Cooper
Neurological Institute

STROKE PROGRAM

PATIENT RESOURCE GUIDE

TABLE OF Contents

Stroke Prevention 1
- Risk Factors for Stroke 1
- Stroke, TIA and Warning Signs 2
- Hemorrhagic Stroke 3

Stroke Diagnosis 4

Stroke Treatment 5

Stroke Recovery 6

Complications After Stroke 7

Patient Resources 8

STROKE Prevention

Risk Factors for Stroke

To prevent stroke, know your risk factors and have regular medical checkups. Some risk factors can be changed and some cannot.

What risk factors can I change or treat?

- **High blood pressure** is the single most important risk factor for stroke because it's the No. 1 cause of stroke. If your blood pressure is consistently 140/90 or above, it's high. Have it checked by your doctor at least once every two years and talk to your doctor about how to manage it.
- **Tobacco use** damages blood vessels. Don't smoke, and avoid second-hand smoke.
- **Diabetes mellitus.** Having diabetes increases your risk of stroke because it can cause disease of blood vessels in the brain. Work with your doctor to manage diabetes.
- **High blood cholesterol** increases the risk of blocked arteries. If an artery leading to the brain becomes blocked, a stroke can result.
- **Physical inactivity and obesity.** Being inactive, obese, or both, can increase your risk of cardiovascular disease.
- **Carotid or other artery disease.** The carotid arteries in your neck supply most of the blood to your brain. A carotid artery damaged by a fatty buildup of plaque inside the artery wall may become blocked by a blood clot, causing a stroke.
- **Transient ischemic attacks (TIAs).** Recognizing and treating TIAs can reduce the risk of a major stroke. TIAs produce stroke-like symptoms but have no lasting effects. Know the warning signs of a TIA and seek emergency medical treatment immediately.
- **Atrial fibrillation or other heart disease.** In atrial fibrillation the heart's upper chambers quiver rather than beating effectively. This causes the blood to pool and clot, increasing the risk of stroke. People with other types of heart disease have a higher risk of stroke, too.
- **Certain blood disorders.** A high red blood cell count makes clots more likely, raising the risk of stroke. Sickle cell anemia increases stroke risk because the "sickled" cells stick to blood vessel walls and may block arteries.
- **Excessive alcohol intake.** Drinking an average of more than one drink per day for women or more than two drinks a day for men raises blood pressure. Binge drinking can lead to stroke.
- **Illegal drug use.** Intravenous drug use carries a high stroke risk. Cocaine use also has been linked to stroke. Illegal drugs commonly cause hemorrhagic strokes.

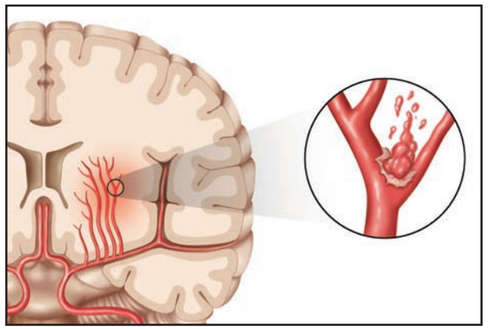
What are the risk factors I can't control?

- **Increasing age.** Stroke affects people of all ages. But the older you are, the greater your stroke risk.
- **Gender.** In most age groups, more men than women have stroke, but more women die from stroke.
- **Heredity and race.** People whose close blood relations have had a stroke have a higher risk of stroke. African Americans have a higher risk of death and disability from stroke than Caucasians, because they have high blood pressure more often. Hispanic Americans are also at higher risk of stroke.
- **Prior stroke.** Someone who has had a stroke is at higher risk of having another one.

Stroke, TIA and Warning Signs

Stroke occurs when a blood vessel bringing blood and oxygen to the brain gets blocked or ruptures. When this happens, brain cells don't get the blood that they need. Deprived of oxygen, nerve cells stop working and die within minutes. Then, the part of the body they control can't function either. The effects of stroke may be permanent depending on how many cells are lost, where they are in the brain, and other factors.

Stroke is the No. 4 cause of death and a leading cause of serious, long-term disability in America.

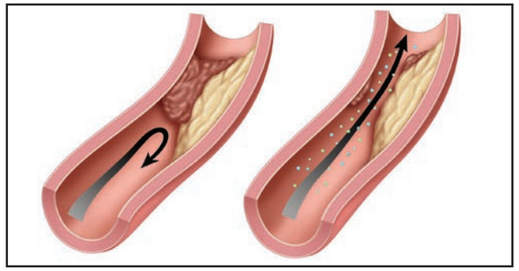


Stroke occurs when a blood vessel bringing blood and oxygen to the brain gets blocked or ruptures.

TIA, or transient ischemic attack, is a "minor stroke" that occurs when a blood clot blocks an artery for a short time. The symptoms of a TIA are the same as those of a stroke, but they usually last only a few minutes. About 15 percent of major strokes are preceded by TIAs, so don't ignore a TIA. Call 9-1-1 or seek emergency medical attention immediately!

Stroke is largely preventable. You can reduce your stroke risk by living a healthy lifestyle — controlling high blood pressure; not smoking; eating a low-fat, low cholesterol diet; being physically active; maintaining a healthy body weight; managing diabetes; drinking moderately or not at all.

Also, much is being done to fight the effects of stroke. For example, the FDA approved use of the clot-dissolving drug tissue plasminogen activator



tPA is an FDA-approved clot-dissolving drug used to stop a stroke in progress.

(tPA) to treat stroke. This is an advantage because tPA can stop a stroke in progress and reduce disability. But to be eligible for tPA you must seek emergency treatment right away, because it must be given within 4.5 hours after symptoms start, and have a stroke caused by a clot.

The warning signs of stroke should be recognizable by you and your family members. You may have some or all of these signs. Note the time when symptoms start and call 9-1-1 or the emergency medical number in your area. Stroke is a medical emergency!

Don't ignore these warning signs, even if they go away. Timing is important. There are treatments that can be considered within 4.5 to 8 hours of the onset of symptoms

Stroke Warning Signs

- Sudden numbness or weakness of the 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.

Before you need to take emergency action, find out where the emergency entrance is to your nearest hospital. Also, keep a list of emergency phone numbers next to your phone and with you at all times, just in case. Take these steps NOW!

Hemorrhagic Stroke

There are two kinds of hemorrhagic stroke. In both, a blood vessel ruptures, disrupting blood flow to part of the brain.

Intracerebral hemorrhages

(most common type of hemorrhagic stroke)

- Occur when a blood vessel bleeds or ruptures into the tissue deep within the brain.
- Are most often caused by chronically high blood pressure or aging blood vessels.
- Are sometimes caused by an arteriovenous malformation (AVM). An AVM is a cluster of abnormally formed blood vessels. Any one of these vessels can rupture, also causing bleeding into the brain.

Subarachnoid hemorrhages

- Occur when an aneurysm (a blood-filled pouch that balloons out from an artery) on or near the surface of the brain ruptures and bleeds into the space between the brain and the skull.
- Are often caused by high blood pressure.
- In addition to high blood pressure, factors that increase the risk of hemorrhagic strokes include:
  - Cigarette smoking.
  - Use of oral contraceptives (particularly those with high estrogen content).
  - Excessive alcohol intake.
  - Use of illegal drugs.

Diagnosis

When someone has shown symptoms of a stroke or a TIA, a doctor will gather information and make a diagnosis. The doctor will review the events that have occurred and will:

- Get a medical history.
- Do a physical and neurological examination.
- Have certain laboratory (blood) tests done.
- Recommend a CT or MRI scan.
- Study the results of other diagnostic tests that might be needed.

Diagnostic tests examine how the brain looks, works and gets its blood supply. They can outline the injured brain area. Diagnostic tests fall into three categories.

- Imaging tests give a picture of the brain similar to X-rays.
- Electrical tests record the electrical impulses of the brain.
- Blood flow tests show any problem that may cause changes in blood flow to the brain.

Treatment

Because hemorrhages may be life-threatening, hospital care is required. Medication is used to control high blood pressure. Other medicine may be given to reduce the brain swelling that follows a stroke.

Surgery may be needed depending on the cause of the hemorrhage. Surgery is often recommended to either place a metal clip at the base of an aneurysm or to remove the abnormal vessels that make up an AVM.

Some procedures are less invasive and use a catheter that goes in through a major artery in the leg or arm. The catheter is guided to the aneurysm or AVM where it places a device, such as a coil, to prevent rupture.

STROKE Diagnosis

It's critical to diagnose a stroke in progress because the treatment for stroke depends on the type of stroke, and, in some cases, the location of the injury to the brain. Other conditions with similar symptoms to stroke and TIAs will need to be ruled out to diagnose stroke. Some of these include seizures, fainting, migraine headaches, heart problems or other general medical conditions.

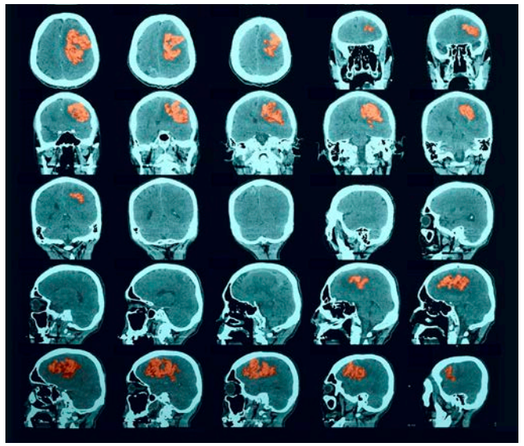
Diagnostic Tests

Diagnostic tests examine how the brain looks, works and gets its blood supply. Most are safe and painless.

These tests fall into two categories: 1) imaging tests and 2) blood flow tests.

Imaging Tests

- **CT (computed tomography) or CAT scan.** Uses radiation to create a picture (like an X-ray) of the brain. It's usually one of the first tests given to a patient with stroke symptoms. CT test results give valuable information about the cause of stroke and the location and extent of brain injury.
- **MRI (magnetic resonance imaging).** This test uses a large magnetic field to produce an image of the brain. Like the CT scan, it shows the location and extent of brain injury. The image produced by MRI is sharper and more detailed than a CT scan, so it's often used to diagnose small, deep injuries.
- **CTA (computed tomographic angiography).** In CTA, a special contrast material (dye) is injected into a vein and images are taken of the blood vessels to look for abnormalities such as an aneurysm.
- **MRA (magnetic resonance angiography).** In this test, the blood vessels are imaged through a magnetic resonance scanner to locate a cerebral aneurysm.

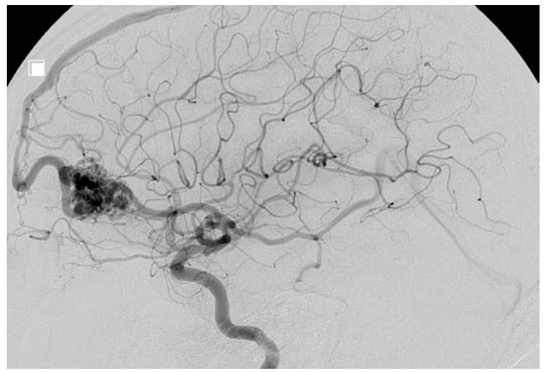


MRI confirms hemorrhagic stroke

Blood Flow Tests

These tests give information about the condition of arteries in your head and neck that supply blood to your brain.

- **Cerebral angiography (or cerebral arteriography).** Special substances are injected into the blood vessels and an X-ray is taken. This test gives a picture of the blood flow through the vessels. This allows the size and location of blockages to be reviewed. This test is very valuable in diagnosing aneurysms and malformed blood vessels.



Cerebral angiography shows arteriovenous malformation (AVM)

STROKE Treatment

When a Stroke Occurs:
Rapid Stroke Treatment Can Save Lives

If you're having a stroke, it's critical that you get medical attention right away. Immediate treatment may minimize the long-term effects of a stroke and prevent death.

There are two types of strokes: hemorrhagic or ischemic.

An ischemic stroke occurs as a result of an obstruction within a blood vessel supplying blood to the brain. It accounts for 87 percent of all stroke cases.

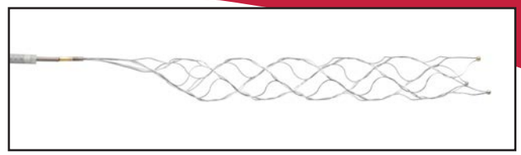
A hemorrhagic stroke occurs when a weakened blood vessel ruptures and spills blood into brain tissue. The most common cause for the rupture is uncontrolled hypertension (high blood pressure). There are two other types of weakened blood vessels that also cause hemorrhagic stroke: aneurysms and AVMs. Treatment differs depending on the type of stroke.

Ischemic Stroke Treatment

tPA, the Gold Standard the only FDA approved treatment for ischemic strokes, is tissue plasminogen activator (tPA, also known as IV rtPA, given through an IV in the arm). tPA works by dissolving the clot and improving blood flow to the part of the brain being deprived of blood flow.

If administered within 3 hours (and up to 4.5 hours in certain eligible patients), tPA may improve the chances of recovering from a stroke. A significant number of stroke victims don't get to the hospital in time for tPA treatment; this is why it's so important to identify a stroke immediately.

Endovascular Procedures. This is another treatment option in which specially trained doctors at Cooper University Hospital try removing the blood clot by sending a catheter to the site of the blocked blood vessel in the brain within an 8 hour window.



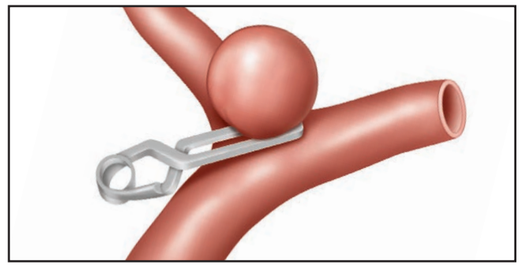
Endovascular clot removing device

Sometimes these procedures involve tPA being administered directly into the blood clot (called intra-arterial treatment) to help dissolve the blockage. In other procedures, the doctor may attempt to remove the clot using a combination of state-of-the-art mechanical thrombectomy devices such as Trevo (Stryker), Solitaire (Covidien), and Penumbra Aspiration device.

Hemorrhagic Stroke Treatment

Endovascular Procedures may be used to treat certain hemorrhagic strokes similar to the way the procedure is used for treating an ischemic stroke. These procedures are less invasive than surgical treatments and involve the use of a catheter introduced through a major artery in the leg or arm. The catheter is guided to the aneurysm or AVM and deposits a mechanical agent — such as a coil, to prevent rupture. Stents and balloon-assisted treatment can also be performed at Cooper University Hospital. For AVM treatment, liquid embolization with special glue or Onyx (covidien) material can be placed followed by radiosurgery or open vascular surgery.

Surgical Treatment for strokes caused by a bleed within the brain (hemorrhagic stroke) or by an abnormal tangle of blood vessels (AVM), may be done to stop the bleeding. If the bleed is caused by a ruptured aneurysm (swelling of the vessel that breaks) a metal clip may be placed surgically at the base of the aneurysm to secure it.



Aneurysm clip

Stroke and Rehabilitation

When the immediate crisis of a stroke has passed and you've been stabilized medically, it's time to consider rehabilitation (rehab) therapy.

What is stroke rehabilitation?

After a stroke, you may have to change or relearn how you live day to day. Rehab may reverse some of the effects of stroke.

The goals of rehab are to increase independence, improve physical functioning and help you gain a satisfying quality of life after stroke. Another goal is to help you make lifestyle changes to prevent another stroke.

Your rehabilitation team may include:

- **Physiatrist** — A medical doctor who specializes in rehab.
- **Physical therapist** — A health care provider who specializes in maximizing a stroke survivor's mobility and independence to improve major motor and sensory impairments, such as walking, balance and coordination.
- **Occupational therapist** — A therapist who focuses on helping stroke survivors rebuild skills in daily living activities such as bathing, toileting and dressing.

- **Rehabilitation nurse** — A nurse who coordinates the medical support needs of stroke survivors throughout rehab.
- **Speech therapist** — A specialist who helps to restore speech and language skills and also treats swallowing disorders.
- **Recreational therapist** — A therapist who helps to modify activities that the survivor enjoyed before the stroke or introduces new ones.
- **Psychiatrist or psychologist** — Specialists who help stroke survivors adjust to the emotional challenges and new circumstances of their lives.
- **Vocational rehabilitation counselor** — A specialist who evaluates work-related abilities of people with disabilities. They can help stroke survivors make the most of their skills to return to work.

Rehabilitation programs often focus on:

- Activities of daily living such as eating, bathing and dressing.
- Mobility skills such as transferring from bed to chair, walking or self-propelling a wheelchair.
- Communication skills in speech and language.
- Cognitive skills such as memory or problem solving.
- Social skills in interacting with other people.
- Psychological functioning to improve coping skills and treatment to overcome depression, if needed.

Your doctor's highest priorities after a stroke are to prevent complications from the stroke and to prevent another stroke. Your doctor must determine that you are medically stable and able to resume some self-care activities. This means that all complications must be treated and under control.

Some things happen as a direct result of injury to the brain due to stroke. Others are because of a change in your abilities. For example, being unable to move freely can result in bedsores. Clinical depression can also occur with a stroke.

The most common complications of stroke are:

- **Brain edema** — swelling of the brain after a stroke.
- **Pneumonia** — causes breathing problems, a complication of many major illnesses.
- **Common swallowing problems** after stroke can sometimes result in things "going down the wrong pipe", leading to aspiration pneumonia.
- **Urinary tract infection** and/or bladder control.
- **Seizures** — abnormal electrical activity in the brain causing convulsions.
- **Clinical depression** — a treatable illness that often occurs with stroke and causes unwanted emotional and physical reactions to changes and losses.
- **Bedsores** — pressure ulcers that result from decreased ability to move and pressure on areas of the body because of immobility.
- **Limb contractures** — shortened muscles in an arm or leg from reduced range of motion or lack of exercise.
- **Shoulder pain** — stems from lack of support of an arm due to weakness or paralysis. This usually is caused when the affected arm hangs resulting in pulling of the arm on the shoulder.
- **Deep venous thrombosis** — blood clots form in veins of the legs because of immobility from stroke.

What can be done?

If you need medical treatment, your doctor will prescribe it.

- Medical treatment often involves medical supervision, monitoring and drug therapies.
- Physical treatment usually involves some type of activity that may be done by you, a health care provider or by both of you working together.

Types of treatment may include:

- Range-of-motion exercises and physical therapy to avoid limb contracture, shoulder pain and blood vessel problems.
- Frequent turning while in bed to prevent pressure sores and good nutrition.
- Bladder training programs for incontinence.
- Swallowing and respiratory therapy and deep breathing exercises. These all help to decrease the risk of pneumonia.
- Psychological treatment can include counseling or therapy for feelings that result from clinical depression. Types of treatment may include antidepressant medication, psychotherapy or both. You may also be referred to a local stroke support group.

PATIENT Resources

National Organizations

American Stroke Association
1-888-4-STROKE (78-7653)
strokeassociation.org

ASA Support Network
http://supportnetwork.heart.org/home

Local Stroke Support Groups

Our Lady of Lourdes Stroke Group
Regional Rehab 1600 Haddoen Avenue
Camden, NJ 08103
856.757.3972

Brain Injury Group
Marlton Rehabilitation Hospital
92 Brick Road
Marlton, NJ 08053

Contact Information

Cooper Neurological Institute (CNI)
Three Cooper Plaza, Suite 104
Camden, NJ 08103

CNI main number
856.968.7965

Cooper University Hospital, main number
856.342.2000

Cooper
University Health Care

World Class Care. Right Here. Right Now.

George E. Norcross, III
Chairman
Board of Trustees

Adrienne Kirby, PhD
President and CEO
The Cooper Health System