Call the Stroke Helpline: 0303 3033 100
or email: info@stroke.org.uk

Ischaemic stroke

Most strokes happen because of a blockage in an artery leading to the brain. This is called an ischaemic stroke. This guide explains some of the causes of ischaemic stroke, as well as how it is diagnosed and treated. It also considers some of the questions you may have if you have had a stroke.

What is an ischaemic stroke?

A stroke is a brain attack. It happens when the blood supply to part of your brain is cut off, killing brain cells. Damage to brain cells can affect how the body works. It can also can change how someone thinks and feels.

Around 85% of strokes are ischaemic strokes, which happen when a blockage cuts off the blood supply to the brain. You may also hear it referred to as a clot. Brain cells start to die quickly after their blood supply is cut off, but this damage can be limited in many cases if treatment can be provided very quickly (within a few hours, see below). The less common type of stroke is haemorrhagic stroke, which is due to bleeding in or around the brain.

In ischaemic stroke, the blockage can be caused by a blood clot forming in an artery leading to the brain or within one of the small vessels deep inside the brain.

What causes an ischaemic stroke?

There are a number of reasons why blockages can form and cause an ischaemic stroke.

Atherosclerosis

Our arteries naturally become thicker and less flexible as we get older, but the condition atherosclerosis can speed this process up.

Atherosclerosis occurs when fatty deposits build up on the inside walls of your arteries. These deposits are called plaques or atheromas. They cause your arteries to become harder and narrower, making them more likely to become blocked. The narrowing of your arteries is called stenosis. Lifestyle factors, like smoking, lack of exercise and eating unhealthy food, as well as certain medical conditions, such as high blood pressure, high cholesterol or diabetes, can lead to atherosclerosis.

Atheromas can build up in any artery, especially the ones in your neck leading to your brain. As well as narrowing the artery, making it harder for blood to pass

through it, the fatty deposits can break down, rupture or become inflamed. When this happens a blood clot forms around the atheroma, which can block the artery. It may break off and move through the bloodstream, causing a blockage to an artery in the brain.

Small vessel disease

Small vessel disease involves damage to the tiny blood vessels within the brain. Deposits collect in the blood vessels, causing them to thicken. If they become completely blocked, this can lead to a stroke.

Over time, the damage caused by small vessel disease can cause a type of dementia called vascular dementia. High blood pressure is a major risk factor for small vessel disease.

Heart conditions

Atrial fibrillation

Some conditions can cause blood clots to form in your heart, which can then move through your bloodstream up into your brain. This is called an embolism.

The most common condition to cause this is atrial fibrillation or AF (a type of irregular heartbeat). Some people with atrial fibrillation can feel their heart beating irregularly, but many cannot. AF can come and go at intervals. A GP can check for AF, and refer you for tests if AF is suspected.

Other heart problems, such as a recent heart attack or a mechanical heart valve, can cause embolisms too.

Patent foramen ovale (PFO)

'Foramen ovale' is the name of the hole between the right and left side of the heart of a baby in the womb. This hole normally closes after birth, but in as many as one in four people it remains open or 'patent'. A PFO is sometimes referred to as a 'hole in the heart'.

If an adult has a PFO, it makes it possible for a blood clot to pass from one side of the heart to the other and up to the brain. However, it is not known whether a PFO increases the risk of a stroke.

If someone with a PFO has a stroke or TIA (transient ischaemic attack) they will be given treatment as well as advice about reducing their risk of another stroke. They may be offered an operation to close the PFO, but this is not always helpful and may lead to atrial fibrillation.

Arterial dissection

Sometimes tears in the lining of an artery can develop and allow blood to get between the layers in your artery walls. This is called arterial dissection. It can happen for no clear reason or it can be the result of an injury. As blood builds up, a clot can form. If this clot restricts the flow of blood to your brain, or moves up into your brain, it can cause a stroke.

How is an ischaemic stroke diagnosed and treated?

Diagnosis

If someone has any signs of a stroke, it's time to call **999** immediately. Ambulance paramedics are trained in stroke, and will assess the person and take them to the right type of hospital for the treatment they need. This could be a hospital with a specialist stroke unit or a hyper-acute stroke unit. A stroke unit has a range of trained professionals who are experienced in stroke care.

The quicker your stroke is diagnosed and treated, the better your chances of recovery. Once you're admitted to hospital, you will have tests and checks to confirm if you have had a stroke, and what type of stroke it is.

Brain scan

If you have a suspected stroke, you should receive a brain scan, within one hour if possible. A brain scan can help doctors decide on the right treatment for you if are:

- eligible for an urgent clot-busting alteplase injection (thrombolysis)
- eligible for mechanical clot removal (thrombectomy)
- taking blood-thinning medication
- thought to have bleeding in or around your brain.

You will either have a CT (computed tomography) scan or an MRI (magnetic resonance imaging) scan. Both of these produce pictures of your brain and will help doctors to rule out other causes of your symptoms and see how much of your brain has been affected. It will also help them decide how best to treat you, as treatments are different depending on the cause of your stroke.

Sometimes these scans will involve an injection, a CT or magnetic resonance angiogram (MRA) to highlight the arteries of the neck and brain more clearly.

Other checks and tests

The doctors will also measure your blood pressure and carry out blood tests to determine whether you have any health conditions linked to stroke, such as diabetes and high cholesterol.

You may undergo other tests to check for conditions that could have contributed to your stroke. These include an electrocardiogram (ECG), which checks for an irregular heartbeat, or Doppler ultrasound scan to check for narrowing of the arteries in your neck.

Treatment

Thrombolysis

If your ischaemic stroke is caused by a blood clot, you may be treated with a clot-busting medicine. The most common medicine is called alteplase, or recombinant tissue plasminogen activator (rt-PA). The process of giving this medicine is known as thrombolysis.

Thrombolysis can break down and disperse a clot that is preventing blood from reaching your brain. Currently, for most people, it needs to be given within four and a half hours of stroke symptoms starting. In some circumstances your doctor may decide that

it could still be of benefit beyond four and a half hours.

However, the more time that passes, the less effective and the more risky thrombolysis will be. This is why it's important to get to hospital as quickly as possible when your symptoms start.

Who can have thrombolysis?

Not everyone who has an ischaemic stroke is suitable for thrombolysis. At present around 12% of people who are admitted to hospital with a stroke are eligible to receive it.

If you are not suitable, it may be because:

- your stroke was not caused by a clot
- you do not know or cannot tell doctors when your symptoms began
- you do not reach hospital within the time limits for receiving thrombolysis (within three hours but can be up to four and a half hours for some individuals)
- you have a bleeding disorder
- you have recently had brain surgery
- you have had another stroke or head injury within the past three months
- your current medication is not compatible with alteplase.

If you are suitable for thrombolysis, your medical team will explain the treatment to you. You do not have to sign any paperwork – a verbal agreement is enough. If you are unable to give your consent, either because of the effects of your stroke or another reason, the medical team will seek permission from your next of kin or another family member.

Time is critical so if it isn't immediately possible to talk to your family, the medical staff will make the decision based on what they feel is in your best interests.

You will receive the medicine through a small tube into one of the veins in your arm. During this procedure, which takes around one hour, the medical team will closely monitor your blood pressure, body temperature, breathing and blood sugar levels to ensure that they remain stable.

Risks and benefits

After thrombolysis, 10% more patients survive and live independently.

Despite its benefits, there is a risk that thrombolysis can cause bleeding in the brain. Within seven days of having thrombolysis, about one in 25 people treated will have bleeding in the brain, and this can be fatal in about one in 40 cases. The sooner you are treated the better the chances of improvement and the lower the risk of harm.

Doctors carefully balance the risk to the patient against the potential benefit of the treatment. So someone may not be eligible for thromblysis if they have conditions like internal bleeding or head injury, an aneurysm or uncontrolled high blood pressure.

Thrombectomy

A newer treatment involves extracting the blood clot using a clot retrieval device. This procedure is called thrombectomy. It usually involves inserting a mesh device into an artery in your groin, moving it up to your brain, and pulling the blood clot out.

Thrombectomy only works with people where the blood clot is in a large artery but in these people it is more effective than thrombolysis. Like thrombolysis it has to be carried out within hours of a stroke starting.

There are currently only a few centres in the UK where this treatment is available, as the number of trained practitioners is still low. However it is a very effective treatment for the most severe strokes, and studies show that in the UK 9,000 people every year could be eligible for this treatment, so it is likely to become more widespread.

What happens if the clot is not treated?

If left untreated, the blood clot will usually break up naturally within a few days or weeks. You will have treatment to reduce your risk of another stroke, such as medications to prevent clots forming and reduce blood pressure. If you are being looked after on a specialist stroke unit, the expert care you will receive can support your recovery.

Surgery

In a very small number of cases an operation may be needed to relieve pressure on your brain. When the brain is injured the tissues can swell, just like a bruise. If there is a lot of swelling, there is a danger that it will put increased pressure onto other areas of your brain, causing further damage. If this is the case you will need a procedure called a decompressive hemicraniectomy. This involves opening up a section of your skull to allow the brain to swell outwards and relieve some of the pressure. This can only be carried out in neurosurgery centres so people often have to move hospital for this treatment.

Preventing another clot

Most people who have an ischaemic stroke will be given anti-platelet medication, which helps to prevent clots from forming. For most people this will be a daily dose of aspirin, and doctors will advise you how long you will need to take this. If you receive thrombolysis, you have to wait at least 24 hours before you can begin taking aspirin. If aspirin is not suitable for you, you may be given an alternative drug, such as clopidogrel.

In the longer term you will be prescribed blood-thinning medication to take indefinitely. For most people this will be an anti-platelet medication but for others such as those with atrial fibrillation it will be an anticoagulant such as warfarin, apixaban, dabigatran, edoxaban or rivaroxaban.

After your stroke is treated

The team on the stroke unit will continue to monitor you closely for at least 24 hours to ensure you remain stable. After a stroke, you should have a swallowing test. It can be dangerous to give you fluids, food or oral medication to take if you're experiencing swallowing problems, so you won't be allowed anything to eat or drink until your ability to swallow has been checked. This should be done within four hours of you being admitted to hospital.

You may see some signs of recovery from your stroke early on, but if you're still showing lasting effects after 24 hours, you will need to have a full assessment with all the professionals on the stroke team. This means that according to your needs, you might be seen by a physiotherapist, speech and language therapist, occupational therapist, dietitian, orthoptist and a psychologist.

Getting up and about soon after a stroke is important for recovery, but you may be asked to stay in bed for the first 24 hours or so even if you are able to get up, as getting out of bed too early after a stroke can sometimes be harmful.

If you're not able to move about very much, the way you are positioned is very important if you are to avoid problems with breathing, chest infections (pneumonia), shoulder pain or pressure sores. The members of your stroke team should show you the best way to sit or lie down and help you to reposition yourself at regular intervals.

As soon as you are well enough, your doctor should talk to you about what may have caused your stroke and what action needs to be taken to reduce your risk of it happening again. This could mean taking medication or making changes to your lifestyle or both. Make sure you understand what you need to do and why.

What effects can a stroke have?

The effects of stroke depend on both the location of the stroke in your brain, and how much the stroke has damaged your brain. Although the effect of each stroke is different, people may experience some of the following:

- impaired movement and balance: stroke often causes weakness or loss of coordination down one side affecting the arms and legs. This can lead to problems with walking, balancing and holding things
- communication problems: many people experience aphasia. This affects their ability to use language, and while their intelligence is unaffected, they have difficulty with reading, writing and understanding. Other people have dysarthria: muscle weakness or loss of coordination in the face, mouth, tongue and throat can lead to slurred speech
- problems with memory, concentration and thinking (cognition)
- problems being able to notice things to one side (spatial neglect)
- problems with vision
- problems with swallowing
- continence problems
- fatigue (severe tiredness).

A stroke can also have an emotional impact and can cause problems such as anxiety, depression or changes to your behaviour.

For some people the effects of a stroke may be relatively minor and may not last long, while others may be left with more serious long-term effects.

Coping with the effects of stroke

Stroke can have a powerful emotional effect on the individual and the people around them.

Stroke can change how people see themselves. Stroke usually comes as a big shock, and this shock can have a big emotional impact. Around a third of stroke survivors experience depression after a stroke.

Talking to the right people and finding answers to some of your questions will help you feel more in control of your situation and help you plan for the future.

- Try to find out as much as you can from professionals in hospital before you leave.
- Your GP is the person to ask for help with health problems or support needs after leaving hospital.
- You might need support from therapists, such as physiotherapists, occupational therapists, speech and language therapists and psychologists.
- You might have a community stroke nurse.
- You may have a social worker.
- Depending on where you live, you may have help from a Stroke Association Coordinator.

Around six months after you leave hospital, you should get a review of your progress. This makes sure you are getting the right support if your needs have changed. The review is sometimes carried out by a Stroke Association Coordinator, or by a specialist nurse or other stroke professional. If a review does not take place, contact your GP.

Will I be able to make a full recovery?

Everyone recovers differently. Some people recover fully. Other people will have health problems or a disability.

The fastest recovery takes place in the first few months. After that, progress can be slower. Although the brain cells that have been severely damaged or have died can't grow back, other parts of the brain can learn to take over the jobs that they did. This is called neuroplasticity. People can continue to improve for months or years.

Rehabilitation

You should receive rehabilitation soon after your stroke. It may begin in hospital and should carry on at home if you need it. While recovery means getting better, rehabilitation is about overcoming and adapting to the effects of your stroke.

During rehabilitation, the therapist carries out a full assessment and designs treatment tailored to your needs. Depending on the type of therapy, you may have exercises to practice. You may work towards building up stamina, or learn new ways of doing things. You can read more about the different types of therapy in our guide L12, *Next steps after a stroke*.

Am I likely to have another stroke and can I stop it happening again?

Once you've had a stroke your risk of having another one is increased. In the UK more than a quarter of people who have had a stroke have had a TIA or a stroke before.

Even though your risk of having another stroke is increased, understanding what factors caused your stroke will help you know how you can reduce your risk of it happening again.

When you have a stroke, doctors check you for any health conditions linked to stroke. If you have any of these conditions, you will be treated to lower the risk of another stroke. These health conditions include:

- high blood pressure
- atrial fibrillation (irregular heartbeat)
- diabetes
- high cholesterol.

One of the best ways to reduce your risk is to carry on with any treatment you are given.

You should be given advice about other ways of reducing your risk of a stroke. Some people need to lose weight, exercise more, give up smoking or drink less alcohol. All of these actions can help to manage your health conditions, as well as reducing your risk of a stroke.

If you have any questions about your medication, go back to your doctor or pharmacist and ask. Tell them if you are worried about side effects, as there will often be an alternative that you can take. If you don't know why you have been given a particular medication, or would rather not take it, ask your doctor. Never stop taking your medication without talking to your doctor first.

Spotting the signs of a stroke

The FAST test can help you to recognise the symptoms of a stroke. These symptoms usually come on suddenly.

FAST test

Face
Can the person smile? Has their face fallen on one side?

Arms
Can the person raise both arms and keep them there?

Speech
Can the person speak clearly and understand what you say? Is their speech slurred?

Time
If you see any of these three signs, it's time to call **999**.

The FAST test identifies the main signs of a stroke. But there are also some others to look out for:

- sudden weakness or numbness on one side, including legs, hands or feet
- difficulty finding words or speaking in clear sentences
- sudden blurred vision or loss of sight in one or both eyes
- sudden memory loss or confusion, and dizziness or a sudden fall
- a sudden, severe headache.

If you spot any of these signs, call **999** straight away.

A TIA or transient ischaemic attack (also known as a mini-stroke) is the same as a stroke, except that the symptoms last for a short amount of time. A TIA is serious and should not be ignored. If you experience any of the symptoms described above, you must call **999**.

Where to get help and information

From the Stroke Association

Talk to us

Our Stroke Helpline is for anyone affected by a stroke, including family, friends and carers. The Helpline can give you information and support on any aspect of stroke.

Call us on **0303 3033 100**, from a textphone **18001 0303 3033 100** or email **info@stroke.org.uk**.

Read our publications

We publish detailed information about a wide range of stroke topics including reducing your risk of a stroke and rehabilitation. Read online at stroke.org.uk or call the Helpline to ask for printed copies.

Other sources of help and information

Atrial Fibrillation Association (AFA)
Website www.heartrhythmalliance.org
Tel: 01789 687 502
Provides information and support for people with atrial fibrillation.

Brain and Spine Foundation
Website: www.brainandspine.org.uk
Helpline: 0808 808 1000
Provides information and support to people affected by neurological conditions including stroke. The helpline is run by neuroscience nurses.

Chest, Heart and Stroke Scotland
Website www.chss.org.uk
Helpline: 0808 801 0899
Provides information on local stroke groups in Scotland. It also runs an advice line staffed by nurses.

Different Strokes
Website www.differentstrokes.co.uk
Tel: 0845 130 7172
Provides information and support for younger stroke survivors, including guides for survivors, their family and employers.

Headway
Website www.headway.org.uk
Tel: 0808 800 2244
A national charity supporting people with a brain injury. They have local groups and branches, which include rehabilitation programmes, carer support, social activities, community outreach and respite care.

NHS Choices
Website: www.nhs.uk/livewell

NHS Inform (Scotland)
Website: www.nhsinform.co.ukscot
Tel: 0800 22 44 88
NHS websites providing information about living a healthier lifestyle. The NHS Live Well website offers programmes to help you lose weight, eat better and do more exercise.

Your notes

About our information

We want to provide the best information for people affected by stroke. That's why we ask stroke survivors and their families, as well as medical experts, to help us put our publications together.

How did we do?

To tell us what you think of this guide, or to request a list of the sources we used to create it, email us at **feedback@stroke.org.uk**.

Accessible formats

Visit our website if you need this information in audio, large print or braille.

Always get individual advice

Please be aware that this information is not intended as a substitute for specialist professional advice tailored to your situation. We strive to ensure that the content we provide is accurate and up-to-date, but information can change over time. So far as is permitted by law, the Stroke Association does not accept any liability in relation to the use of the information in this publication, or any third-party information or websites included or referred to.

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Together we can conquer stroke.