written by
Harvard Medical School

Stroke

Protecting Your Brain

PROMED
Patient Education Center
www.patientedu.org

The name "stroke" comes from an old English word meaning "blow" or "sudden attack." Even today, many people use the term "shock" to describe strokes. Strokes are the 3rd leading cause of death in the U.S. Most people who suffer strokes have a long history of risk factors that can be detected and treated to prevent brain damage.

To protect your brain, you should:

- **Get tested** for risk factors and treat any that are found
- Learn to **recognize warning symptoms** and know what to do about them
- **Call 911** if you or your loved ones show signs of a stroke

For more information about stroke from Harvard Health Publications, go to www.patientedu.org/stroke.

Who Gets Strokes?

This year alone, nearly **800,000 Americans will have strokes,** and about **150,000 will die as a result.** Although young people can also have strokes, the problem is much more common in older individuals. **Almost 75% of stroke patients are older than age 65.** Strokes are slightly more common in women than men, and the risk is double for African Americans.

Some strokes occur without rhyme or reason, but most people have one or more of the following risk factors:

- High blood pressure
- Heart disease
- Smoking
- Diabetes
- Lack of exercise
- Obesity
- Abnormal cholesterol levels
- Drug abuse

Warning Signs

Strokes develop when a blood clot, or something else, blocks the brain's blood supply. If the interruption is brief, brain cells are stunned. However, they will recover when blood flow is restored. During the interruptions, the patient develops symptoms much like those of a stroke (see Table 1). When the brain cells recover, the symptoms clear, and the patient returns to normal. These warning attacks are called *transient ischemic attacks* or TIAs. Recovery usually takes less than an hour and the symptoms are gone within 24 hours.

Because TIAs are brief, at least 50% of patients who have them never even tell their doctors. That's a big mistake because about 10% of TIA patients go on to have a true stroke within the next 3 months.

10% of patients who suffer from a TIA go on to have a true stroke within 3 months.

Contact your doctor right away if you have symptoms of a possible TIA. In most cases, you'll be checked for stroke risk factors (see page 3) and:

- You'll have a *carotid ultrasound* to check for blockages in the arteries in your neck that carry blood to your brain.
- You'll also have an EKG (*electrocardiogram*) and possibly an *echocardiogram* (ultrasound of the heart) to check for problems that can cause blood clots.

Table 1	Typical Symptoms of TIAs and Strokes
Tingling, numbness, or loss of feeling in the face, arm, or leg, especially on one side of the body	
Weakness or being unable to move the muscles of the face, arm, or leg, especially on one side of the body	
Trouble finding words or speaking clearly	
Trouble understanding spoken words	
Loss of vision, especially in one eye	
Severe dizziness, lack of coordination, or loss of balance	
A sudden, very severe headache	

Silent Strokes

TIAs are sometimes called "mini strokes" because the symptoms are so brief. The fact is, TIAs are not real strokes since no brain cells die. But if blood flow to a small area of the brain is permanently interrupted, a true mini stroke can occur. Because the damage is so small, patients don't notice them. But people who suffer a series of small, silent strokes often develop memory loss (or *dementia*). **You can protect your brain from this problem** by controlling your blood pressure and other risk factors (see page 13).

Types of Strokes

There are 2 types of major strokes: *ischemic* and *hemorrhagic*. **About 90% of strokes are ischemic strokes,** which develop when a blood clot blocks an artery in the brain (Figure 1). This blockage deprives brain cells of oxygen-rich blood. In some cases, the clot develops right in the brain artery. More often it develops in the heart or in one of the large arteries that carry blood to the brain, and then the clot travels to the brain.

The other 10% of stokes are hemorrhagic strokes that develop when a blood vessel in the brain leaks or bursts (Figure 2). In some cases, blood spills into the brain tissue. In others, the blood seeps into the fluid that surrounds the brain. **Hemorrhagic strokes often cause a horrible headache and collapse.** Often, the culprit is a tiny area of damage in one of the brain's arterial walls.

Figure 1
Ischemic Stroke

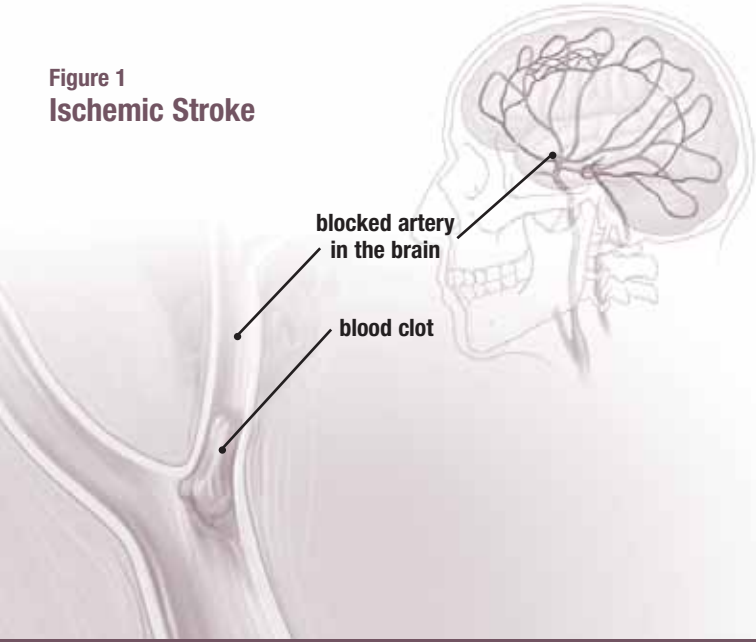
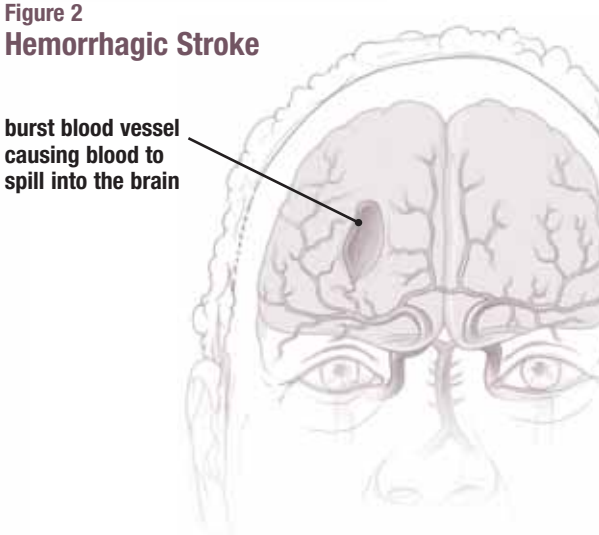


Figure 2
Hemorrhagic Stroke



What To Do

Stroke treatment has improved over the past few years. For treatment to work best, it should be started as soon as possible. Call 911 and go to the hospital as soon as symptoms listed in Table 1 occur.

A stroke is a medical emergency, but emergencies can make it hard to remember all the possible symptoms. Remembering these four simple tests can help you act **FAST:**

Face:	Ask the person to smile. If one side droops, it may suggest a TIA or stroke.
Arms:	Ask the person to hold out both arms in front of the body. If one arm droops, it may suggest a TIA or stroke.
Speech:	Ask the person to repeat a simple sentence. Slurred speech, garbled words, or other errors may suggest a stroke or TIA.
Time:	If any warning signs are present, call 911. Ask for the nearest hospital with an emergency department and, if possible, a stroke center.

If any warning signs are present, call 911.

Evaluating Stroke Patients

Strokes are complex problems, and diagnostic testing is high-tech. If you have symptoms that could indicate a stroke, your doctors will decide what tests are best, often with the help of specialists. Here are some steps your doctors will consider:

- Monitoring and managing blood pressure and vital functions.
- Testing for diabetes, cholesterol, and kidney function.
- Testing for heart disease, usually with an immediate EKG and often with an echocardiogram.
- Imaging the brain and its circulation. Computed tomography (CT) is often the first step, sometimes followed by magnetic resonance imaging (MRI). Doctors may use CT angiography (CTA) or MR angiography (MRA) with a contrast agent to see blood vessels in the neck and brain.
- Testing for carotid artery blockages using ultrasound, CTA, or MRA.

Treatment

Stroke treatment is complex and tricky. When possible, patients should be treated in a stroke center where neurologists, neurosurgeons, and neuroradiologists work together.

All patients need to have their blood pressure, heart and lung function, and metabolism checked. Additional treatment depends on the type of stroke and must be tailored to a each patient's needs.

Ischemic strokes:

- "Clot-busting drugs" can help some patients by opening blocked brain arteries. To be effective, they must be given within a few hours of the stroke. To be safe, they must be prescribed by experts who take the risk of bleeding into account.
- Anti-platelet therapy can reduce the risk of new clots and more strokes. It does not dissolve clots or open blocked arteries. The main anti-platelet therapy is low-dose aspirin (81 mg a day). Many experts recommend taking *dipyridamole* with aspirin. Another drug, *clopidogrel*, may be helpful in certain patients.
- Patients who have severe narrowing of the carotid artery may benefit from an operation (*carotid endarterectomy*) or an *angioplasty with stent* to open the artery and prevent further strokes. Anti-platelet therapy can also protect many patients with less-severe carotid blockages.
- "Blood thinners" (*anticoagulants*) can reduce the risk of stroke for patients whose clots develop in the heart. *Warfarin* is usually prescribed for long-term use. Patients will need blood tests to adjust the dosage along with precautions to prevent bleeding.

Hemorrhagic strokes:

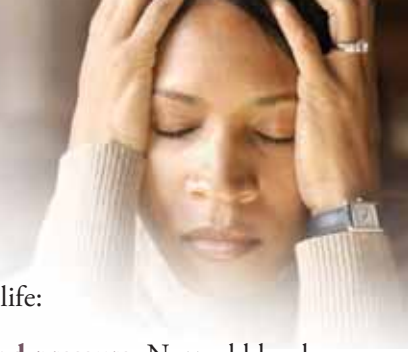
- Urgent treatment requires four steps:
  1. Diagnosing the cause of bleeding
  2. Controlling blood pressure
  3. Monitoring fluid pressure in the brain
  4. Stopping drugs that can increase bleeding
- Patients with high brain pressure may need fluid drained from the brain to lower pressure.
- Patients whose bleeding can be traced to abnormal blood vessels in the brain may benefit from operations to repair the blood vessels. Other options include threading a tiny tube (*catheter*) into the artery and using a coil or glue-like material to seal the leak.
- Certain patients with pooled blood in the brain may benefit from an operation to drain the blood.

Rehabilitation

Many stroke patients are left with mild-to-severe impairments. During rehabilitation, a team approach can help to prevent complications and to restore as much function as possible. Key elements include:

- **Physical therapy** to retrain the brain and body
- **Speech therapy** to improve speech and swallowing
- **Nursing care** to prevent infection and bed sores
- **Good nutrition**
- **Support devices,** such as a walker, **and training** to prevent falls
- **Medication** to prevent blood clots in the legs of patients who cannot walk

Prevention



Most strokes are predictable and preventable. Here's how you can protect your brain and your life:

- **Control your blood pressure.** Normal blood pressure is below 120/80. Most people with high pressure should aim for 140/90 or lower, but people with diabetes, heart or blood vessel disease, kidney problems, or previous strokes should aim for 130/80 or lower (see the PEC brochure, 'High Blood Pressure').

- **Stop smoking** and avoid secondhand smoke (see the PEC brochure, 'Smoking Cessation').

- **Eat right.** Fruits, vegetables, and whole grains will help—and so will cutting down on salt and fats (see the PEC brochure, 'Good Eating for Good Health').

- **Exercise regularly.**
- **Control your weight.** It's hard, but exercise and a healthy diet can really help.

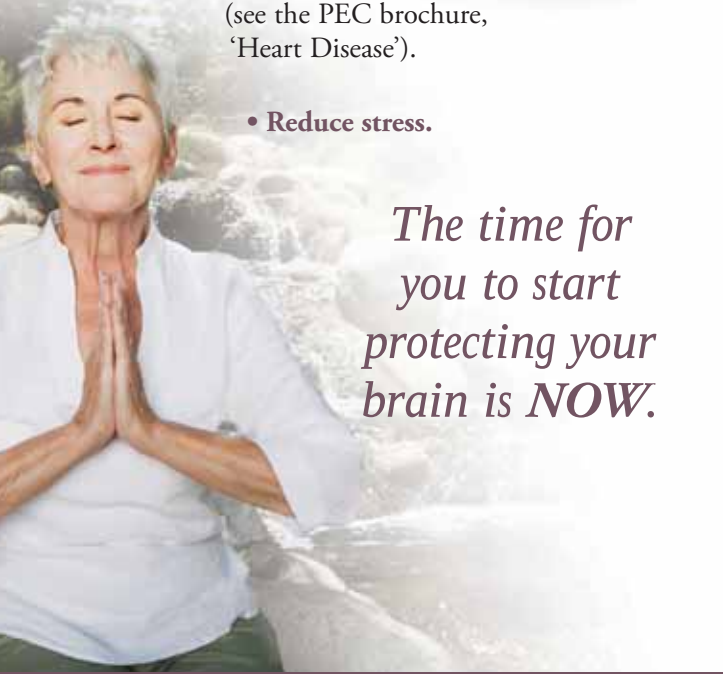
- **Control your blood sugar** (see the PEC brochure, 'Diabetes').

- **Improve your cholesterol levels.** If diet and exercise don't bring you to your goal, a statin drug can reduce your risk of stroke by 15% to 30% (see the PEC brochure, 'Understanding Cholesterol').

- **Limit alcohol** to 1 (for women) to 2 (for men) drinks a day.

- **Protect your heart,** and take medication to prevent clots if you have problems such as the irregular pumping rhythm *atrial fibrillation* (see the PEC brochure, 'Heart Disease').

- **Reduce stress.**



*The time for you to start protecting your brain is **NOW**.*

Striking Back

Every 40 seconds someone in the United States has a stroke, and someone dies from stroke every 3 to 4 minutes. But strokes can be prevented. The incidence of strokes in the U.S. has fallen by over 70% in the past 60 years, and we can do even better in the future.

For More Information

National Institute of Neurological Disorders and Stroke

www.ninds.nih.gov/disorders/stroke/stroke.htm

American Stroke Association

www.strokeassociation.org

National Stroke Association

www.stroke.org

To learn more about stroke and protecting your brain, visit the **Pri-Med Patient Education Center** at **www.patientedu.org/stroke**.

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