

Preventing Stroke

If you're like most Americans, you plan your future. When you take a job, you examine its benefit plan. When you buy a home, you consider its location and condition so that your investment is safe. Today, more and more Americans are protecting their most important asset—their brain. Are you?

Stroke ranks as the fourth leading killer in the United States. A stroke can be devastating to individuals and their families, robbing them of their independence. It is the most common cause of adult disability. Each year more than 700,000 Americans have a stroke, with about 160,000 dying from stroke-related causes. Officials at the National Institute of Neurological Disorders and Stroke (NINDS) are committed to reducing that burden through biomedical research.

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What is a Stroke?

A stroke, or “brain attack,” occurs when blood circulation to the brain fails. Brain cells can die from decreased blood flow and the resulting lack of oxygen. There are two broad categories of stroke: those caused by a blockage of blood flow and those caused by bleeding into the brain. A blockage of a blood vessel in the brain or neck, called an ischemic stroke, is the most frequent cause of stroke and is responsible for about 80 percent of strokes. These blockages stem from three conditions: the formation of a clot within a blood vessel of the brain or neck, called thrombosis; the movement of a clot from another part of the body such as the heart to the brain, called embolism; or a severe narrowing of an artery in or leading to the brain, called stenosis. Bleeding into the brain or the spaces surrounding the brain causes the second type of stroke, called hemorrhagic stroke.

Two key steps you can take will lower your risk of death or disability from stroke: control stroke's risk factors and know stroke's warning signs. Scientific research conducted by the NINDS has identified warning signs and a large number of risk factors.

What are Warning Signs of a Stroke?

Warning signs are clues your body sends that your brain is not receiving enough oxygen. If you observe one or more of these signs of a stroke or “brain attack,” don’t wait, call a doctor or 911 right away!

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

Other danger signs that may occur include double vision, drowsiness, and nausea or vomiting. Sometimes the warning signs may last only a few moments and then disappear. These brief episodes, known as transient ischemic attacks or TIAs, are sometimes called “mini-strokes.” Although brief, they identify an underlying serious condition that isn’t going away without medical help. Unfortunately, since they clear up, many people ignore them. Don’t. Paying attention to them can save your life.

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What are Risk Factors for a Stroke?

A risk factor is a condition or behavior that occurs more frequently in those who have, or are at greater risk of getting, a disease than in those who don’t. Having a risk factor for stroke doesn’t mean you’ll have a stroke. On the other hand, not having a risk factor doesn’t mean you’ll avoid a stroke. But your risk of stroke grows as the number and severity of risk factors increases.

Some factors for stroke can’t be modified by medical treatment or lifestyle changes.

- *Age.* Stroke occurs in all age groups. Studies show the risk of stroke doubles for each decade between the ages of 55 and 85. But strokes also can occur in childhood or adolescence. Although stroke is often considered a disease of aging, the risk of stroke in childhood is actually highest during the perinatal period, which encompasses the last few months of fetal life and the first few weeks after birth.
- *Gender.* Men have a higher risk for stroke, but more women die from stroke. Men generally do not live as long as women, so men are usually younger when they have their strokes and therefore have a higher rate of survival.

- *Race.* People from certain ethnic groups have a higher risk of stroke. For African Americans, stroke is more common and more deadly—even in young and middle-aged adults—than for any ethnic or other racial group in the United States. Studies show that the age-adjusted incidence of stroke is about twice as high in African Americans and Hispanic Americans as in Caucasians. An important risk factor for African-Americans is sickle cell disease, which can cause a narrowing of arteries and disrupt blood flow. The incidence of the various stroke subtypes also varies considerably in different ethnic groups.
- *Family history of stroke.* Stroke seems to run in some families. Several factors may contribute to familial stroke. Members of a family might have a genetic tendency for stroke risk factors, such as an inherited predisposition for high blood pressure (hypertension) or diabetes. The influence of a common lifestyle among family members also could contribute to familial stroke.

Some of the most important treatable risk factors for stroke are:

- ***High blood pressure, or hypertension.*** Hypertension is by far the most potent risk factor for stroke. Hypertension causes a two-to four-fold increase in the risk of stroke before age 80. If your blood pressure is high, you and your doctor need to work out an individual strategy to bring it down to the normal range. Some ways that work: Maintain proper weight. Avoid drugs known to raise blood pressure. Eat right: cut down on salt and eat fruits and vegetables to increase potassium in your diet. Exercise more. Your doctor may prescribe medicines that help lower blood pressure. Controlling blood pressure will also help you avoid heart disease, diabetes, and kidney failure.
- ***Cigarette smoking.*** Cigarette smoking causes about a two-fold increase in the risk of ischemic stroke and up to a four-fold increase in the risk of hemorrhagic stroke. It has been linked to the buildup of fatty substances (atherosclerosis) in the carotid artery, the main neck artery supplying blood to the brain. Blockage of this artery is the leading cause of stroke in Americans. Also, nicotine raises blood pressure; carbon monoxide from smoking reduces the amount of oxygen your blood can carry to the brain; and cigarette smoke makes your blood thicker and more likely to clot. Smoking also promotes

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aneurysm formation. Your doctor can recommend programs and medications that may help you quit smoking. By quitting, at any age, you also reduce your risk of lung disease, heart disease, and a number of cancers including lung cancer.

- **Heart disease.** Common heart disorders such as coronary artery disease, valve defects, irregular heart beat (atrial fibrillation), and enlargement of one of the heart's chambers can result in blood clots that may break loose and block vessels in or leading to the brain. Atrial fibrillation—which is more prevalent in older people—is responsible for one in four strokes after age 80, and is associated with higher mortality and disability. The most common blood vessel disease is atherosclerosis. Hypertension promotes atherosclerosis and causes mechanical damage to the walls of blood vessels. Your doctor will treat your heart disease and may also prescribe medication, such as aspirin, to help prevent the formation of clots. Your doctor may recommend surgery to clean out a clogged neck artery if you match a particular risk profile. If you are over 50, NINDS scientists believe you and your doctor should make a decision about aspirin therapy. A doctor can evaluate your risk factors and help you decide if you will benefit from aspirin or other blood-thinning therapy.
- **Warning signs or history of TIA or stroke.** If you experience a TIA, get help at once. If you've previously had a TIA or stroke, your risk of having a stroke is many times greater than someone who has never had one. Many communities encourage those with stroke's warning signs to dial 911 for emergency medical assistance. If you have had a stroke in the past, it's important to reduce your risk of a second stroke. Your brain helps you recover from a stroke by asking the unaffected brain regions to do double duty. That means a second stroke can be twice as bad.
- **Diabetes.** In terms of stroke and cardiovascular disease, having diabetes is the equivalent of aging 15 years. You may think this disorder affects only the body's ability to use sugar, or glucose. But it also causes destructive changes in the blood vessels throughout the body, including the brain. Also, if blood glucose levels are high at the time of a stroke, then brain damage is

*Stroke strikes fast.
You should, too.
Call 911.*

usually more severe and extensive than when blood glucose is well-controlled. Hypertension is common among diabetics and accounts for much of their increased stroke risk. Treating diabetes can delay the onset of complications that increase the risk of stroke.

- ***Cholesterol imbalance.*** Low-density lipoprotein cholesterol (LDL) carries cholesterol (a fatty substance) through the blood and delivers it to cells. Excess LDL can cause cholesterol to build up in blood vessels, leading to atherosclerosis. Atherosclerosis is the major cause of blood vessel narrowing, leading to both heart attack and stroke.
- ***Physical inactivity and obesity.*** Obesity and inactivity are associated with hypertension, diabetes, and heart disease. Waist circumference to hip circumference ratio equal to or above the mid-value for the population increases the risk of ischemic stroke three-fold.

Do You Know Your Stroke Risk?

Some of the most important risk factors for stroke can be determined during a physical exam at your doctor's office. If you are over 55 years old, the worksheet in this pamphlet can help you estimate your risk of stroke and show the benefit of risk factor control.

The worksheet was developed from NINDS-supported work in the well-known Framingham Study. Working with your doctor, you can develop a strategy to lower your risk to average or even below average for your age.

Many risk factors for stroke can be managed, some very successfully. Although risk is never zero at any age, by starting early and controlling your risk factors you can lower your risk of death or disability from stroke. With good control, the risk of stroke in most age groups can be kept below that for accidental injury or death.

Americans have shown that stroke is preventable and treatable. In recent years, a better understanding of the causes of stroke has helped Americans make lifestyle changes that have cut the stroke death rate nearly in half.

Scientists at the NINDS predict that, with continued attention to reducing the risks of stroke and by using currently available therapies and developing new ones, Americans should be able to prevent 80 percent of all strokes.

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Score your stroke risk for the next 10 years–MEN

Key: **SBP** = systolic blood pressure (score one line only, untreated or treated); **Diabetes** = history of diabetes; **Cigarettes** = smokes cigarettes; **CVD** (cardiovascular disease) = history of heart disease; **AF** = history of atrial fibrillation; **LVH** = diagnosis of left ventricular hypertrophy; **untrd** = untreated; **trtd** = treated with medication

Points	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Age	54-56	57-59	60-62	63-65	66-68	69-72	73-75	76-78	79-81	82-84	85
SBP-untrd	97-105	106-115	116-125	126-135	136-145	146-155	156-165	166-175	176-185	186-195	196-205
or SBP-trtd	97-105	106-112	113-117	118-123	124-129	130-135	136-142	143-150	151-161	162-176	177-205
Diabetes	No		Yes								
Cigarettes	No			Yes							
CVD	No				Yes						
AF	No				Yes						
LVH	No					Yes					

Your Points	10-Year Probability	Your Points	10-Year Probability	Your Points	10-Year Probability
1	3%	11	11%	21	42%
2	3%	12	13%	22	47%
3	4%	13	15%	23	52%
4	4%	14	17%	24	57%
5	5%	15	20%	25	63%
6	5%	16	22%	26	68%
7	6%	17	26%	27	74%
8	7%	18	29%	28	79%
9	8%	19	33%	29	84%
10	10%	20	37%	30	88%

Compare with Your Age Group	Average 10-Year Probability of Stroke
55-59	5.9%
60-64	7.8%
65-69	11.0%
70-74	13.7%
75-79	18.0%
80-84	22.3%

Source: D’Agostino, R.B.; Wolf, P.A.; Belanger, A.J.; & Kannel, W.B. “Stroke Risk Profile: The Framingham Study.” *Stroke*, Vol. 25, No. 1, pp. 40-43, January 1994.

Score your stroke risk for the next 10 years-WOMEN

Key: **SBP** = systolic blood pressure (score one line only, untreated or treated); **Diabetes** = history of diabetes; **Cigarettes** = smokes cigarettes; **CVD** (cardiovascular disease) = history of heart disease; **AF** = history of atrial fibrillation; **LVH** = diagnosis of left ventricular hypertrophy; **untrd** = untreated; **trtd** = treated with medication

Points	0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10
Age	54-56	57-59	60-62	63-64	65-67	68-70	71-73	74-76	77-78	79-81	82-84
SBP-untrd		95-106	107-118	119-130	131-143	144-155	156-167	168-180	181-192	193-204	205-216
or SBP-trtd		95-106	107-113	114-119	120-125	126-131	132-139	140-148	149-160	161-204	205-216
Diabetes	No			Yes							
Cigarettes	No			Yes							
CVD	No		Yes								
AF	No						Yes				
LVH	No				Yes						

Your Points	10-Year Probability	Your Points	10-Year Probability	Your Points	10-Year Probability
1	1%	11	8%	21	43%
2	1%	12	9%	22	50%
3	2%	13	11%	23	57%
4	2%	14	13%	24	64%
5	2%	15	16%	25	71%
6	3%	16	19%	26	78%
7	4%	17	23%	27	84%
8	4%	18	27%		
9	5%	19	32%		
10	6%	20	37%		

Compare with Your Age Group	Average 10-Year Probability of Stroke
55-59	3.0%
60-64	4.7%
65-69	7.2%
70-74	10.9%
75-79	15.5%
80-84	23.9%

This example helps you assess your risk of stroke. Tally your points to score your stroke risk over the next 10 years.

Martha, age 65, wanted to determine her risk for having a stroke, so she took this stroke risk profile. This is how she arrived at her 10-year probability risk for having a stroke:

Age 65	4 points
SBP – treated, 107-113	2 points
Diabetes - No	0 points
Cigarettes - Yes	3 points
CVD -No	0 points
AF - Yes	6 points
LVH -No	0 points
TOTAL	15 points

Interpretation: 15 points carries a 16 percent, 10-year probability of having a stroke. If Martha quits smoking she can reduce her points to 12, which carries a 9 percent, 10-year probability of having a stroke.

Her current point total does not mean Martha will have a stroke, but serves as a wake-up call to ways she can lower her risk or even prevent a stroke. A lower percent score doesn't mean that Martha won't have a stroke, only that she is at a lower risk of having one.

No matter what your score is, it is important to work on reducing your risk factors as Martha did in this example by quitting smoking.

The National Institute of Neurological Disorders and Stroke (NINDS)

Since its creation by Congress in 1950, the NINDS—a component of the National Institutes of Health—has grown to become the leading supporter of neurological research in the United States. Most research funded by the NINDS is conducted by scientists in public and private institutions such as universities, medical schools, and hospitals. Government scientists also conduct a wide variety of neurological research in the laboratories and branches of the NINDS itself. This research ranges from studies on the structure and function of single brain cells to tests of new diagnostic tools and treatments for those with neurological disorders. For more information, write or call the Institute's Brain Resources and Information Network (BRAIN):

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