels in the retina of the eye become damaged and leaky. This leads to cotton wool spots (which may indicate ischaemia) and hard exudate (which can affect vision).^{15, 16} As the disease progresses, aneurysms can occur and new fragile blood vessels can form, which can haemorrhage.¹⁵ Diabetic retinopathy can cause blindness and is the leading cause of preventable sight loss in the UK.¹⁷

DIABETIC RETINOPATHY



For more information on retinopathy, visit the Diabetes UK page [Diabetic retinopathy – diabetes and eye problems](#).

Chronic painful neuropathy is estimated to affect up to 26 percent of people with diabetes, and amputation is up to 30 times more likely in people with diabetes compared with the general population.¹² The most common amputations are of toes, feet and lower leg.

For more information on neuropathy, visit the Diabetes UK page [Diabetic neuropathy \(nerve damage\)](#).

Autonomic neuropathy may lead to sweating, postural hypotension, gastroparesis (stomach muscle dysfunction), diarrhoea, and heart, bladder and sexual dysfunction. Erectile dysfunction affects 35-90 percent of men with diabetes.¹²

Metabolic complications

Dyslipidaemia is an abnormal amount of lipids (fats) in the blood, which is a risk factor for cardiovascular disease.

Diabetic ketoacidosis (DKA) may occur in people with T2DM, although it is more common in those with type 1 diabetes.¹² For more information on DKA, visit the Diabetes UK page [What is DKA \(diabetic ketoacidosis\)?](#)

The Medicines and Healthcare products Regulatory Agency (MHRA) Drug safety update: [SGLT2 inhibitors: updated advice on the risk of diabetic ketoacidosis](#) (April 2016) contains important advice on management of the risk of DKA in those treated with a sodium-glucose co-transporter 2 (SGLT2) inhibitor (canagliflozin, dapagliflozin or empagliflozin).

Diabetic foot disease

Diabetic foot disease, or diabetic foot, is one of the main observable and preventable complications of diabetes. People in care homes are particularly susceptible due to immobility; however, they are likely to have their foot support reviewed/observed regularly, and therefore receive early intervention.

Diabetic foot disease describes infection, ulceration and loss of tissue in the foot, which may lead to amputation. Ulcers can occur due to loss of sensation caused by peripheral neuropathy, ischaemia due to peripheral arterial disease, or a combination of both of these factors. Additionally, a condition called Charcot foot (destruction of the of bone, joints and soft tissue in the foot and ankle) can contribute to foot deformity and amputation.¹⁸

Good glycaemic control, regular foot assessment, appropriate footwear, education and early referral for pre-ulcerative lesions can prevent diabetic foot disease.¹⁸

Diabetes UK's page [Diabetes and foot problems](#) contains more information on diabetic foot disease and foot care.

NICE guideline [NG19]: [Diabetic foot problems: prevention and management](#) (October 2019) covers preventing and managing foot problems in children, young people and adults with diabetes.

The MHRA Drug safety update [SGLT2 inhibitors: updated advice on increased risk of lower-limb amputation \(mainly toes\)](#) (March 2017) contains important advice on canagliflozin and how it may increase the risk of lower-limb amputation (mainly toes) in people with T2DM.

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Diagnosis/detection

In adults, diagnosis of T2DM is usually based on HbA1c and symptom recognition. Read the NICE CKS: [Diabetes – type 2 – Diagnosis in adults](#) for further information.

The *Type 2 diabetes: blood glucose and cholesterol case study 5* on the CPPE [Biochemistry](#) learning gateway looks at a person who has T2DM and an elevated HbA1c. Further information on interpretation of biochemistry data can be found in the [Further resources](#) section.

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Management

NICE guideline [NG28]: [Type 2 diabetes in adults: management](#) outlines recommendations on individualised care, patient education, dietary advice and bariatric surgery, antiplatelet therapy, blood glucose management and managing complications.¹⁹ It also contains patient decision aids to help people assess their options for controlling their blood glucose levels, in order to try to reduce the long-term risks of diabetes.¹⁹

CPPE's [Type 2 diabetes: supporting people better – focal point](#) aims to enable you to better support people with type 2 diabetes through effective management, including reducing complications and improving outcomes, by applying the principles of [NICE guideline \[NG28\]](#) to your practice.

The MHRA Drug safety update [SGLT2 inhibitors: reports of Fournier's gangrene \(necrotising fasciitis of the genitalia or perineum\)](#) contains important advice on urgent actions to take if a person has suspected Fournier's gangrene and is taking an SGLT2 inhibitor, as it is a rare but serious and potentially life-threatening infection.²⁰ The [Prescribing information section](#) of the NICE CKS: *Diabetes – type 2* provides important aspects of prescribing information relevant to primary healthcare teams.

The Scottish Intercollegiate Guidelines Network (SIGN) clinical guideline [SIGN 154]: [Pharmacological management of glycaemic control in people with type 2 diabetes](#) (November 2017) is another useful resource.

Management of older people and people with frailty

The management of older adults and people with frailty who have type 2 diabetes is complicated by comorbidities, shortened life expectancy and the consequences of adverse effects from treatment, so it is important to ensure person-centred shared decision making when looking at management options.

Elevated HbA1c results are associated with the development of long-term diabetic complications, including increased risk of skin and urine infections. However, HbA1c targets should reflect the person's current health status and long-term prognosis.²¹ In older people and people with frailty, the main aim of diabetes management is to minimise hypoglycaemia, as they are more vulnerable to its consequences, including falls, fractures, hospitalisation, cardiovascular events and all-cause mortality. Recommended therapeutic approaches for the UK were updated and summarised in 2021.²¹ A useful resource is the NICE [Type 2 diabetes: agreeing my blood glucose \(HbA1c\) target patient decision aid](#), which supports person-centred conversations.

Diabetes UK has produced [recommendations for managing older people with diabetes](#), as well as a collection of resources and tools to improve care for people living with diabetes in care homes, which can be found on their [Diabetes care in care homes](#) page.

Training, Research and Education for Nurses in Diabetes (TREND UK), in partnership with the Institute of Diabetes for Older People (IDOP), has produced [Diabetes and dementia: guidance on practical management](#) to highlight the importance of recognising the relationship between diabetes and dementia, and how these conditions impact on each other, and maximising the benefits of diabetes treatments while minimising the risk of hypoglycaemia.

Diabetes and dementia are common complex conditions which affect people in different ways. The successful management of diabetes requires the person to have a good understanding of the condition, follow a regular healthy-eating and physical-activity plan, monitor glucose levels, attend clinic reviews and take medicine as prescribed. The presence of dementia, with increasing problems with memory and communication, can make these tasks difficult to follow. Diabetes can also have a negative impact on memory and confusion.

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Patient support

[Diabetes UK](#) offers patient-focused information about both type 1 and type 2 diabetes, local patient support groups and a national helpline.

The [Diabetes Research and Wellness Foundation](#) is a registered charity that was established to raise public awareness of type 1 and type 2 diabetes, their associated complications and their treatment options.

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Further resources

CPPE's [Diabetes \(type 2\)](#) learning gateway contains core and foundation learning, and links to further resources. These include the Northern Ireland Centre for Pharmacy Learning and Development diabetes e-learning programmes, which are available via the CPPE website and cover risk factors for developing type 2 diabetes, the difference between type 1 and type 2 diabetes, best practice in managing people with diabetes, and monitoring and managing complications.

The Diabetes UK [Understanding diabetes](#) training programme is specifically designed for healthcare professionals who do not work in a diabetes specialist area. It is endorsed by the Royal Pharmaceutical Society and takes around three hours to complete.

Topics covered include:

- how to recognise the symptoms of diabetes, and how it can be diagnosed
- how to treat diabetes through lifestyle and medicines, and what to do if not under control
- how diabetes is monitored, both by healthcare professionals and by the person with diabetes

- how to recognise people at risk of complications associated with diabetes, and how to support them to reduce these risks
- how diabetes affects people's lives, and how to provide emotional support through a person's diagnosis and treatment
- how to encourage self-management and structured education.

We suggest that you access and work through this training to further your learning on this topic.

Protocol for type 2 diabetes

Safety needles and lancets that are used as part of the management of people with diabetes should be used in line with the Health and Safety (Sharps Instruments in Healthcare) Regulations 2013. More information can be found on the Health and Safety Executive's [Background to EU Directive](#) page.

Driving advice should be individualised, following the Driver and Vehicle Licensing Agency (DVLA) guidance [Assessing fitness to drive: a guide for medical professionals](#), and advice from Diabetes UK: [Diabetes and your driving licence](#) and [Driving and diabetes](#).

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External websites

CPPE is not responsible for the content of any non-CPPE websites mentioned on this page or for the accuracy of any information to be found there.

All web links were accessed on 8 September 2023.

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