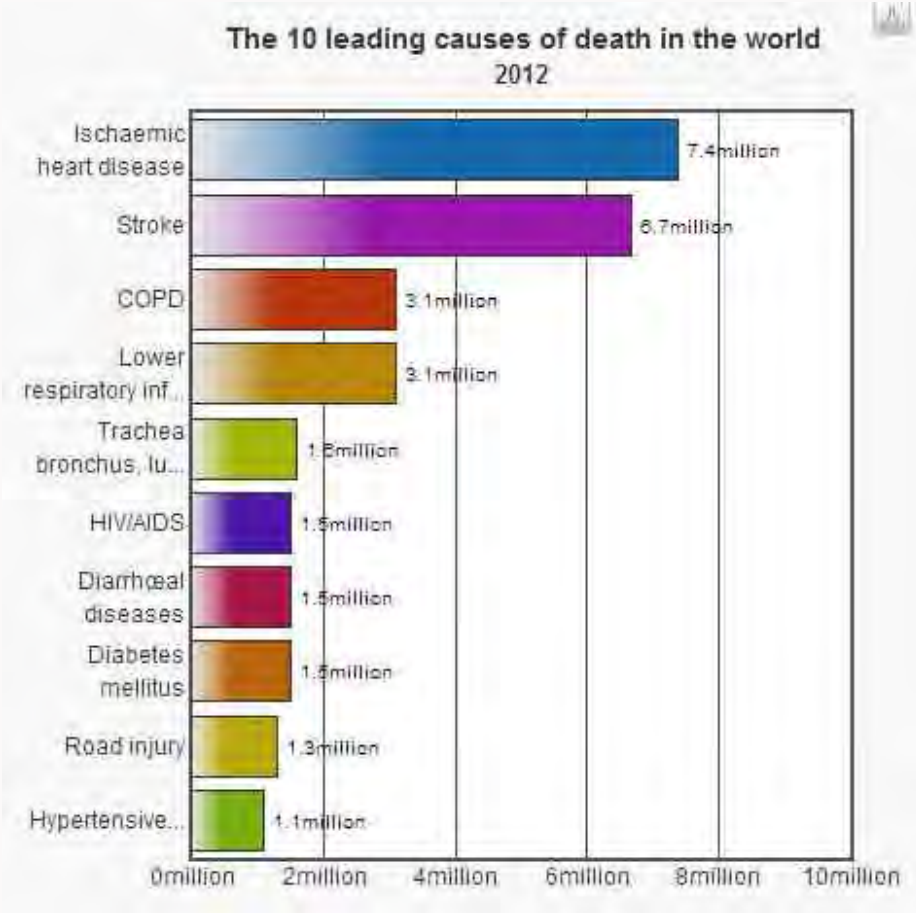
COVER ARTICLE

Deadliest Diseases of the world

STROKE

Stroke is a brain attack, cutting off vital blood flow and oxygen to the brain.



Source : WHO

A stroke occurs when the blood supply to your brain is interrupted or reduced. This deprives your brain of oxygen and nutrients, which can cause your brain cells to die.

A stroke may be caused by a blocked artery (ischemic stroke) or a leaking or burst blood vessel (hemorrhagic stroke). Some people may experience a temporary disruption of blood flow through their brain (transient ischemic attack, or TIA).

A stroke is an acute neurologic event leading to death of neural tissue of the brain and resulting in loss of motor, sensory and/or cognitive function. Also it is explained as a medical emergency which can cause permanent neurological damage or death. In the 1970s the World Health Organization(WHO) defined stroke as a "neurological deficit of cerebrovascular cause that persists beyond 24 hours or is interrupted by death within 24 hours".

It is said to be the second leading cause of death in the world.

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History

Hippocrates, the father of medicine, first recognized stroke over 2,400 years ago. At this time stroke was called apoplexy, which means "struck down by violence" in Greek. This was due to the fact that a person developed sudden paralysis and change in well-being.

It was not until the mid-1600s that Jacob Wepfer found that patients who died with apoplexy had bleeding in the brain. He also discovered that a blockage in one of the brain's blood vessels could cause apoplexy.
Medical science continued to study the cause, symptoms, and treatment of apoplexy and, finally, in 1928, apoplexy was divided into categories based on the cause of the blood vessel problem. This led to the terms stroke or "cerebral vascular accident (CVA).

Epidemiology

Stroke is one of the leading causes of death and disability in India. The estimated adjusted prevalence rate of stroke range, 84-262/100,000 in rural and 334-424/ 100,000 in urban areas. The incidence rate is 119-145/100,000 based on the recent population based studies. There is also a wide variation in case fatality rates with the highest being 42% in Kolkata. Stroke units are predominantly available in urban areas that too in private hospitals. Intravenous (IV) and intra-arterial thrombolysis (IA) are commonly used in India. In the on-going Indo USA National stroke registry the rate of IV thrombolysis is 11%. Journal of STROKE 2013;15(3) :128-134.

Prevalence

•One in every 10 deaths is caused by stroke; thus it is the third most common cause of death in developed countries, exceeded only by coronary heart disease and cancer.

•The prevalence of stroke in the US is about 7 million (3.0%).

•In China, the prevalence of stroke ranges between 1.8% (rural areas) and 9.4% (urban areas).

•Worldwide, China has one of the highest rates of mortality (19.9% of all deaths in China), along with Africa and parts of South America.

Incidence

•Worldwide, 15 million people suffer a stroke each year; one-third die and one-third are left permanently disabled.

•795,000 new or recurrent strokes occur per year in the US, accounting for approximately 1 in 18 deaths.

•In Europe, the incidence of stroke varies from 101.1 to 239.3 per 100,000 in men and 63.0 to 158.7 per 100,000 in women.

•Within 5 years of a stroke, over half of patients aged ≥ 45 years will die: 52% of men and 56% of women.
(Source: Roger VL et al. AHA Heart Disease and Stroke Statistics 2011 update. Circulation 2011;123:e18-e209

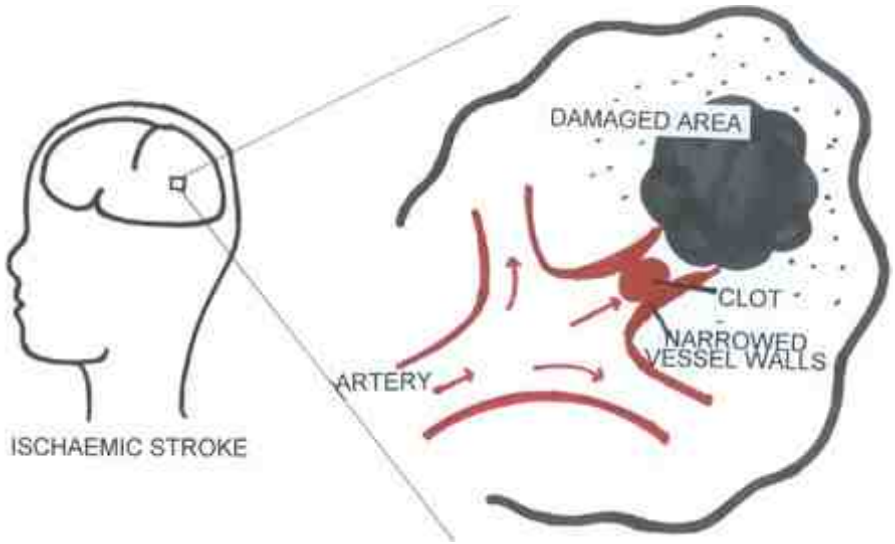
Clinical manifestations

Ischemia comprises not only insufficiency of oxygen, but also reduced availability of nutrient substrates and inadequate removal of metabolites.

1.Ischemic stroke

About 85 percent of strokes are ischemic strokes. Ischemic strokes occur when the arteries to your brain become narrowed or blocked, causing severely reduced blood flow (ischemia). The most common ischemic strokes include:

Thrombotic stroke. A thrombotic stroke occurs when a blood clot (thrombus) forms in one of the arteries that supply blood to your brain. A clot may be caused by fatty deposits (plaque) that build up in arteries and cause reduced blood flow (atherosclerosis) or other artery



conditions.

Embolic stroke. An embolic stroke occurs when a blood clot or other debris forms away from your brain — commonly in your heart — and is swept through your bloodstream to lodge in narrower brain arteries. This type of blood clot is called an embolus.

2.Hemorrhagic stroke

Hemorrhagic stroke occurs when a blood vessel in your brain leaks or ruptures. Brain hemorrhages can result from many conditions that affect your blood vessels, including uncontrolled high blood pressure (hypertension) and weak spots in your blood vessel walls (aneurysms).

A less common cause of hemorrhage is the rupture of an abnormal tangle of thin-walled blood vessels (arteriovenous malformation) present at birth. Types of hemorrhagic stroke include:

Intracerebral hemorrhage. In an intracerebral hemorrhage, a blood vessel in the brain bursts and spills into the surrounding brain tissue, damaging brain cells. Brain cells beyond the leak are deprived of blood and damaged.

High blood pressure, trauma, vascular malformations, use of blood-thinning medications and other conditions may cause intracerebral hemorrhage.

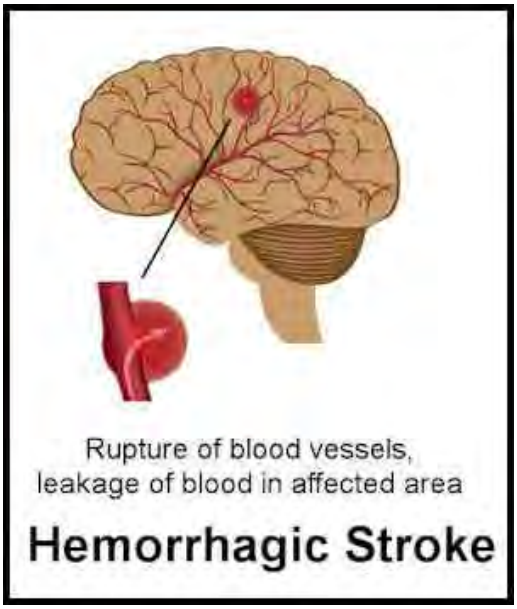
Subarachnoid hemorrhage. In a subarachnoid hemorrhage, an artery on or near the surface of your brain bursts and spills into the space between the surface of your brain and your skull. This bleeding is often signaled by a sudden, severe headache.

A subarachnoid hemorrhage is commonly caused by the bursting of a small sack-shaped or berry-shaped outpouching on an artery (aneurysm) in the brain. After the hemorrhage, the blood vessels in your brain may widen and narrow erratically (vasospasm), causing brain cell damage by further limiting blood flow.

3.Transient ischemic attack (TIA)

A transient ischemic attack (TIA) — also called a ministroke — is a brief period of symptoms similar to those you'd have in a stroke. A temporary decrease in blood supply to part of your brain causes TIAs, which often last less than five minutes. Like an ischemic stroke, a TIA occurs when a clot or debris blocks blood flow to part of your brain. A TIA doesn't leave lasting symptoms because the blockage is temporary. Seek emergency care even if your symptoms seem to clear up. If you've had a TIA, it means there's likely a partially blocked or narrowed artery leading to your brain, or a clot source in the heart, putting you at a greater risk of a full-blown stroke that could cause permanent damage later. It's not possible to tell if you're having a stroke or a TIA based only on your symptoms. Up to half of people whose symptoms appear to go away actually have had a stroke causing brain damage.

The importance of hypertension in stroke pathogenesis has conclusively been shown by large randomized prospective trials, demonstrating that treatment of hypertension reduces the risk of stroke by at least 40% (MacMahon et al., 1990).



Risk factors

High blood pressure is the main risk factor for strokes. the other major risk factors are:

- Atrial fibrillation
- Diabetes
- Family history of stroke
- High cholesterol
- Increasing age, especially after age 55
- Race (black people are more likely to die of a stroke)

Stroke risk is also higher in:

- People who have heart disease or poor blood flow in their legs caused by narrowed arteries
- People who have unhealthy lifestyle habits such as smoking, high fat diet, and lack of exercise
- Women who take birth control pills (especially those who smoke and are older than 35)

Genetic Risk Factors

Although there may not be a single genetic factor associated with stroke, genes do play a large role in the expression of stroke risk factors such as hypertension, heart disease, diabetes, and vascular malformations. It is also possible that an increased risk for stroke within a family is due to environmental factors, such as a common sedentary lifestyle or poor eating habits, rather than hereditary factors.

Vascular malformations that cause stroke may have the strongest genetic link of all stroke risk factors. A vascular malformation is an abnormally formed blood vessel or group of blood vessels. One genetic vascular disease called CADASIL, which stands for cerebral autosomal dominant arteriopathy with subcortical infarcts and leukoencephalopathy. CADASIL is a rare, genetically inherited, congenital vascular disease of the brain that causes strokes, subcortical dementia, migraine-like headaches, and psychiatric disturbances. CADASIL is very debilitating and symptoms usually surface around the age of 45. The exact incidence of CADASIL in the United States is unknown.

Symptoms

Stroke symptoms include:

- SUDDEN numbness or weakness of face, arm or leg - especially on one side of the body.
- SUDDEN confusion, trouble speaking or understanding.
- SUDDEN trouble seeing in one or both eyes.
- SUDDEN trouble walking, dizziness, loss of balance or coordination.
- SUDDEN severe headache with no known cause.

Diagnosis

Your doctor will diagnose a stroke based on your signs and symptoms, your medical history, a physical exam, and test results. Your doctor will want to find out the type of stroke you've had, its cause, the part of the brain that's affected, and whether you have bleeding in the brain. If your doctor thinks you've had a transient ischemic attack (TIA), he or she will look for its cause to help prevent a future stroke.

Medical History and Physical Exam

Your doctor will ask you or a family member about your risk factors for stroke. Your doctor also will ask about your signs and symptoms and when they began.

During the physical exam, your doctor will check your mental alertness and your coordination and balance. He or she will check for numbness or weakness in your face, arms, and legs; confusion; and trouble speaking and seeing clearly.

Your doctor will look for signs of carotid artery disease, a common cause of ischemic stroke. He or she will listen to your carotid arteries with a stethoscope. A whooshing sound called a bruit (broo-E) may suggest changed or reduced blood flow due to plaque buildup in the carotid arteries.

Diagnostic Tests and Procedures

Brain Computed Tomography

A brain computed tomography (to-MOG-rah-fee) scan, or brain CT scan, is a painless test that uses x rays to take clear, detailed pictures of your brain. This test often is done right after a stroke is suspected. A brain CT scan can show bleeding in the brain or damage to the brain cells from a stroke. The test also can show other brain conditions that may be causing your symptoms.

Magnetic Resonance Imaging

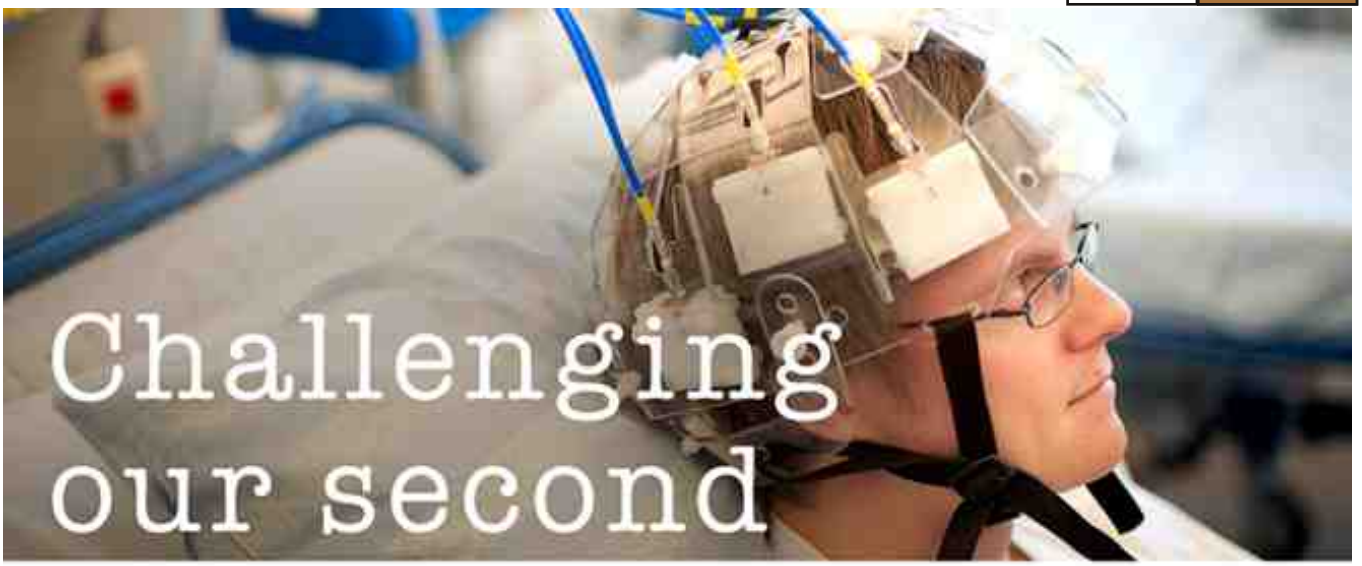
Magnetic resonance imaging (MRI) uses magnets and radio waves to create pictures of the organs and structures in your body. This test can detect changes in brain tissue and damage to brain cells from a stroke. An MRI may be used instead of, or in addition to, a CT scan to diagnose a stroke.

Computed Tomography Arteriogram and Magnetic Resonance Arteriogram

A CT arteriogram (CTA) and magnetic resonance arteriogram (MRA) can show the large blood vessels in the brain. These tests may give your doctor more information about the site of a blood clot and the flow of blood through your brain.

Carotid Ultrasound

Carotid ultrasound is a painless and harmless test that uses sound waves



Challenging our second biggest killer

to create pictures of the insides of your carotid arteries. These arteries supply oxygen-rich blood to your brain. Carotid ultrasound shows whether plaque has narrowed or blocked your carotid arteries. Your carotid ultrasound test may include a Doppler ultrasound. Doppler ultrasound is a special test that shows the speed and direction of blood moving through your blood vessels.

Carotid Angiography

Carotid angiography (an-jee-OG-ra-fee) is a test that uses dye and special x rays to show the insides of your carotid arteries. For this test, a small tube called a catheter is put into an artery, usually in the groin (upper thigh). The tube is then moved up into one of your carotid arteries. Your doctor will inject a substance (called contrast dye) into the carotid artery. The dye helps make the artery visible on x-ray pictures.

Heart Tests

EKG (Electrocardiogram)

An EKG is a simple, painless test that records the heart's electrical activity. The test shows how fast the heart is beating and its rhythm (steady or irregular). An EKG also records the strength and timing of electrical signals as they pass through each part of the heart. An EKG can help detect heart problems that may have led to a stroke. For example, the test can help diagnose atrial fibrillation or a previous heart attack.

Echocardiography

Echocardiography (EK-o-kar-de-OG-ra-fee), or echo, is a painless test that uses sound waves to create pictures of your heart. The test gives information about the size and shape of your heart and how well your heart's chambers and valves are working. Echo can detect possible blood clots inside the heart and problems with the aorta. The aorta is the main artery that carries oxygen-rich blood from your heart to all parts of your body.

Blood Tests

Your doctor also may use blood tests to help diagnose a stroke. A blood glucose test measures the amount of glucose (sugar) in your blood. Low blood glucose levels may cause symptoms similar to those of a stroke.

A platelet count measures the number of platelets in your blood. Blood platelets are cell fragments that help your blood clot. Abnormal platelet levels may be a sign of a bleeding disorder (not enough clotting) or a thrombotic disorder (too much clotting).

Your doctor also may recommend blood tests to measure how long it takes for your blood to clot. Two tests that may be used are called PT and PTT tests. These tests show whether your blood is clotting normally.

Treatment

A stroke is a medical emergency. Quick treatment is needed. Call 911 or your local emergency number or seek urgent medical care at the first signs of a stroke.

- If the stroke is caused by a blood clot, a clot-busting drug may be given to dissolve the clot.

• To be effective, this treatment must be started within 3 to 4 1/2 hours of when the symptoms first started.

Other treatments given in the hospital will depend on the cause of the stroke. These may include:
• Blood thinners such as heparin, warfarin (Coumadin), aspirin, or clopidogrel (Plavix)
• Medicine to control symptoms such as high blood pressure
• Special procedures or surgery to relieve symptoms or prevent more strokes
• Nutrients and fluids
• Feeding tube in the stomach (gastrostomy tube)

Aneurysm Clipping and Coil Embolization

If an aneurysm (a balloon-like bulge in an artery) is the cause of a stroke, your doctor may recommend aneurysm clipping or coil embolization.

Aneurysm clipping is done to block off the aneurysm from the blood vessels in the brain. This surgery helps prevent further leaking of blood from the aneurysm. It also can help prevent the aneurysm from bursting again.

Coil embolization is a less complex procedure for treating an aneurysm. The surgeon will insert a tube called a catheter into an artery in the groin. He or she will thread the tube to the site of the aneurysm.

Then, a tiny coil will be pushed through the tube and into the aneurysm. The coil will cause a blood clot to form, which will block blood flow through the aneurysm and prevent it from bursting again.

Arteriovenous Malformation Repair

If an AVM is the cause of a stroke, your doctor may recommend an AVM repair. (An AVM is a tangle of faulty arteries and veins that can rupture within the brain.) AVM repair helps prevent further bleeding in the brain.

Doctors use several methods to repair AVMs. These methods include:
• Surgery to remove the AVM
• Injecting a substance into the blood vessels of the AVM to block blood flow
• Using radiation to shrink the blood vessels of the AVM

Physical therapy, occupational therapy, speech therapy, and swallowing therapy will all begin in the hospital. The goal of treatment after a stroke is to help you recover as much function as possible and prevent future strokes. Recovery from your stroke will begin while you are still in the hospital or at a rehabilitation center. It will continue when you go home from the hospital or center.

How Can a Stroke Be Prevented?

Taking action to control your risk factors can help prevent or delay a stroke. If you've already had a stroke, these actions can help prevent another one.

• Don't smoke. If you smoke or use tobacco, quit. Smoking can damage and tighten blood vessels and raise your risk of stroke. Talk with your doctor about programs and products that can help you quit. Also, try to avoid secondhand smoke. Secondhand smoke also can damage the blood vessels.

• Make healthy eating choices. A healthy diet includes a variety of fruits, vegetables, and whole grains. It also includes lean meats, poultry, fish, beans, and fat-free or low-fat milk or milk products. A healthy diet is low in saturated fat, trans fat, cholesterol, sodium (salt), and added sugars.

• Maintain a healthy weight. If you're overweight or obese, work with your doctor to create a reasonable weight-loss plan. Controlling your weight helps you control stroke risk factors.

• Be as physically active as you can. Physical activity can improve your fitness level and your health. Talk with your doctor about what types and amounts of activity are safe for you.

• Know your family history of stroke. If you or someone in your family has had a stroke, be sure to tell your doctor.