Stroke

A stroke causes damage to the brain. A common cause of stroke is a blood clot that forms in a brain artery. Immediate treatment may include a clot-busting medicine to dissolve the blood clot. Other treatments include medication to reduce risk factors for further strokes. Rehabilitation is a major part of treatment. Disability following a stroke depends on factors such as the part of the brain affected, how quickly treatment was given and the extent of the damage to the brain. Call for an ambulance immediately if you suspect someone is having a stroke. Common symptoms are listed below.

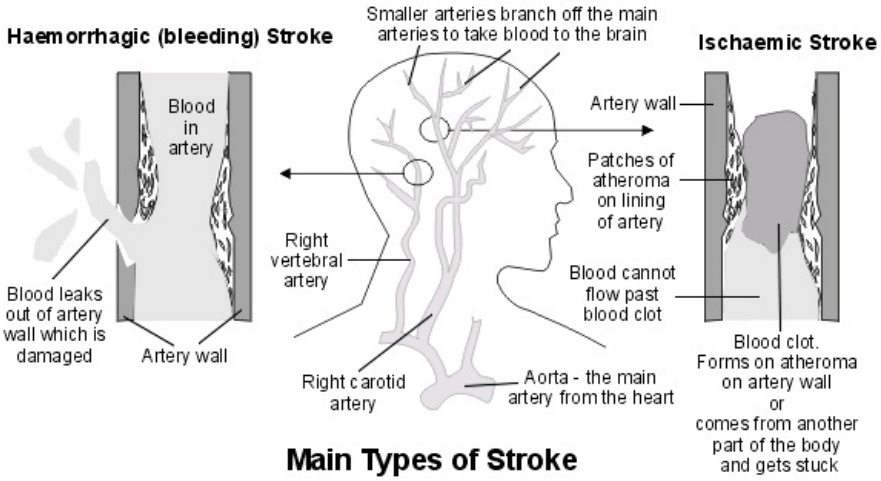
What is a stroke and what causes it?

A stroke means that the blood supply to a part of the brain is suddenly cut off. The brain cells need a constant supply of oxygen from the blood. Soon after the blood supply is cut off, the cells in the affected area of brain become damaged, or die. A stroke is sometimes called a brain attack.

The blood supply to the brain comes mainly from four arteries - the right and left carotid arteries, and the right and left vertebrobasilar arteries (see diagram below). These branch into many smaller arteries which supply blood to all areas of the brain. The area of brain affected, and the extent of the damage, depends on which blood vessel is affected.

For example, if you lose the blood supply from a main carotid artery, then a large area of your brain is affected, which can cause severe symptoms, or death. In contrast, if a small branch artery is affected, then only a small area of brain is damaged which may cause relatively minor symptoms.

There are two main types of stroke - ischaemic and haemorrhagic.



Main Types of Stroke

Ischaemic stroke - caused by a blood clot

Ischaemic means a reduced blood and oxygen supply to a part of the body. It is usually caused by blood clot in an artery, which blocks the flow of blood. This occurs in about 7 in 10 cases.

- The blood clot often forms within the artery itself. This commonly occurs over a patch of fatty material called atheroma. Atheroma is often called furring or hardening of the arteries. Small patches of atheroma form on the inside of arteries in most older people. If a patch of atheroma becomes thick, it can trigger the blood to clot.

- In some cases, the blood clot forms in another part of the body, and then travels in the bloodstream - this is called an embolus. The most common example is a blood clot which forms in a heart chamber as a result of abnormal turbulent blood flow. This may occur in a condition called atrial fibrillation (see separate leaflet called *'Atrial Fibrillation'* for more detail). The blood clot is then carried in the bloodstream until it gets stuck in an artery in the brain.
- There are other rare causes of ischaemic stroke.

Haemorrhagic stroke - caused by bleeding

A damaged or weakened artery may burst and bleed:

- An intracerebral haemorrhage is when the blood vessel bursts inside the brain. The blood then spills into the nearby brain tissue. This can cause the affected brain cells to lose their oxygen supply. They become damaged or die. This happens in about 1 in 10 strokes.
- A subarachnoid haemorrhage is when a blood vessel bursts in the subarachnoid space. This is the narrow space between the brain and the skull. This space is normally filled with a fluid called the cerebrospinal fluid. About 1 stroke in 20 is due to a subarachnoid haemorrhage.

Uncertain cause

The cause is uncertain in a small number of strokes.

Who is affected by stroke?

Each year around 120,000 people in the UK have a first stroke, and about 30,000 have a recurrent stroke. Stroke is the largest cause of disability in the UK, and the third most common cause of death (after heart disease and cancer). Most cases occur in people aged over 65. Each year about 1 in 100 people over the age of 75 will have a stroke. But a stroke can occur at any age - even in babies. About one million people in the UK are living with the effects of stroke. Half of these people depend on others for help with everyday activities.

What are the symptoms of a stroke?

The functions of the different parts of the body are controlled by different parts of the brain. So, the symptoms vary depending on which part of the brain is affected and on the size of the damaged area. Symptoms develop suddenly and usually include one or more of the following:

- Weakness of an arm, leg, or both. This may range from total paralysis of one side of the body, to mild clumsiness of one hand.
- Weakness and twisting of one side of the face. This may cause you to drool saliva.
- Problems with balance, co-ordination, vision, speech, communication, or swallowing.
- Dizziness or unsteadiness.
- Numbness in a part of the body.
- Headache.
- Confusion.
- Loss of consciousness (occurs in severe cases).

What is a mini-stroke?

A mini-stroke is a set of symptoms similar to a stroke, but which last for less than 24 hours. It is due to a temporary lack of blood to a part of the brain. It is more correctly called a transient ischaemic attack (TIA). In most cases, a TIA is caused by a tiny blood clot that becomes stuck in a small blood vessel (artery) in the brain. This blocks the blood flow and a part of the brain is starved of oxygen. The affected part of the brain is without oxygen for just a few minutes, and soon recovers. This is because the blood clot either breaks up quickly, or nearby blood vessels are able to compensate.

Unlike a stroke, the symptoms of a TIA soon go. However, you should see a doctor urgently if you have a TIA, as you are at increased risk of having a full stroke. (See separate leaflet called *'Transient Ischaemic Attack'* for more detail.)

A quick guide for the general public to remember

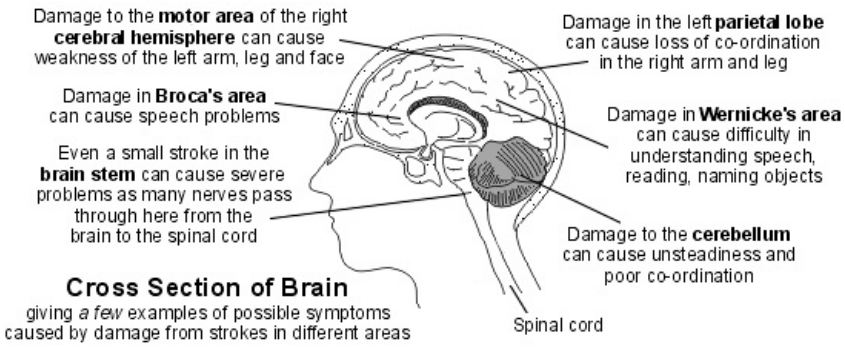
Both a stroke and a TIA are medical emergencies and need immediate medical attention. As a way of helping the general public to become more aware of the symptoms of a stroke or TIA, a simple symptom checklist to remember has been devised and publicised. This is to think of the word FAST. That is:

F - Facial weakness. Can the person smile? Has their mouth or eye drooped? **A** - Arm weakness. Can the person raise both arms? **S** - Speech disturbance. Can the person speak clearly? Can they understand what you say? **T** - Time to call 999.

If any of these symptoms suddenly develop, then the person needs to see a doctor urgently. So call an ambulance FAST. The FAST checklist does not cover every possible symptom of stroke or TIA. However, it is easy to remember and it is estimated that about 8 or 9 in 10 people with a stroke or TIA will have one or more FAST symptoms.

What are the long-term effects from having a stroke?

The type and extent of disability caused by a stroke can vary greatly. It depends on the extent of the damage to the brain.



Cross Section of Brain
giving *a few* examples of possible symptoms caused by damage from strokes in different areas

A large stroke can cause death. A small stroke may cause minor problems, which may go completely over time. In many cases the effects are somewhere in between these two extremes.

The sort of problems that may occur include one or more of the following:

- **Weakness of one side of the body**. This may cause problems with walking if a leg is affected, or problems using an arm or hand properly.
- **Problems with balance** and co-ordination.
- **Swallowing problems are common**. In some cases this can be dangerous, as food may go down the windpipe rather than down the gullet when you eat. Because of this, it is usual to do a swallow test on all people with a stroke before they are allowed to eat or drink. This is to make sure that swallowing is safe. If there is severe difficulty with swallowing then you may need to have food and drinks passed into your stomach via a tube.

- **Speech and communication difficulties**. This may range from a difficulty in finding the correct words to say in the middle of a sentence, to being completely unable to speak. Also, understanding speech, reading, or writing may be affected.
- **Difficulty with vision**. If a part of the brain that deals with vision is affected then problems may arise. For example, some people who have had a stroke have double vision. Some people lose half of their field of vision.
- **Difficulties with mental processes**. For example, difficulty in learning, concentrating, remembering, etc.
- **Inappropriate emotions**. For example, following a stroke, some people cry or laugh at times for no apparent reason.
- **Tiredness**.

The above are just some examples of what *may* occur following a stroke. Every stroke is different and the problems and difficulties have to be assessed for each affected person.

In the first few weeks after a stroke the swelling and inflammation around the damaged brain tissue settles down. Some symptoms may then improve. In time, sometimes other parts of the brain can compensate for the damaged part of the brain. With rehabilitation and appropriate therapy, there may be a gradual improvement.

Of those people who survive a stroke, about 3 in 10 are fully independent within three weeks. This rises to about 5 in 10 within six months. However, it is common for some degree of disability to remain.

Are any tests needed?

A doctor can usually diagnose a stroke by the typical symptoms and signs which develop suddenly. Tests which are commonly done include:

- A brain scan (CT scan or MRI scan). This can determine the type of stroke (ischaemic or haemorrhagic) and may detect rarer conditions which may have caused the stroke, or which may mimic a stroke.
- Blood tests to check on such things as blood sugar level and cholesterol level. High levels can increase the risk of a further stroke.
- Chest X-ray and ECG (a heart tracing) to check for heart or lung conditions which may be a cause of stroke (for example, atrial fibrillation).
- Ultrasound scan of the carotid arteries in the neck to check if there are large patches of atheroma in these arteries.

What treatment and care are usual for people who have a stroke?

If you suspect that you (or a person you are with) are having a stroke, then call for an ambulance immediately. You should be admitted to hospital.

Immediate care

Ideally, you will be assessed quickly by a doctor. Commonly, a scan of the brain is organised as soon as possible. The aim of the scan is to confirm the diagnosis and to tell whether the stroke is an ischaemic or haemorrhagic stroke. This is very important to know, as the initial treatment of the two is very different.

If an ischaemic stroke is diagnosed, and it has been less than three hours since symptoms started, you may be given a medicine directly into a vein, called alteplase. This is a clot-busting medicine which aims to dissolve the blood clot. The medical word for this is thrombolysis. If the blood clot that caused the stoke can be dissolved shortly after symptoms begin, it can improve the eventual outcome. This is because brain cells that would have died, are able to survive.

Further early treatment

A plan for any other treatments should be devised and started as soon as possible. Treatments should be tailored to the particular need of the individual. The treatment plan can depend on factors such as the severity of the stroke, the effects it has, the cause of the stroke, and other diseases that may be present. Treatments that may be considered include the following:

- Antiplatelet medication. Platelets are tiny particles in the blood which help blood to clot. Antiplatelet medication is usually advised if you have had an ischaemic stroke (due to a blood clot). Antiplatelet medication reduces the stickiness of platelets. This helps to prevent blood clots forming inside arteries, which helps to prevent a further stroke. Aspirin (low-dose) is the most commonly used antiplatelet medicine. Other antiplatelet medicines that may be used include clopidogrel and dipyridamole.
- If you are unable to swallow, you will be given food and fluids via a tube that is passed into your stomach. As mentioned earlier, a swallowing test is usually done early after being admitted to hospital.
- Medication may be advised to reduce any risk factors for having a further stroke (as discussed later in this article). For example, medication to lower a raised blood pressure, sugar level, or cholesterol level.
- If you have atrial fibrillation, you have an increased risk of a blood clot forming in a heart chamber and travelling to the brain to cause a stroke. If you have atrial fibrillation (or certain other heart conditions), a medicine called warfarin may be prescribed. Warfarin helps to prevent blood clots forming. Warfarin is an anticoagulant.
- If you have carotid stenosis then you have an increased risk of having a stroke. Carotid stenosis means a narrowing of one of your carotid arteries, due to atheroma. If the narrowing is severe, you may be advised to have surgery to strip out the atheroma. Your doctor will advise if this is an option.
- If you have a haemorrhagic (bleeding) stroke and are taking an anticoagulant medicine such as warfarin, treatment to reverse the effect of the anticoagulation is given.
- If a subarachnoid haemorrhage is the cause of the stroke, an operation to fix the leaking artery is sometimes an option.
- Other operations are occasionally done. For example, sometimes surgery is considered to ease the pressure within the skull if the pressure becomes high following certain types of stroke.
- As soon as possible after having a stroke you should be helped to sit up in bed, and to get out of bed and move around if you are able to do so. This is to start the process of rehabilitation as soon as possible. Also, this reduces the risk of having a deep vein thrombosis (DVT) in a leg vein, which is a risk if you are inactive in bed for long periods.

Rehabilitation

The aim of rehabilitation is to maximise activity and quality of life following a stroke. Hospitals which deal with stroke patients have various specialists who help in rehabilitation. These include: physiotherapists, occupational therapists, speech therapists, dieticians, psychologists, specialist nurses and doctors. One or more of these may be required, depending on how the stroke has affected you. Good-quality rehabilitation is vital following a stroke, and can make a big difference to your eventual outcome.

Can strokes be prevented?

As described above, a common reason why a blood clot forms is because it develops over a patch of atheroma on the lining of an artery. Certain risk factors increase the chance of atheroma forming - which increase your risk of having a stroke (and heart attack). You can reduce the risk of having a stroke (or a further stroke) if you reduce your risk factors. These are briefly mentioned below, but are dealt with in more detail in a separate leaflet called *'Preventing Cardiovascular Diseases'* . Briefly, risk factors that can be modified are:

- **Smoking**. If you smoke, you should make every effort to stop. The chemicals in tobacco are carried in your bloodstream and can damage your arteries. If you smoke, stopping smoking can greatly cut your risk of having a stroke.

- **High blood pressure**. Make sure your blood pressure is checked at least once a year. If it is high it can be treated. High blood pressure usually causes no symptoms, but can be damaging to the arteries. If you have high blood pressure, treatment of the blood pressure is likely to have the greatest effect on reducing your risk of having a stroke.
- **If you are overweight**, losing some weight is advised.
- **A high cholesterol level**. This can be treated if it is high.
- **Inactivity**. If able, you should aim to do some moderate physical activity on most days of the week for at least 30 minutes. For example, brisk walking, swimming, cycling, dancing, gardening, etc.
- **Diet**. You should aim to eat a healthy diet. Briefly, a healthy diet means:
    - AT LEAST five portions of *a variety of* fruit and vegetables per day.
    - THE BULK OF MOST MEALS should be starch-based foods (such as cereals, wholegrain bread, potatoes, rice, pasta), plus fruit and vegetables.
    - NOT MUCH fatty food such as fatty meats, cheeses, full-cream milk, fried food, butter, etc. Use low-fat, mono-, or poly-unsaturated spreads.
    - INCLUDE 2-3 portions of fish per week. At least one of these should be oily (such as herring, mackerel, sardines, kippers, pilchards, salmon, or *fresh* tuna).
    - If you eat red meat, it is best to eat lean red meat, or poultry such as chicken.
    - If you do fry, choose a vegetable oil such as sunflower, rapeseed or olive.
    - Try not to add salt to food, and limit foods which are salty.

- **Alcohol**. Do not drink more than the recommended limits. That is, men should drink no more than 21 units of alcohol per week, no more than four units in any one day, and have at least two alcohol-free days a week. Women should drink no more than 14 units of alcohol per week, no more than three units in any one day, and have at least two alcohol-free days a week. Pregnant women should not drink at all. One unit is in about half a pint of normal strength beer, or two thirds of a small glass of wine, or one small pub measure of spirits.
- **Diabetes** is a risk factor. If you have diabetes, treatment to keep your blood sugar as near normal as possible is important.

Further help and information

The Stroke Association

240 City Road, London, EC1V 2PR
Tel: 0303 303 3100 Web: www.stroke.org.uk
Provides information and help for people who have had a stroke, and for their carers.

Chest Heart & Stroke Scotland

Third Floor, Rosebery House, 9 Haymarket Terrace, Edinburgh. EH12 5EZ
Tel: 0845 077 6000 phone/textphone - local call rate Web: www.chss.org.uk
See also their online videos about stroke - www.chss.org.uk/publications/videos_dvds/

Chest, Heart & Stroke Northern Ireland

21 Dublin Road, Belfast, BT2 7HB
Tel: 08457 697299 Web: www.nichsa.com

Different Strokes

9 Canon Harnett Court, Wolverton Mill, Milton Keynes, MK12 5NF
Tel: 0845 130 7172 Web: www.differentstrokes.co.uk
A national charity for young stroke survivors.

Healthtalkonline

Web: www.healthtalkonline.org/Nerves_and_brain/Stroke
People who have had a stroke tell of their experiences.

Connect

16-18 Marshalsea Road, London SE1 1HL
Tel: 020 7367 0840 Web: www.ukconnect.org
Connect is a national charity. Their vision is a world where people with aphasia (communication disability) can find opportunity and fulfilment. They work to promote effective services, new opportunities and a better quality of life for people living with aphasia. (Some people with a stroke have aphasia.)

Further reading & references

- Stroke: The diagnosis and acute management of stroke and transient ischaemic attacks, NICE Clinical Guideline (July 2008)
- National clinical guideline for stroke (third edition), Royal College of Physicians (July 2008); Prepared by the Intercollegiate Stroke Working Party, incorporating the recommendations from NICE stroke guideline
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- Sandercock PA, Counsell C, Gubitz GJ, et al; Antiplatelet therapy for acute ischaemic stroke. Cochrane Database Syst Rev. 2008 Jul 16;(3):CD000029.
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