High Blood Pressure
High Blood Pressure: The Science Inside

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Your heart is the hardest working muscle in your body. No bigger than a fist, this powerful pump circulates blood throughout your entire body, providing the oxygen and nutrients you need to live. Unlike most pumps, however, this pump never stops as long as you’re alive. In fact, the average human heart works at a rate of 100,000 beats a day, or an incredible 2.5 billion beats over a lifetime of 70 years!

Every time your heart beats, it pumps blood through arteries, exerting pressure (or force) on the inside of your blood vessels. This is called blood pressure. To understand this, think of a water pump and hose. When you turn the pump on, it pushes water into the hose, creating pressure against the inner walls of the hose and causing the water to flow. Now, if you interrupt the flow of water—for example, by putting a bend in the hose—you create a blockage that stops up the water. The water will build up behind the blockage, exerting more pressure and pushing out the walls of the hose. If you keep the hose bent, eventually either the hose will burst or the pump will shut down. If you get rid of the blockage, water will once again flow smoothly through the hose.

You can think of high blood pressure, or hypertension, in the same way. It is a condition in which the pressure of the blood inside the arteries is too high. If the condition is left untreated, it will cause damage to the arteries and put strain on the heart. You can develop serious complications of high blood pressure, including stroke, heart attacks, heart failure, kidney failure, and eyesight problems or even blindness. Developing these and other related illnesses can lead to a life of considerable suffering or premature death.
Research shows that more than 50 million Americans over the age of 6 have high blood pressure. Roughly 1 in every 4 American adults has the disorder. In 1999 alone, high blood pressure contributed to the deaths of more than 227,000 Americans. This number is expected to rise in the years ahead.

Sadly, millions of Americans are walking around with high blood pressure and don’t even know it. It seems that most people find out they have the disorder only when their doctors bring it to their attention during an office visit. This is due to the fact that there are no clear-cut symptoms for high blood pressure—which is part of the reason it has become known as “the silent killer.”

One basic marker that people can use to keep tabs on their blood pressure is their age. As people grow older, their chance of developing the condition becomes greater. Health experts have determined that roughly 54% of people over 60 have high blood pressure and that two out of three Americans will have it by the age of 70. For this simple fact alone, it is important for people to become more aware of their blood pressure, have it measured periodically, and learn healthy ways to prevent or control this potentially deadly condition.

High blood pressure does not affect all people in the same way. African Americans and older people are particularly hard hit by the disorder. Those with lower incomes and lower educational backgrounds also tend to be at greater risk for developing high blood pressure. In addition, research studies have shown that people living in the southeastern United States have average blood pressure levels that are higher than Americans living in other parts of the country. The exact reasons for this still remain unclear.

What is clear is that people can take many actions to reduce their chances of developing high blood pressure. This involves having blood pressure checked regularly, since high blood pressure is simple to detect, and making changes in lifestyle, such as increasing physical activity, reducing the amount of salt consumed, and committing to a lifetime of healthier eating.

For those suffering from high blood pressure, medical science and modern research since the 1940s and 1950s have come a long way in understanding and treating this silent condition. Many medications have been developed and proven effective in helping to get blood pressure levels under control, to limit or avoid further complications, and to prolong life.
Ongoing research and technological advances also have enabled doctors to better adjust treatment plans to the individual, since medical remedies do not necessarily work for everyone in the same way.

Medical advances and greater public awareness about high blood pressure are critical for saving the lives of millions of Americans in the future. What may be more important, however, is to realize that there are a number of healthy, natural ways that people can prevent their blood pressure from getting out of control in the first place.

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**Retired from Teaching But Not from Learning about Her Health**

Some people with high blood pressure ignore the problem or think it can’t hurt them.

Not Marge Prioleau.

“High blood pressure can lead to stroke and having problems with the heart. There are so many things that can come from high blood pressure.”

Prioleau is a retired school teacher who lives in Beaufort, South Carolina. She found out that she had high blood pressure about 14 years ago.

“I started to feel dizzy and went to the school’s nurse. She took my blood pressure and said it was high.”

Following health advice is easier said than done, but somehow Prioleau manages to do it. She keeps her blood pressure under control by getting exercise, eating healthy foods, and taking blood pressure medications.

Her main exercise is walking around a quarter-mile running track at a nearby school. She gets up early to beat the heat, which in South Carolina can sap even the most determined person’s willpower to exercise. She does 16 to 20 laps, which equals four to five miles.

She makes sure her shoes are comfortable. Unlike many people who run and walk for their health, she doesn’t wear a Walkman.
“I like to take time to take an inventory of myself,” says Prioleau. “It gives me time to think.”

She has banned fried food from her diet except for fish and a special treat of fried chicken on New Year’s. She makes juice from carrots and apples and drinks a lot of water.

And does Prioleau eat grits, the porridge-like dish made from corn that Southerners crave? “Of course,” she says laughing, “but I don’t eat them with salt.”

Like many people with high blood pressure, Prioleau can’t keep it under control with diet alone. She was originally prescribed Lotrel, a calcium-channel blocker, but her blood pressure started going up again. Now she takes Norvasc, a calcium-channel blocker; Cozaar, an angiotensin II receptor blocker; and a diuretic.

Prioleau says her doctor, Dr. William Bestermann, deserves part of the credit for her outlook. “On a scale of 1 to 10, I would say Dr. Besterman is a 10. He promotes a healthy way of life.”

Many of us take our health for granted. We just go along assuming we’ll stay well or that doctors will be able to treat us if anything goes wrong. Prioleau sees her health as something she has to work for.

“I am the sort of person who if there is something that is going to help me have a better way of life, then I am going to try to do it.”
Healthy blood pressure

Before we can understand the harmful problems related to high blood pressure, it is important to have a basic understanding of how a normal, healthy body functions. To this end, we will examine the workings of the cardiovascular system.

The cardiovascular system is made up of the heart and blood vessels. The heart is a very powerful muscular pump that delivers blood to the organs, tissues, and cells throughout the body. The blood sends oxygen and nutrients that our cells need to live and removes the carbon dioxide and other wastes that cells produce. From the heart, oxygen-rich blood is circulated through a vast network of arteries, arterioles, and capillaries, and oxygen-poor blood is pushed back to the heart through venules and veins.

As mentioned earlier, blood pressure is the force that blood exerts against the arteries as it circulates throughout the body. The flow of blood around the body is not constant, but is based on the beats of the pumping heart. On average, about two ounces of blood per heart-beat is pumped through the left ventricle of the heart and into the 60,000-mile- (96,500-kilometer-) long network of blood vessels that make up the human body.

It is also important to note that blood pressure does not stay the same all the time and is based on the activities people do (and how hard or rapidly their hearts are pumping). For example, the heart muscle can pump nearly three times faster during periods of exercise as compared to times of rest. The heart pauses, or rests, between beats in order to prepare itself for the next beat.

Using a sphygmomanometer, or blood pressure cuff, doctors measure...
two key blood pressure numbers—the **systolic pressure** and **diastolic pressure**. The systolic pressure shows the highest pressure in the arteries. This is when the blood is forcefully pumped out of the heart and into the blood vessels during a heartbeat. The diastolic pressure represents the lowest pressure in the arteries. This is when the heart pauses or relaxes between beats.

The numbers that result from a reading usually come in the form of 100 **mmHg** (millimeters of mercury) over 70 mmHg, or 100/70 mmHg. The higher number represents the systolic pressure (heart pumping) and the lower represents the diastolic pressure (heart resting). A consistent measurement of 140/90 mmHg indicates that the heart is pumping harder than it should and that the person has high blood pressure. The optimal blood pressure reading for adults is 119/79 mmHg or lower.

**Blood pressure problems**

Hypertension is another term for high blood pressure. It is a condition in which blood is pushed through the body’s blood vessels at greater force than normal. There are three main types of hypertension:

**Primary hypertension** (or “essential hypertension”)—This form of high blood pressure is the most common, affecting over 90% of those people 45 years old and over who have hypertension. While there is no known cause, there are a number of factors that contribute to its development, including age, heredity, lifestyle, diet, ethnicity, and more.

**Secondary hypertension** (or “non-essential hypertension”)—Unlike primary hypertension, this form of high blood pressure can be determined by a specific cause. Among the possible short-term causes are pregnancy and the use of certain types of medication. The long-term causes include kidney disorders and head injuries. This type of hypertension accounts for nearly 10% of all high blood pressure cases.
When the specific cause is identified and properly treated, blood pressure often returns to normal levels.

**Isolated systolic hypertension (ISH)**—This form of high blood pressure is most common in older people, affecting over 65% of people more than 60 years of age. ISH comes with no symptoms, so many people may have it and do not know it. ISH is characterized by high pressure levels when the heart is beating (systolic), but normalized levels between beats, when the heart is resting (diastolic). This large gap between pressure levels can lead to a straining of the arteries.

**Symptoms of high blood pressure**

Unlike many other conditions, high blood pressure often causes no symptoms. However, when symptoms do arise, it means that blood pressure is too high, often causing damage to such critical organs as the heart or kidneys. In the most severe cases, when symptoms can arise, they might come in the form of:

- headaches
- excessive perspiration (sweating)
- chest pains
- muscle tremors
- nosebleeds
- fatigue, weakness
- nausea, vomiting
- heart palpitations
- vision problems
- blood in urine
- confusion

**How high blood pressure affects the body**

High blood pressure affects the body in a variety of ways. The most critical effect is the strain it can put on the heart. High blood pressure also damages blood vessels.

**Low blood pressure—Is it ever a problem?**

Though generally regarded as a good thing, a person’s blood pressure can be too low and potentially harmful. There may be no symptoms associated with low blood pressure, and, in certain cases, it may actually be desirable. When blood pressure drops below 90/60, however, it indicates that there may not be enough blood flowing to the heart, brain, kidneys, and other major organs. Causes may include heart disease, dehydration, gastrointestinal bleeding, and the use or allergic reaction to certain medications. Most common with the elderly, sudden drops in blood pressure may lead to symptoms like fatigue, anxiety, depression, or dizziness—especially upon making a sudden change in body movement. In rare cases, treatment is required, usually in the form of medication that helps alter blood pressure receptors or constrict arteries to reduce the likelihood of sudden or frequent drops in blood pressure.
and, if left untreated over time, can greatly impair the heart, brain, kidneys, and eyes. With few or no noticeable symptoms, this silent and potentially deadly condition can lead to severe physical damage well before a person understands what is happening and seeks medical treatment.

High blood pressure is a serious risk factor for different forms of heart disease, including congestive heart failure, which most commonly affects the elderly. As high blood pressure stretches and damages the heart from overwork, it also strains the blood vessels and hardens the arteries, making them thicker and less flexible, greatly increasing the chance of heart attack and stroke. Without diagnosis or treatment, the kidneys can become stressed and damaged, hurting their ability to clean the blood and potentially leading to kidney failure. Among the temporary or permanent vision problems that can result are optic nerve swelling and bleeding in the retina.

To avoid these and other life-threatening complications, doctors recommend having blood pressure checked at least once a year, so patients who have high blood pressure can be treated effectively. This is important because research shows that—compared to people who have received treatment for high blood pressure—those who have hypertension but do not know it are about 6 times more likely to have congestive heart failure, 7 times more likely to have a stroke, and 3 times more likely to have coronary artery disease. Since high blood pressure has virtually no symptoms until it becomes severe, it is especially important for people to monitor and control their blood pressure on an ongoing basis.

Causes of high blood pressure

Doctors and researchers have not been able to determine a specific cause of high blood pressure. Moreover, the cause of hypertension is unknown in 90 to 95 percent of the cases. Since no single cause seems apparent, treatment for the condition has been based on keeping blood pressure at normal levels or under control. This involves identifying the
specific risk factors that, when combined, can greatly increase a person’s chance of developing high blood pressure. These risk factors include:

**Controllable**  
- high salt intake  
- obesity  
- excessive alcohol use  
- lack of exercise  
- use of certain medications  
- drug or chemical use  
- diabetes  
- kidney disease  
- stress

**Uncontrollable**  
- heredity  
- race  
- gender  
- age

Salt has been found to be a risk factor because too much of it can raise fluid levels in the bloodstream, forcing the heart to work harder and blood pressure levels to rise. This is particularly true if the kidneys, which regulate **sodium** (salt) and water levels in the body, are not working properly. **Obesity** is another key risk factor. When a person gains weight, his or her blood levels also increase, causing the heart to pump more blood. The additional weight also causes a person’s blood pressure to elevate because it increases **cholesterol** levels, leading to a further straining and hardening of the blood vessels and heart. Excessive alcohol consumption can also reduce the heart’s ability to function properly, increasing blood pressure levels. Drinking too much alcohol can also make high blood pressure medication less effective.

Luckily, as suggested by the “controllable” factors above, there is much that people can do throughout their lives to keep their blood pressure at a healthy level. Unfortunately, high blood pressure doesn’t affect all people in the same way. For example, African Americans are much more likely to develop the condition earlier and more severely than whites. Also, in terms of gender, men have a greater chance of developing it between the ages of 35 to 55, whereas women are more likely to develop it after the age of 75. What is clear, however, is that as people age, they increase their chances of developing high blood pressure.
Health problems from high blood pressure

IMPORTANT NOTE: The following complications of high blood pressure described below can be avoided or delayed through prevention and treatment. (See the section on care beginning on page 25.)

Stroke. High blood pressure is a leading cause for stroke, which occurs when blood has trouble flowing to the brain. High blood pressure can make a blood vessel rupture, causing a hemorrhage (bleeding) in the brain. Strokes, (or “brain attacks”) are also caused by blood clots and narrowing of the arteries (atherosclerosis). They can lead to such complications as the inability to speak, brain damage, paralysis, and death. Stroke is the third leading cause of death in the United States, accounting for 1 out of every 15 deaths. It is important for high blood pressure patients in particular to monitor their health and get effective treatment for the condition before it leads to a stroke—the risk of which doubles every 10 years after the age of 35.

Kidney Disease. The kidneys help to keep blood pressure levels regular by cleaning the blood of extra fluids and wastes. When a person develops high blood pressure, the kidneys can become damaged. When the kidneys are no longer able to function properly, the extra fluids and wastes that remain in the blood can lead to even higher blood pressure levels and,ulti-
mately, illness. If left untreated, a person suffering from kidney disease may need a kidney transplant or **dialysis** treatment, which is the use of a machine to help the kidneys function and clean blood. High blood pressure is the second leading cause of kidney failure, and leads to over 15,000 new cases in the U.S every year. Research has also shown that between 20 to 25 percent of patients who must undergo dialysis first had “slightly elevated blood pressure” that had been untreated. Early and effective treatment of high blood pressure can help to prevent the occurrence of kidney disease.

**Vision Problems.** Vision loss or blindness can result from optic nerve damage that is brought on by high blood pressure. The condition can also lead to bleeding in the retina, the light-sensing part of the eye. This disease is called **retinopathy**, which can result in partial or complete blindness. Early detection and treatment can help to prevent vision loss brought on by high blood pressure.

**Hardened Arteries.** **Atherosclerosis,** or a hardening and thickening of the arteries, can result from high blood pressure. Hardened arteries can lead to a greater buildup of fats and cholesterol in the arteries and blood vessels, causing the heart to enlarge and weaken because it is forced to pump harder. This disease
can block the proper flow of blood and oxygen that the heart, brain, and vital organs need to work properly. Blood clots may also form in an artery, blocking the flow of blood entirely. While considered a slow and advancing disease that mainly affects the aged, atherosclerosis (also called arteriosclerosis) may result in a heart attack or stroke if left untreated over time. In addition to high blood pressure, other risk factors that contribute to the progression of this disease include smoking, diabetes, obesity, and family history.

Heart Attack. As previously noted, hypertension can contribute to the hardening of arteries, which can lead to a heart attack. In order to function properly, the heart muscle itself needs a continuous supply of oxygen-rich blood. When arteries become narrowed or blocked, this vital flow becomes lessened, causing muscle damage and angina (chest pains). Heart attacks result when arteries and the flow of blood to the heart become completely blocked. In general, any disruption in the workings of the heart is life threatening and in need of prompt medical attention.

Heart Failure. Another aspect of the toll that high blood pressure can have on the heart is in the form of heart failure. As previously mentioned, the heart can be forced to work harder due to complications of high blood pressure and atherosclerosis. Under these unhealthy, untreated conditions, the heart begins to stretch and enlarge (either partially or as a whole). Eventually, the heart fails to function effectively—either too much, not often enough, or irregularly—and ultimately results in congestive heart failure. This disorder may involve a failing of the entire heart or just one side of it. When the left side of the heart fails, blood and other fluids get backed up in the lungs. The first signs of this condition are breathing problems, such as shortness of breath. When the right side fails, blood may back up into other areas of the body as the veins fill and leak fluid into the surrounding tissue. Symptoms of right-side failure include fatigue, indigestion, liver damage, and swelling in the legs.
DASHing High Blood Pressure

You can bring down high blood pressure by changing the way you eat. Just ask Joe Wagner.

Wagner's blood pressure was 150/100 two years ago. Now it is 130/80, which is close to the 119/79 level that is considered the healthiest for adults. He also lost 20 pounds.

Wagner made the changes by following a diet called the Dietary Approaches to Stop Hypertension—or the DASH diet, for short. He learned about the diet through a special computer-based project at his job.

“I didn’t exactly follow it to the letter,” says Wagner. “But I basically followed the advice on the Web site.”

Doctors at Harvard Medical School developed the DASH diet several years ago. It emphasizes fruits, vegetables, and low-fat dairy products. The diet was developed to test whether eating habits could lower blood pressure as much as blood-pressure pills.

Studies have shown that it does.

“The results were better than we ever dreamed of,” says Dr. Frank Sacks, the Harvard doctor who led the DASH diet studies. Sacks says if people followed DASH it could be a substitute for the “gazillions” of dollars spent every year on blood-pressure pills.

Wagner just wanted to avoid taking pills, period. “I don’t like taking medicines for anything. I will take an aspirin for a headache but that is about it.”

Wagner works at a computer company called EMC Corporation outside of Boston. The computer-based project he enrolled in is part of a Boston University study. The researchers hope to show that weekly e-mails and postings on a special Web site will help people stick with the DASH diet. They also collect blood pressure and weight information from people so
they can track their progress. So far, about 1,000 EMC employees have participated.

Before he started the DASH diet, Wagner’s eating habits were...well, in his words, he was “pretty much a junk food junkie.” Burger King Whoppers on the way home. A real weakness for Twinkies.

His favorite sport to watch on TV? “The worst—football,” says Wagner, “because it is on during the late fall and winter when you’re not that active anyway.”

Besides eating more fruits and vegetables (“vegetables for breakfast sometimes, believe it or not,” he says), breakfast cereal made from whole grain, and a lot less meat, Wagner does not snack so much between meals. At work, he chomps on sugarless gum instead.

But Wagner says the DASH diet worked for him partly because it is “not really that severe.” It even allows for some sweets and fatty food. Every once in a while he gives into temptation and has a big bowl of ice cream.

The e-mails have worked to encourage him to stick with it. He feels like he has a bit more energy. His clothes fit better, too.

But Wagner’s eight-year-old son isn’t too happy about his dad’s diet. “He hates it, laughs Wagner. “Before DASH, I used to take him out to Burger King and McDonald’s.”
Rising incidence of high blood pressure

Although heart disease and stroke are the first and third leading causes of death in the United States, there has been a continued reduction in the overall death rates from these diseases. The medical community has attributed these improvements to a higher quality of medical treatment, lower sodium consumption, and more and more people giving up smoking. However, mortality rates from heart disease and stroke are expected to rise as America’s population grows older. Finding newer and more effective ways to treat hypertension will help prevent the number of deaths from both heart disease and stroke from getting out of control.

While studies have shown that the incidence of high blood pressure in America is declining, the statistics and trends related to high blood pressure remain staggering, if not mixed. For example, hypertension currently affects over 25% of all Americans—roughly 50 million people. In the United States in 1999, high blood pressure caused the death of 42,997 people and contributed to the deaths of an additional 227,000 others. (As compared to the year before, this represents a decrease of 1,438 caused by high blood pressure, and an increase of 17,000 due to complications from the condition.) What makes high blood pressure a greater health concern is that an estimated 31.6% of Americans have the disorder but do not even know it. Another obstacle in the fight for better treatment and prevention is lack of knowledge about treating the condition. The American Heart Association estimates that one-third of all people
who have high blood pressure do not know how to manage or control it effectively.

Doctors and researchers alike attribute the slight decline in the development of high blood pressure to the lifestyle improvements of younger people and more effective drug therapies for older patients. However, with America’s aging society and the significant lack of awareness about high blood pressure, future trends in this area continue to be a great cause for concern.

For example, in the area of obesity alone, a disturbing 1999–2000 government study found that 31% of all Americans (almost 59 million people) are obese. When compared to the 15% obesity rate in 1980, it means that twice as many Americans are obese today as were obese 20 years ago. Obesity is a major risk for high blood pressure, heart disease, strokes, diabetes, and different types of cancer. Adults who are even moderately obese are twice as likely to develop high blood pressure as people who are not overweight.

Studies also show that obesity may be the leading cause of high blood pressure in older adults, and that children and adolescents who are overweight—and babies who are underweight—stand a greater chance of developing the condition when they become adults. For these and other reasons, high blood pressure will continue to be a serious and threatening public health concern for the United States.

**Uneven impact of high blood pressure**

High blood pressure does not affect all people, races, or genders alike. For example, men are more likely to develop the condition than women up to the age of 55, while aging women between 55 and 74 become more likely than men to get high blood pressure. In fact, some statistics indicate that the condition is harder on women than men. In 1999 alone, the high blood pressure mortality rate for men was 17,194 as compared to 25,803 for women.

A much more startling difference is the impact that high blood pressure has on African Americans, who are among the most likely groups in the world to develop the condition. Over 50% of African-American males are said to have high blood pressure, while a little less than half of women from this group suffer from it. In addition, African Americans are also much more likely than white Americans to develop high blood pressure at an early age and to have higher average readings. The overall death rate from high blood pressure in 1999 for white men and women was 12.8 per 100,000—as compared to 40.3 per 100,000 for black females and 46.8 per 100,000 for black males. On average, African Americans with
high blood pressure have a much greater rate of stroke, heart failure, and other diseases than whites. In the area of kidney failure alone, African Americans between 25 and 44 years old are 20 times more likely than whites to develop this hypertension-related disease. On the positive side, African Americans are considered more “salt sensitive” than other groups and can substantially improve their blood pressure levels by losing weight and reducing their sodium intake.

Another key group that is more likely to develop high blood pressure is older people, since levels tend to rise as people become older. Over 50% of Americans over 60 years old have high blood pressure, and over 65% older than 75 suffer from the condition. This is because, as people age, the arteries become harder and less flexible, causing the heart to work harder to pump blood throughout the body. When this takes place, only the systolic blood pressure increases, causing what is called isolated systolic hypertension.
(ISH). In general, doctors have to be careful when monitoring the blood pressures of older people because readings can vary greatly within the first several minutes of an office visit.

On a positive note, older adults who lead stable, active lives may be able to sustain normal blood pressures throughout life. For those who are inactive or have unhealthy lifestyles, studies have shown that medical treatment for high blood pressure has proven to be effective in lowering the risk of heart attacks, strokes, and other complications in older patients.

Geography may also play a role in the development of high blood pressure in the United States. For example, research has shown that African Americans and whites living in the southeastern U.S. have a higher risk of high blood pressure and stroke than Americans living in other regions. Part of the reason for this discrepancy is that people living in this area are more likely to be from lower economic and educational backgrounds, which make people in general more susceptible to anxiety, depression, and diets that are high in salt and poor in nutrition. In fact, many of the states within this region have
Uneven Impact of HBP—High Blood Pressure in Women and Children

**WOMEN**

As previously mentioned, women appear to suffer from high blood pressure later in life, as compared to men. However, high blood pressure does have a particular impact on women during pregnancy and menopause.

Studies have shown that high blood pressure is common in up to 15% of all pregnancies. Doctors usually monitor blood pressure levels closely during the last three months of pregnancy, when it can quickly develop. For mothers who already have high blood pressure before their pregnancy, their blood pressure levels should be properly treated and may become even worse. For mothers who develop hypertension during the pregnancy, they face the risk of harming themselves and their baby if it is not treated properly. In many patients, high blood pressure subsides after birth.

Older women are also prone to develop high blood pressure after menopause, when hormone changes in their bodies make them susceptible to the condition. Though research has not yet uncovered the kinds of specific effects menopause has on high blood pressure, doctors recommend that older women carefully monitor their blood pressures on a regular basis.

**CHILDREN**

Though high blood pressure in children is largely uncommon—about 1 percent of all children in the U.S.—the children of parents who have the condition are 20 to 30 percent more likely to develop high blood pressure than those with parents with normal blood pressures. Another potential cause is the lifestyle habits that children and adolescents learn from their parents or siblings. For example, children are more likely to develop high blood pressure as adults if they have poor diets, smoke or drink, take drugs, or are inactive or overweight. For these and other reasons, it is recommended that children have their blood pressure taken on regular intervals when they are as young as three years old. In the rare cases when children develop severe high blood pressure, it is usually a symptom of a more serious problem, like heart irregularities or kidney disease.

10% higher stroke rates than other parts of the country. The 11 states that make up the so-called “stroke belt” are Alabama, Arkansas, Georgia, Indiana, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, and Virginia. It still remains unclear the extent to which environment or genetics are influencing these marked differences.

The impact of high blood pressure on other racial groups in the country is more even. For example, Hispanic and Native Americans have similar rates of developing hypertension as whites, while Asian/Pacific Islanders have the lowest rates among all minority groups. The only problem is that high blood pressure is not being adequately addressed or treated.
among these groups—particularly African and Hispanic Americans—causing yearly mortality rates from heart disease and stroke to be unnecessarily high.

Reasons for uneven impact

Among the other reasons for the uneven impact of high blood pressure are genetics, economics, and culture.

Health research has proven that genetics is one of the causes of high blood pressure and cardiovascular disease. Genetics is the field of science that looks at how genes are passed down from one generation to another to influence traits. Researchers have been able to identify that certain racial groups like African Americans, for example, carry certain genes that perhaps may increase the likelihood of developing high blood pressure. Some studies now suggest that 30 to 60 percent of all primary high blood pressure cases may be genetically inherited. Other investigations also suggest that a person is more likely to develop hypertension if he or she has a sibling with coronary artery disease—as compared to having a parent with the ailment. The genetics of high blood pressure remain a critical area of study for medical researchers, since future findings may help to explain why certain
individuals or groups of people have a greater genetic predisposition for high blood pressure than others.

Economics is another key factor that can further explain the uneven impact of high blood pressure in America. For example, millions of Americans with lower incomes and lower educational backgrounds may not be able to attain health insurance without a full-time job. Many Americans either work in low-paying, part-time jobs or are unemployed, which makes them and their family members more likely to be without adequate health insurance (or treatment if they have high blood pressure). By comparison, people with salaried jobs and higher levels of income are better able to afford decent health coverage or the added medical expenses that can come from developing a condition like high blood pressure. Better coverage also increases the likelihood of receiving better care.

Unfortunately, people from lower socioeconomic groups also tend to have diets that are poorer in nutrition and to be less physically active, both of which can lead to high blood pressure. Many struggling families may be unable to afford or fully recognize that fresh fruits and vegetables are the cornerstone of a healthy diet. Instead, frozen processed foods or high-sodium snacks may be the affordable food choice for many. In addition, people living in poor areas have fewer opportunities to develop and sustain physically active lifestyles, due to safety reasons and fewer parks or affordable fitness centers.

Cultural, particularly language, differences is another cause of the uneven rise of high blood pressure in a given population. For example, in the United States, members of minority groups who do not speak English may have a harder time hearing, reading, or understanding the basic information about high blood pressure that is transmitted to the public through television, newspapers, radio, pamphlets, or directly from health care providers. The lack of exposure to health care information (and treat-

Some studies now suggest that 30 to 60 percent of all primary high blood pressure cases may be genetically inherited.
ment) is particularly common with minorities who have poor educations and come from low-income families. Many immigrants also remain uninformed or indifferent about the disorder, since they may have come from countries or cultures with poor health care standards and facilities. They may also dispute the effectiveness of medicine, be afraid of doctors, or consider prevention efforts to be either a luxury or a waste of time.

When it comes to health, teenagers are often perceived as coming from a different culture than their parents or adults in general. With their energy and unbridled youth, many teenagers often take for granted that they will always be healthy and will live long lives. What they tend to miss or overlook is the fact that how they live today can affect their health when they become adults. Eating poorly, avoiding physical activity, smoking, and drinking can cause them to prematurely and unnecessarily develop high blood pressure—not to mention a number of other serious conditions or illnesses. These and other barriers make it harder for the medical community to reach and inform teenagers about the wisdom of prevention and proper treatment.

High blood pressure will continue to have a disproportional effect on the people of the United States until all major groups are given the proper support, information, and access to health care on an ongoing basis.
People of all races and ethnic groups get high blood pressure, but it is an especially serious problem for African Americans.

We know that is true partly because of 30 years of work by Dr. Elijah Saunders.

Saunders is a professor at the University of Maryland Medical School in Baltimore and head of the hypertension section there.

His research has helped show that some blood pressure medications are more effective than others for African Americans. He helped start an organization called the International Society on Hypertension in Blacks.

Recently, the organization came up with guidelines telling doctors how they should treat high blood pressure in their African American patients, which is not always the same way it should be treated in whites. For example, many African Americans need to start on at least two medications to lower their blood pressure.

"Why waste time and effort prescribing just one drug when in most cases it won’t work?" asks Saunders.

Saunders was inspired to become a doctor by the example of Dr. Ralph Reckling, one of the doctors in the segregated west Baltimore neighborhood where he grew up.

When Saunders was a medical student in the late 1950s, doctors thought only people with extremely high blood pressure would benefit from treatment. "Extremely high" meant readings in the 200s and 300s. Blood pressure that high is called malignant hypertension.

The attitude about blood pressure started to change after the results of a study by the Veterans Administration were published in 1970. The study included people with what was then considered moderately high
blood pressure. The results showed that lowering even moderately high levels lessens your risk of having a heart attack or stroke.

Those early studies didn’t include many African Americans, but others that came after did. Saunders worked to push the problem of African American hypertension into the spotlight.

“There was a lack of appreciation that this is a more serious problem in African Americans that needs to be treated aggressively,” he says. Saunders also co-wrote *Hypertension in Blacks*, the first thorough textbook on the subject. He researched blood pressure medications and found that drugs called calcium-channel blockers were more effective in African Americans than other drugs.

Hypertension is still a major problem for African Americans. Approximately 30 percent of adult African Americans have high blood pressure compared with approximately 22 percent of white adults.

But Saunders says progress has been made. More doctors are aware that they must pay extra close attention to the blood pressure of their black patients. Drug companies make a point of including African Americans in their studies. The federal government has paid for large studies of blood pressure medications, including one that cost about $100 million.

He notes, “A funded study like that would have never happened if it hadn’t been for the noise me and my colleagues made.”
Part 3: Care

Diagnosing high blood pressure

The diagnosis for high blood pressure is fairly simple and painless. As previously mentioned, to measure blood pressure, a doctor or nurse wraps a sphygmomanometer (blood pressure cuff) around the upper arm and pumps it with air, so the instrument can cut off the circulation in your artery. Then, with the use of a stethoscope, the doctor or nurse gradually lets air out of the cuff in order to listen to and accurately measure the level of your blood pressure when it is being pumped (systolic pressure) and when the beating stops (diastolic pressure).

Since blood pressure levels and measurements can change quickly and vary in degree, a doctor may decide to take a patient’s blood pressure more than once. This may involve taking measurements while the person is both standing and sitting down or at different points in the week, since blood pressure may be high on one day and more normalized on another. Factors that contribute to these fluctuations include stress, worry, and the kind of usual nervousness that can arise during a doctor’s visit (which is also referred to as “white coat hypertension”). This broad-based approach enables doctors to more accurately determine whether a person actually suffers from high blood pressure.

The two numbers that are measured—the systolic and diastolic pressures—can vary greatly depending on the health and background of the patient. For example, a reading below 120/80 is considered average or normal for most adults. Doctors also consider blood pressure readings like 110/70 to be “low” and, therefore, safe and acceptable. However, doctors identify someone as having “high blood pressure” when his or her systolic pressure (top number) is at 140 or higher or when his or her diastolic pressure (bottom number) is at 90 or above. For instance, people with blood pressure readings of 110/90, 140/70, and 150/90 all have high blood pressure. In these cases, patients are usually
prescribed some combination of treatment, often involving a healthier diet, physical exercise, and/or medication.

People who have a systolic pressure of 120-139 or diastolic pressure of 80-90 have a condition known as **prehypertension** that affects 46 million Americans. People who are diagnosed with prehypertension are at high risk for developing high blood pressure later on, but making healthy lifestyle changes now can help prevent that from happening. People with prehypertension should have their blood pressure monitored regularly.

As shown in the chart below, high blood pressure is also commonly diagnosed and classified at different levels.

## Preventing and controlling high blood pressure

Although there is still no cure for high blood pressure, it can be effectively controlled through treatment that may involve lifestyle and dietary changes, as well as medication. For those who have yet to develop the condition, maintaining a healthy lifestyle and diet throughout life can go a long way in preventing this potentially deadly condition.

There are many ways people of all ages, races, and family backgrounds can help to prevent or lessen their chances of developing high blood pressure. Among the most important recommendations are:

- Maintain the right weight (lose weight if obese).

### Diagnosing high blood pressure levels

<table>
<thead>
<tr>
<th>Blood Pressure Category</th>
<th>Systolic (top number) (mmHg)</th>
<th>Diastolic (bottom number) (mmHg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>less than 120</td>
<td>and less than 80</td>
</tr>
<tr>
<td>Prehypertension</td>
<td>120-139</td>
<td>or 80-89</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>140-159</td>
<td>or 90-99</td>
</tr>
<tr>
<td>Stage 2</td>
<td>160 or higher</td>
<td>or 100 or higher</td>
</tr>
</tbody>
</table>

_mmHg = millimeters of mercury_
Part 3: Care

- Eat properly (limit salt intake).
- Get exercise.
- Practice relaxation techniques to reduce stress.
- Avoid alcohol and tobacco.
- Monitor your health (including regular blood pressure readings).
- Take blood pressure medicine, if prescribed.

You can greatly reduce your chance of developing high blood pressure by following the recommendations listed above. In more serious cases, medication may be necessary to help control the condition. However, it is very important to prevent the development of high blood pressure in the first place.

The following is a more in-depth review of the key ways that people with and without high blood pressure can help to control or prevent the condition from becoming severe or out of control:

**Maintaining the right weight**

Over 50% of all Americans are overweight, with 31% classified as “obese.” Even more serious is the fact that the percentage of children and adolescents who are obese has doubled in the last two decades.

The link between weight and blood pressure is often very strong and direct. Moreover, as people gain weight, their blood pressure levels increase. The same is true for many people who are obese but lose weight—they can expect their blood pressure levels to decrease. In fact, losing ten pounds or more can help to lower your blood pressure. This is why weight loss is considered one of the most important and effective natural treatments for preventing or reducing high blood pressure.

So, when is a person considered “obese” or “overweight”? As a general rule, men are considered obese when they are 20 percent over their ideal weight, as based on their height. Women are considered obese at 25 percent over ideal. Adults, in general, are considered morbidly obese when they are 100 pounds or more overweight. People who are overweight (as opposed to obese) are believed to be two to six times more likely to develop high blood pressure.
than those who are at or maintain their healthy, desirable weight levels.

It is worth noting another factor that can influence the likelihood of a person developing high blood pressure. This has to do with where an overweight person carries fat on their body. For example, there is evidence to suggest that people who are “apple-shaped,” storing extra weight around their waists, are more at risk for health problems than those who are “pear-shaped,” storing excess weight around their thighs and hips.

Weight and shape aside, what is certain is that weight loss can greatly reduce the possibility of developing high blood pressure. The key to losing weight is to take in fewer calories (energy) than you burn up. It is important to steer clear of weight loss pills or the newest, most popular diets, because they can be dangerous and are usually ineffective in keeping weight off over the long term. The best way to reduce or keep blood pressure levels healthy over the course of one’s life is to develop and commit to a new lifestyle plan that starts with eating better and getting more physical activity. In general, maintaining the right weight throughout life will not only help to lower blood pressure, but will reduce the likelihood of developing other illnesses like cancer, heart disease, stroke, diabetes, and kidney disease.
Eating properly

The golden rule for living a long and healthy life is maintaining a balanced diet that includes fruits, vegetables, grains, and fish along with limited amounts of salt, fat, and sugar. This is especially important for people with high blood pressure who are also striving to lose weight.

As mentioned earlier, more than half of all Americans are overweight. A natural consequence of this fact is that Americans eat more salt and sodium than they should. As a rule, many medical organizations recommended that people consume no more than 1 teaspoon (2,400 milligrams) of sodium a day. Americans, on average, take in between 4,000 to 6,500 milligrams a day! This is why more Americans—as compared to people in other countries—have a greater risk of developing high blood pressure. (African Americans and the elderly are particularly sensitive to sodium.) There are many reasons for this health disparity, as well as many healthy actions that people can take to improve their diets, lifestyles, and blood pressures.

One critical change that people suffering from high blood pressure need to make is to reduce the amount of salt and sodium they consume. This includes table salt and foods that are high in sodium, like canned soups, smoked meats, seasonings, and many packaged and processed foods. This is why it is important to read the “Nutritional Facts” labels on most goods at the supermarket in order to determine how much sodium per serving a food item contains.

MONITOR LABELS: Foods with High Salt or Sodium

- Hot dogs
- Canned soups
- Ketchup
- Saltines
- Sausages
- Canned vegetables
- Mustard
- Pretzels
- Ham
- Pickles
- Cheese
- Potato chips
- Smoked meat/fish
- Sauerkraut
- Soy sauce
- Packaged frozen dinners
- Canned meat/fish
- Olives
- Tomato sauce/ juice
- Packaged cakes/pastries
Sodium chloride is the equivalent of table salt. It contains about 40 percent sodium. Sodium is defined as “a silvery, soft, waxy, metallic element that occurs abundantly in natural compounds, especially in salt water.” Sodium is created naturally in foods, often in small amounts. These foods include milk, meat, cheese, fish, and some vegetables.

Buying foods that are low in sodium or that have labels like “no salt” or “low sodium” can help to reduce or prevent the onset of high blood pressure. Since “fast food” and other restaurant meals are high in sodium, it is also important to make healthier food choices. While eating out, this may even require asking waiters to hold the salt in preparing meals. Using doctor-recommended salt substitutes is another good habit that could go a long way in improving blood pressure.

As with weight loss, a long-term reduction in salt consumption can directly reduce blood pressure levels. In fact, a simple regimen of weight loss and salt reduction can help 20 to 25 percent of high blood pressure patients normalize their levels and even avoid the need to take specific medications.

**Getting exercise**

Along with eating properly, regular physical activity is the key to losing weight, feeling good, and ensuring better, lifelong health. In addition to lowering blood pressure, exercise helps to burn calories, reduce appetites, tone muscles, alleviate stress, lower cholesterol levels, and prevent heart disease and countless other health problems.

Whether one has high blood pressure or not, it is widely recommended that people perform at least 30 to 40 minutes of physical exercise three to four times a week. The benefits are innumerable. In terms of high blood pressure, people who exercise are 20 to 50 percent less likely to develop high blood pressure than those who are not physically active.

There are many forms of exercise that can meet the standard, weekly health requirement. If done on a continual basis, light-to-moderate activities like walking, climbing stairs, or gardening can have many health
benefits. While more aerobic forms of exercise like running, biking, or tennis may appear to have more substantial and immediate benefits, there is no concrete proof that these more strenuous activities are more effective than a regimen of more moderate and enjoyable ones. That is why it is necessary for all people—particularly those diagnosed with high blood pressure—to develop and commit to long-term exercise routines that they enjoy doing.

For those who are not physically active, it is always a good idea to slowly and gradually adjust to a new and reasonable exercise routine. To avoid injuries and other serious complications, the choice and duration of the exercise routine needs to be consistent and appropriate for the age and physical conditioning of the person. While most people do not have to consult with a doctor before starting, there are a number of health conditions that require a doctor’s approval, including:

- High blood pressure
- Chest or shoulder pain
- Dizziness or faintness
- Being out of breath after light exercise
- History of stroke, diabetes, or heart disease
- Other serious medical or physical conditions

Avoiding alcohol and tobacco

Using alcohol or tobacco to excess can greatly raise blood pressure (and lead to numerous other medical and personal problems).

While putting a person at greater risk for developing high blood pressure, excessive alcohol consumption can damage the liver, heart, and brain. High in calories, alcohol can easily hurt one’s efforts to lose weight. As a result, it is recommended that people who choose to drink do so in moderation. According the Dietary Guidelines for All Americans, women should

What is considered a drink?

12 ounces of beer, regular or light (150 calories), 1.5 ounces of 80-proof whiskey (100 calories), or 5 ounces of wine (100 calories).
What is cholesterol?

Cholesterol is a soft, waxy substance that is found in all areas of the body such as the heart, liver, intestines, muscle, skin, and nervous system. It is produced by the body and derived from animal-based foods (like meat, eggs, and butter) in the diet.

There are two types of cholesterol: “good” and “bad.” “Good” cholesterol (HDL) helps blood vessels and the liver to clean up and eliminate excess cholesterol. “Bad” cholesterol (LDL) in the diet increases the risk of developing plaque in the arteries, which can hamper the flow of blood and lead to stroke or heart attacks. It is recommended that people maintain blood levels that are low in “bad” cholesterol and relatively high in “good” cholesterol.

limit their consumption to one drink a day, and men to two drinks a day. (Blood pressure levels can be raised by drinking “excessive” amounts of alcohol such as 36 to 48 ounces of beer, 3 to 4 ounces of 100 proof whiskey, or 18 ounces of wine.)

A number of recent studies have shown that limited alcohol consumption is not entirely bad for people and can have some health benefits. For example, some clinical trials have indicated that people who have one or two drinks a day have lower blood pressure and live longer than those who drink too much. Others have found that limited wine consumption can prevent the accumulation of fat in the arteries and raise “good” blood cholesterol. However, these few benefits aside, what is unmistakable is that excessive alcohol has been and continues to be the source of countless personal, medical, and social problems throughout the world. Those who have a history of alcoholism in their families or who have a particular sensitivity to alcohol should keep from drinking altogether.

Another potentially habit-forming and health-threatening substance is tobacco. Cigarette smoking increases the risk of heart disease, stroke, and a variety of lung diseases, such as emphysema, bronchitis, and lung cancer. While it has not been proven to directly increase blood pressure, smoking has played a significant role in damaging blood vessel walls and speeding up the hardening of the arteries—all of which lead to the development of high blood pressure.

The easy answer to the problem of smoking is not to start in the first place. This is particularly true for American women who, statistics emphasize, are 2 to 6 times more likely to have a heart attack than women who don’t smoke, with the...
risk increasing based on the number of cigarettes smoked each day. For those who do smoke, the simple solution is to gain the support you need to quit. The payoffs are remarkable, if not immediate, since the risk of heart disease after the first year of quitting is reduced by more than 50 percent.

Monitoring health

Another important aspect in preventing and treating high blood pressure and other related conditions involves keeping track of and being informed about your health on an ongoing basis. This involves meeting with your doctor for regular check-ups and having your blood pressure measured on a regular basis, particularly if you have high blood pressure or prehypertension. Again, it is recommended that people have their blood pressure checked at least once a year. For those with hypertension, it is important to monitor, treat, and control the disorder on an ongoing basis.

Doctors or health care providers often advise their patients with hypertension to keep track of their blood pressure on a daily basis using some form of home monitoring device. This allows the doctor and patient to monitor and record how his or her blood pressure changes over time. It also provides a more accurate diagnosis of the fluctuations at different times of the day and in between doctor visits. Home monitoring also helps in cases where a patient’s blood pressure levels or medications change frequently. Overall, it is normal for blood pressure readings to fluctuate 20 to 30 mmHg at different times of the day, particularly after performing some form of physical activity or while experiencing moments of excitement. It is suggested that patients do not become overly concerned about these fluctuations or become obsessive about their readings in general.

Today, there are a number of home monitoring equipment options to choose from. There’s a portable, one-unit device that includes a sphygmomanometer and stethoscope. There are also three types of electronic monitoring devices to consider—mercury, aneroid (air), and automatic. Though each device has its own advantages and disadvantages, most are affordable, easy to operate,
widely available in pharmacies and discount chain stores, and usually take less than a minute to attain an accurate reading. Some devices even record or print out your readings. It is recommended that patients talk with their doctor or health care provider about which type of device would best suit their needs.

Taking blood pressure medicine

For those whose high blood pressure is serious enough to require medication, it is important to remember that changes in diet and lifestyle are also absolutely necessary. No single “wonder” drug or large amount of medication will help a person reduce his or her blood pressure to a healthy level—how one eats and lives will need to be improved as well. In fact, it has been shown that only 40 to 50 percent of people who rely solely on medication to reduce their blood pressure to normal levels are successful.

Thanks to advancements in medicine and technology, a number of medications have been developed to help people with severe high blood pressure to live normal, functional lives well into old age. In most cases, the addition of medicine to a person’s treatment can help to dramatically improve their blood pressure in less than a year.

When a person is first diagnosed with high blood pressure (and medicine is required), doctors typically prescribe diuretics, which is in line with a 2003 report and recommendation by the Joint National Committee (JNC) on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. Doctors may also prescribe a second medicine, such as a beta blocker, to help patients meet their blood pressure goals. The JNC also recommends that otherwise healthy African-American patients, who are particularly sensitive to sodium, begin their treatment taking only diuretics or a combination of drugs containing adequate doses of a duretic.

Depending on the patient and the severity of the problem, doctors may also choose to combine one medication with another to help better control or lower the patient’s blood pressure. Patients are commonly prescribed two or more medications from different classes, since blood pressure medications often complement each other in their efforts to reduce blood pressure. A very common example is the combination of diuretics and ACE inhibitors, which has proven to help 75 to 80 percent of people who set goals of lowering their blood pressure levels below 140/90 mmHg. (The use of only one of these medications helped 40 to 50 percent achieve the same goal.) People with more serious or unstable high blood pressure...
pressure may need to take vasodilators—which lower blood pressure by opening up vessels—along with a diuretic or other anti-hypertensive medication in order to help lower fluid retention.

Once a patient’s blood pressure has improved and stabilized for at least 12 months, doctors typically implement what is called “step-down” therapy. This approach allows doctors to gradually lessen either the number or dosage of the medications...
the patient has been taking. The purpose is to see if the patient can still stabilize his or her blood pressure while either reducing the number or dosage of the medications being prescribed. While some patients cannot afford to reduce their blood pressure medications, any lifestyle or dietary changes they undertake can ultimately help to “step down” their reliance on medications in the long run.

Most patients tolerate blood pressure medications without side effects. But some patients may experience a variety of side effects. These include irritating ones—like dizziness, drowsiness, or skin rash—and potentially serious ones, including depression, hallucinations, and heart problems. Diuretics have also been proven to cause muscle cramps and fatigue in some patients, while ACE inhibitors are known to cause chronic coughing. However, most people feel few or no side effects while taking high blood pressure medicine.

Patients who are prescribed medications and develop one or more side effects should inform their doctors, since there are a number of other medications or dosage amounts that can help to stabilize blood pressure levels with few or no side effects. This is particularly true for high blood pressure patients also suffering from diabetes, kidney disease, or other disorders, since doctors often prescribe stronger medications or higher dosages to treat these more threatening illnesses. It may be necessary for a patient to try different types of blood pressure medications in order to find the one that works most effectively.

As with other medications, it is strongly recommended that patients continue taking the prescribed medicine unless a doctor decides differently. It is also suggested that patients consult with their doctor about other medications they might be taking, since certain types of drugs cause a rise in blood pressure levels. It is also important to tell your doctor about any herbs or other natural or alterna-
tive medicines you may be taking. Just because an alternative medicine is considered “natural” does not mean that it is safe. Some herbs may lower the effectiveness of your medication or actually raise your blood pressure.

**Blood pressure treatment plans**

One of the primary purposes of a treatment plan is to bring blood pressure levels down in order to reduce the chances of health-threatening complications, like stroke, heart disease or kidney failure. Depending on the circumstances, the doctor and patient will work closely together to develop an appropriate and individually tailored plan of treatment. The plan itself may take some time to get used to and will either be implemented in the hospital, at home (while under close supervision), or both. Most plans may involve a number of lifestyle changes, medication, and an ongoing monitoring of blood pressure levels.

As emphasized earlier, all treatment plans involve making changes in diet and lifestyle to facilitate weight loss and the lowering of blood pressure levels. This may include adjusting to a diet that is low in fat and sodium, and lifestyle changes that involve lots of physical activity and an avoidance of alcohol and smoking.

These and other basic, personal lifestyle changes will go far in helping to reduce one’s blood pressure, particularly those who have to rely

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**Ten Ways to Control Your High Blood Pressure**

- Know your blood pressure. Have it checked regularly.
- Know what your weight should be. Keep it at that level or below.
- Don’t use excessive salt in cooking or at meals. Avoid salty foods.
- Eat a low-fat diet according to American Heart Association recommendations.
- Don’t smoke cigarettes or use tobacco products.
- Take your medicine exactly as prescribed. Don’t run out of pills even for a single day.
- Keep appointments with the doctor.
- Follow your doctor’s advice about exercise.
- Make certain your parents, brothers, sisters and children have their blood pressure checked regularly.
- Live a normal life in every other way.

*From the American Heart Association*
on medication to get their condition under control. In time, these changes will also help to limit the number and dosage amounts of medications needed to lower a person’s blood pressure. Naturally, treatment plans also involve regular check-ups with the doctor, where possible side effects are discussed, goals and adjustments are made, and ongoing support and advice are given. Doctors will most likely recommend that the patient use an at-home blood pressure monitor on a regular basis in order to make a detailed record of his or her readings between office visits and throughout the course of the treatment plan.

If carefully followed and adjusted appropriately, treatment plans can work wonders for people with high blood pressure. Unfortunately, it is often hard to tell whether the changes and medications are helping because a patient may or may not feel any different than he or she had before. Remember, the symptoms of this “silent killer” are hard to detect. Nevertheless, the unrecognizable benefits of treatment plans may very well save a patient’s life over the long run, since risk of stroke, heart disease, kidney failure, and other related health problems will be greatly reduced.
One Doctor’s Reasons for Deciding How to Treat High Blood Pressure

Sometimes the more choices you have, the harder it is to make a decision.

Doctors have that problem when it comes to picking the medication that is best for high blood pressure.

There are five major types to choose from: ACE inhibitors; angiotensin-receptor blockers; beta blockers; calcium-channel blockers; and diuretics.

It gets even more complicated. There are subtypes within those five types. And different medications are combined into a single pill. Lotensin HCT is one example. It is a combination of an ACE inhibitor and a diuretic.

So how do doctors decide what to prescribe?

To see what one doctor does, we spoke with Dr. Sandra Taler. Taler is a physician at the Mayo Clinic, the world-famous medical center in Rochester, Minnesota.

Taler says the first type of drug that she usually prescribes is a diuretic: “I have always been a big fan of diuretics.”

She is right in step with new government guidelines that say most people with high blood pressure should try a diuretic first.

Diuretics work by helping the kidneys get rid of sodium (a chemical that is part of salt) and water from the body. That decreases the volume of the blood, so there is less blood pounding against the walls of your blood vessels, creating high blood pressure.

There are two main types: loop and thiazide (pronounced THIGH-ah-zide). Most people taking a diuretic to control high blood pressure take a thiazide diuretic.
Many patients worry that the pills will make them have to go to the bathroom more often. At first, a thiazide diuretic does increase urination. But after several weeks, most people’s bodies adjust and levels return to normal.

Taler takes a different approach with her patients who have had a heart attack or experience the chest pain called angina that comes from the heart pumping without enough blood. For them, she’ll prescribe a beta blocker.

Beta blockers slow down the heart, so it is not pumping blood through your blood vessels with as much force. Slowing down the heart helps if you’ve had heart trouble, because it means the heart isn’t working as hard and can get by with less blood.

If someone has diabetes, Taler says she orders some kidney tests. Depending on the results, she would prescribe an ACE inhibitor. ACE inhibitors affect blood pressure by relaxing blood vessels but are less effective with excess sodium and water levels.

But treating high blood pressure with pills is no substitute for avoiding it in the first place. People get high blood pressure for many reasons, but weight gain and eating too much salty food are two of the main ones. Salty food raises blood pressure, and Taler says people don’t have any idea just how salty the food is when they eat out.

“That’s true at fancy restaurants,” she adds. “It is not just McDonald’s.”
Part 4: Research

Current lines of research

As science, technology, and the field of medicine have advanced over the centuries, so has humankind’s understanding about the mysterious nature and widespread effects of high blood pressure. Over the years, many researchers have dedicated their lives to investigating and discovering more effective ways of identifying, diagnosing, treating, and reducing the complications of high blood pressure in all kinds of people with all types of conditions. We read or hear about many of these exciting discoveries in the news. While much has been learned, many questions remain to be answered. The progress so far has helped to improve—if not save—the lives of millions of people who have developed hypertension. As with other life-threatening diseases and disorders, the hope is that explorations in the area of high blood pressure will one day lead to a cure.

Today, there are still many questions about high blood pressure that researchers are trying to determine. They include: How can high blood pressure be prevented or more effectively treated? Why does it affect African Americans and the elderly more than other groups of people? How can the medical community more effectively educate the public about this potentially deadly condition? Research conducted in all areas and fields of science is helping to build upon the reservoir of knowledge that we presently have about high blood pressure. The following are examples of the types of research that are currently and actively taking place:

Population Studies. By studying a group of people over time, researchers learn a great deal about the nature and mechanics of the disorder. One such study is the Jackson Heart Study (JHS), which has been focusing on cardiovascular disease among African Americans from Jackson, Mississippi. Starting in the fall of 2000, the JHS began to study 6,500 African-American men and women between the ages of 35 and 84. Through questionnaires, lab tests, and other investigations, the researchers hope to determine how the common disorders of high blood pressure, diabetes, and obesity influence the development of cardiovascular disease in African Americans.
The JHS is an extension of the Atherosclerosis Risk in Communities (ARIC) Study that took place in four U.S. cities more than a decade ago. The ARIC Study involved a comprehensive examination of 15,792 people over a 12-year period from four diverse regions in the U.S.: Minneapolis, Minnesota; Forsyth County, North Carolina; Washington County, Maryland; and Jackson, Mississippi. The purpose of the ARIC Study has been to identify and study genetic and chemical risk factors of cardiovascular disease.

The JHS represents the largest research study of cardiovascular disease on an African-American population to date. The research promises to yield significant findings that will help to better educate, prevent, and treat cardiovascular disease and related disorders (like high blood pressure) among this particularly susceptible group of Americans.

Another similar study is the clinical African-American Heart Failure Trial (A-HeFT) currently being sponsored by NitroMed, a pharmaceutical company. The study involves the recruitment of about 600 African-American men and women from over 100 clinics across the United States who suffer from moderate-to-severe heart failure. Among other things, the trial is designed to test the effectiveness of...
a special nitric oxide–enhanced heart medication called BiDil® to see if it can prolong or enhance the quality of the trial members’ lives. This important study is also sponsored by the Association of Black Cardiologists and is bound to shed significant light on the relationship between heart failure and high blood pressure in the high-risk group of African Americans.

Researchers also continue to investigate the effects that high blood pressure has on the aging. One recent study established a link between depression and heart failure among the elderly who have high blood pressure. This study involved 4,538 people over the age of 60 who were part of the Systolic Hypertension and the Elderly Program (SHEP). Researchers discovered that heart failure developed in 18 of 221 depressed patients (8.1%), while it only affected 138 of 4,317 (3.2%) other patients who were not depressed. The investigation represents one of the first studies to establish a link between depression and the development of heart failure. These and other findings from the investigation will help in understanding and addressing the serious long-term complications of high blood pressure among the elderly.

In addition, numerous other high blood pressure studies are being conducted to search for possible hidden insights about the disorder among lower-risk groups. Many recent epidemiological studies have found that small babies who gain weight too rapidly are more likely than others to develop high blood pressure as adults. One particular study of 346 British men and women found that small babies who experienced significant weight gain between the ages of one and five developed higher blood pressure in adulthood. These findings have brought into question the effectiveness of pediatricians who often encourage “catch up” growth for small, underweight babies. Such discoveries have caused doctors and researchers to think about how and why high blood pressure can develop during pregnancy and infancy.
Genetic Research. Diseases and disorders such as stroke, heart disease, and high blood pressure involve highly complex and countless interactions between genes. This is why researchers across the world are trying to identify and isolate the specific genes that may contribute to the development of high blood pressure.

Past and present studies have been able to prove that there is indeed a link between our genetic (family) history and high blood pressure. Though some genes have been identified, researchers have yet to find any genetic variations that have clearly and repeatedly proven to influence the development of hypertension.

It has been shown, however, that genes produce proteins that ultimately regulate body functions. In this sense, some gene-produced proteins can make blood pressure levels rise, while others can cause them to go down. Under certain circumstances—like aging and exercise—some proteins can have a stronger effect on blood pressure levels than others.

One of the serious challenges of researching the genetics of high blood pressure is the amount of resources and expertise needed to effectively study the connection. Moreover, many medical, scientific, and statistical experts are needed to properly design
and implement the study. In addition, researchers need a large pool of participants and a considerable amount of time to thoroughly test and gather massive amounts of data in order to accurately sift through all the various factors—like medical conditions or race—that can influence blood pressure besides genetics.

As a result, a considerable amount of time and money are going to be needed before a clear picture of the genetic workings of high blood pressure can be determined.

Among the many benefits possible from genetic research on blood pressure is that it may one day help identify early on who is more predisposed to develop the condition than others. As a result, people and their doctors could more easily prevent the development of high blood pressure. Research on the genetics of hypertension could also potentially address why some medications are effective in controlling blood pressure in certain types of patients, but not in others. With these kinds of insights, doctors would then be better able to identify and prescribe the best medication for different kinds of patients.

The findings of one genetic research study in 2002 helps to highlight how real these possibilities are. The study found that people carrying a certain type of mutant gene that causes heart arrhythmias face an increased risk of developing this disorder if they take certain types of medication, including blood pressure drugs. Researchers were able to determine that the genetic variant is found most often in people of African descent. Researchers are now hoping to confirm their findings and develop a test that will help them more easily identify carriers of the gene, so that they may be prescribed safer and more effective medications.

Weight management. For years, researchers have been searching for better and more effective ways for people to lose weight and to keep it off. In the various studies dealing with weight loss and high blood pressure, there is added significance simply because overweight people suffering from hypertension may face serious complications if they don’t lose or manage their weight effectively.

One major 1997 research effort seeking to help high blood pressure patients lower their sodium intake and lose weight is the Dietary Approaches to Stop Hypertension (DASH) study. Supported by the National Heart, Lung, and Blood Institute (NHLBI), the DASH diet is a healthy low-sodium, low-fat, low-cholesterol eating plan that was clinically proven within weeks to significantly reduce blood pressure levels and weight in men and women of all ages, races, physical conditions, and medical backgrounds.
low-cholesterol eating plan that was clinically proven within weeks to significantly reduce blood pressure levels and weight in men and women of all ages, races, physical conditions, and medical backgrounds. Studies have shown that the DASH diet also lowers “bad” (LDL) cholesterol and homocysteine (an amino acid), which has shown to cause a greater risk for heart disease. In addition to sample menus and recipes, the DASH diet plan also provides a form to document eating habits before starting the diet and a chart that will help manage and guide a person’s shopping and meal planning. As with the DASH diet and other nutrition-based efforts, researchers work to find better ways for people on both sides of the hypertension fence to eat healthy and manage their eating habits more effectively.

Roughly 20 to 30 percent of all Americans are considered “physically inactive.” Inactivity increases a person’s chances of developing high blood pressure (as well as diabetes, heart disease, and countless other health problems). Research continues to uphold and reinforce the benefits of
exercise, weight loss, and lower blood pressure. One recent study investigated the effects of aerobic exercise on blood pressure by examining 54 previous exercise trials involving 2,419 physically inactive adults.

Researchers found that after two weeks of performing aerobic exercises like jogging, cycling, and swimming, the blood pressure levels of the participants decreased by 3.84/2.58 mmHg. This average decrease was experienced by all groups within the study—those with and without high blood pressure and those who were overweight or of normal weight, as well as members of all racial groups. The results of these and other exercise-based studies help to emphasize how moderate amounts of exercise can directly lower blood pressure, while improving the quality of one’s life and overall weight and fitness level.

**Prediction.** Another related branch of the research effort involves trying to predict who is at risk for developing high blood pressure. This includes trying to determine which people or groups are more at risk for developing complications from high blood pressure. Being able to predict different aspects of the disorder will go far in helping health care providers more accurately prevent and treat high blood pressure. The work researchers are doing in the area of genetics could help the medical community more effectively identify, test, and treat individuals who, for example, are more likely to develop high blood pressure or who will not respond well to certain types of medication.

**The important role of volunteers**

Researchers and medical science in general would not be able to understand or make inroads against high blood pressure and other diseases without the help of thousands of volunteers in the last century alone. As participants in research studies, volunteers are willing to share their personal medical history, participate in clinical studies often for long periods of time, and accept many other sacrifices in order to help humankind’s effort to uncover insights about high blood pressure and find better ways of treating it. Because high blood pressure affects people of all ages, races, and lifestyles—and often to varied degrees—it is critical for researchers to be able to access and study hundreds, if not thousands, of members of these different subgroups within our population. This enables them to gather more accurate race-, age-, or gender-specific information and possibly uncover new insights or ways of treating these special groups for high blood pressure.
When different subgroups or communities participate in a research study, they are able to take advantage of the most current and perhaps effective medical treatment for, in this case, high blood pressure. The quality of care that volunteer patients receive during the course of a study is often very high and very beneficial. Volunteers also benefit from knowing that their participation may one day help others who are suffering from or affected by high blood pressure.

Researchers and medical science in general would not be able to understand or make inroads against high blood pressure and other diseases without the help of thousands of volunteers in the last century alone.
Forecasting New Medications’ Effect on the High Blood Pressure Front

Statistics can be confusing—and be used on purpose to cause confusion. But Dr. Lemuel Moyé says they are also something else: the truth.

“Statistics tell how real something we think we are seeing really is,” he says.

Moyé is a professor at the University of Texas Health Science Center in Houston. He is one of the leading biostatisticians in the country. Biostatisticians are statistics experts who do medical research and work closely with doctors.

Moyé was an important member of the research team that showed high systolic blood pressure increases your risk for heart attack and stroke. Systolic blood pressure is the first, or top, number in a blood pressure reading. So if your blood pressure is 140/90, your systolic blood pressure is 140.

Doctors used to think that it was natural for older people to have a high systolic blood pressure because their arteries got stiffer.

Moyé says, “Just because you are older doesn’t mean you don’t have to worry about systolic blood pressure.”

Moyé grew up in Queens in New York City. He had an interest in keeping track of numbers as a boy. Every day, he carefully recorded the weather—the temperature, humidity, and barometric pressure.

After majoring in math in college, Moyé graduated from medical school and saw patients. But medical research, especially when it involved numbers, was his true love.

Moye, continued on next page
The type of research that Moyé does is called a clinical trial. Many of the medical studies you hear about are clinical trials. They are done to test whether a new medication is safe and effective.

In a typical clinical trial, the researchers give half of the people who volunteered to be in the trial an experimental medication. They give the other half a pill that looks and tastes like the experimental medication but, in reality, contains no medication. This “dummy pill” is called a placebo.

A lot of information is collected during the trial, including information on side effects. After the trial is over, biostatisticians like Moyé analyze that information to see if there are important differences between the people who got the medication and the people who got the placebo.

Objectivity and large numbers of patients are the reasons that clinical trials are so important to medical research, notes Moyé.

He adds, “Physicians are supposed to be exclusively patient oriented. But it is that point of view that blinds them to an objective view of the therapy. Physicians drawing conclusions just from their own experience is fatally flawed.”

Moyé has slightly high blood pressure. Although he has studied blood pressure medications, his goal is keep his blood pressure under control without any pills. He keeps his weight down, doesn’t add salt to his food, and gets his blood pressure checked regularly.

“High blood pressure is like rain on a picnic. Everything about your health is worse with it,” he says.
Conclusion: Let’s bring down high blood pressure

We do not have to continue to let high blood pressure slowly and silently creep up on millions of people each year. This life-threatening trend can be changed or improved upon, but it takes greater awareness and a lifelong commitment to healthy living.

Below are a number of suggestions and resources that can help everyday people steer clear of this debilitating condition and educate others about this serious public health problem. Look on page 57 for further resources. The local library is also a good source of information on high blood pressure.

**Educate yourself about high blood pressure.** Reading this book is a great start. It is important to continue to educate yourself on high blood pressure, particularly as you get older and as new information and research from the medical community arises. Good sources of information are the library and the Internet. Ask a librarian for help in your search, if necessary. Make sure to share the interesting and potentially lifesaving insights you have learned here and in the future with your family, friends, and community.

**Eat healthy and stay fit.** Eating well and being physically active have always been the golden formula for a long, healthy, and positive life. The lives of those diagnosed with high blood pressure may depend on these simple and smart changes. Adjusting to a low-fat, low-sodium diet has shown to improve blood pressure levels, not to mention all the other lifelong benefits that can come with weight loss. Getting out, exercising, and doing things you enjoy help lower blood pressure. The trick is to continually think about and take time to commit to this healthier way of living. Help friends and loved ones who are
High Blood Pressure: The Science Inside

less active and healthy to become better informed, since they are likely to face the kind of hypertensive treatment options explained in this book.

**Quit smoking and avoid alcohol.** High blood pressure aside, quitting smoking and limiting alcohol consumption are just good ideas. The benefits are countless—from short-term financial savings to long-term health benefits. Getting these two areas under control, if you do drink or smoke to excess, will help to improve your blood pressure (and many other areas your life). If you know people who smoke or drink too much, make time to talk about it with them and support their efforts if they ultimately try to quit their use.

**Monitor your health.** In addition to watching your diet and getting enough exercise, it is recommended that all people have their blood pressure checked at least once a year. For those with the disorder, checking your blood pressure may be something you need to measure and record several times a day. Taking this initiative will help you and your doctor better control, treat, and ultimately lower your blood pressure. Monitoring other related aspects of your health and diet are also an important part of life.

**Stick to your treatment plan.** If you have high blood pressure and are prescribed a treatment plan, make sure to follow closely your doctor’s recommendations. For some people, this may involve self-monitoring your blood pressure and quitting smoking. Sticking to your treatment plan is the best way to lower your high blood pressure and fend off other serious illnesses.

**Educate others in the community.** Share what you have learned about high blood pressure with your family and friends. You can also get involved in high blood pressure prevention programs or volunteer for any research studies, particularly if you have the condition. It may also be worthwhile to find out if your local schools are adequately addressing the problem in terms of lunch menus, physical activities, and general student awareness about high blood pressure. Getting involved on the educational side of this “silent killer” will ensure that you and those you care about stay informed over time and continue to work at maintaining a healthy lifestyle.
Appendix 1: Questions to Ask Your Doctor about High Blood Pressure

If you have not been diagnosed with high blood pressure...

- Am I at risk for high blood pressure?
- Should I be tested for high blood pressure?
- What is my body mass index?
- Do I need to lose weight?
- Do I need to make changes in my lifestyle to prevent high blood pressure?
- What help is available for making those changes?

If you have been diagnosed with high blood pressure...

- What can be my short-term goals for control of the high blood pressure?
- What can be my long-term goals?
- What is the treatment plan?
- What lifestyle changes are required by this treatment plan?
- What other specialists do I need to see?
- What medications will help control the high blood pressure and complications?
- What is the schedule for check-ups?
- Can you help me locate a clinical trial to join?

Appendix 2: Taking Part in Research Studies—Questions to Ask

A research study is a way for finding answers to difficult scientific or health questions. Here are important questions you should ask of anyone who wants you or members of your family or community to be part of a research study on high blood pressure.

1. What is the study about?
   - Why are you doing this study?
   - Why do you want to study me or people like me? Who else is being studied?
   - What do you want to get out of this study?
   - What will you do with the results?
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• Have you or others done this type of study ever before? Around here? What did you learn?

2. Who put this study together?
• Who is running or in charge of this study?
• Whose idea was this study?
• How were people like me part of putting it together?
• Who are the researchers? Are they doctors or scientists? Who do they work for?
• Have they done studies like this before?
• Is the government part of this study? Who else is a part of this study?
• Who is paying for this study?
• Who will make money from the results of this study?

3. How can people like me share their ideas as you do this study?
• How will the study be explained in my community?
• Who of people like me will look at this study before it starts?
• Who of people like me are you talking to as you do this study? A Community Advisory Board?
• Who from the study can I go to with ideas, questions, or complaints?
• How will people like me find out about how the study is going?

4. Who is going to be in this study?
• What kinds of people are you looking for? Why?
• Are you trying to get minorities in this study?
• Are you including people less than 18 years old?
• How are you finding people for this study?
• Are transportation and/or daycare provided for people in this study?
• Do I need to sign to participate?
• Will you answer all of my questions before I sign the consent form?
• Can I quit the study after signing the consent form? If I quit the study, will anything happen to me?

5. What will I get out of this study?
• What are the benefits?
• Is payment involved? How will I be paid?
• Will I get free health care or other services if I participate? For how long?
• Will I get general health care and/or psychological care if I participate? For how long?
6. How will I be protected from harm?

- Do I stand a chance of being harmed in this study? In the future?
- Does the study protect me from all types of harm?
- If I get harmed, who will take care of me? Who is responsible?
- If I get harmed in any way, will I get all needed treatment? Who pays for treatment?

7. How will my privacy be protected?

- Who is going to see the information I give?
- Will my name be used with the information?
- What happens to the information I gave if I quit the study?
- Is there a written guarantee of privacy?

8. What do I have to do in this study?

- When did you start this study? How long will it last?
- How much of this study have you already done?
- Have there been any problems so far?
- Will I get treated the same as everyone else?
- What kinds of different treatments are offered in this study? Are there both a real and a fake treatment?

9. What will be left behind after the study is over?

- What will happen to the information people give? How will it be kept?
- What are you going to do with the results of the study?
- How will the public learn about the results? Will results be in places where the public can see them?
- Are you going to send me a copy of the results? When?
- What other studies are you planning to do here?

The questions above are from a pamphlet developed by Project LinCS (Linking Communities and Scientists), Community Advisory Board (Durham, NC), and Investigators (University of North Carolina Center for Health Promotion and Disease Prevention) in cooperation with the Centers for Disease Control and Prevention, Atlanta, GA. hivmail@cdc.gov For copies of this brochure: CDC National Prevention Information Network 1-800-458-5231
Resources

American Heart Association
A privately funded, non-profit health organization providing basic information, news, personal stories, and health tips on various medical diseases and conditions including high blood pressure.
American Heart Association—National Center
7272 Greenville Avenue
Dallas, TX 75231
800-AHA-USA-1
www.americanheart.org

American Society of Hypertension
The largest American organization dedicated exclusively to research, diagnosis, and treatment of hypertension and related cardiovascular disease.
515 Madison Ave, Suite #1212
New York, NY 10022
212-644-0650
www.ash-us.org

Bloodpressure.com—The Hypertension Network
A web-based service that provides patients and the public with accurate and up-to-date information on hypertension and highlights effective ways to manage the condition. A service of Lifeclinic.
www.bloodpressure.com

ClinicalTrials.gov
A web-based resource for finding clinical trials in need of volunteers.
www.clinicaltrials.gov
Select the “hypertension” topic to search for high blood pressure–related trials.

Combined Health Information Database
A web-based service that combines resources on high blood pressure and other diseases from several federal agencies. A service of the National Institutes of Health.
www.chid.nih.gov/simple/simple.html

Family Blood Pressure Program
A large multi-center genetics study of high blood pressure and related conditions in multiple racial groups. Affiliated with the National Heart, Lung, and Blood Institute.
www.sph.uth.tmc.edu/hgc/fbpp/
Healthy People 2010
A nationwide health promotion and disease prevention campaign sponsored by the Department of Health and Human Services. One of the goals of the campaign is to reduce health disparities.
Office of Disease Prevention and Health Promotion
200 Independence Avenue S.W., Room 738G
Washington, DC 20201
www.healthypeople.gov
For information on the Healthy People 2010 Microgrant program that finances community-based prevention activities:
www.healthypeople.gov/implementation/community/

Hypertension Education Foundation, Inc. (H.E.F)
An organization seeking “to improve health and possibly save lives by generating and distributing information about hypertension and by promoting research and teaching in the field of hypertension.”
P.O. Box 651
Scarsdale, NY 10583
www.hypertensionfoundation.org/index.htm

International Society on Hypertension in Blacks (ISHIB)
A non-profit, medical membership society dedicated to fostering research, developing programs, and “promoting public awareness of the harmful effects of hypertension, especially among ethnic populations.”
2045 Manchester Street, NE
Atlanta, GA 30324
404-875-6263
www.ishib.org

MEDLINEplus
A comprehensive source of health information provided by the National Library of Medicine.

National Center for Chronic Disease Prevention and Health Promotion
Promotes the transfer of research knowledge into actual prevention and treatment strategies. Provides information to the general public. Affiliated with the Centers for Disease Control and Prevention’s Cardiovascular Health Program.
www.cdc.gov/cvh/
National Heart, Lung, and Blood Institute Information Center
Provides patient education and professional materials on topics of interest to high blood pressure patients.
P.O. Box 30105
Bethesda, MD 20824-0105
301-592-8573
www.nhlbi.nih.gov/health/infoctr/
National High Blood Pressure Education Program
www.nhlbi.nih.gov/hbp/index.html

National Hypertension Association
An organization dedicated to “conquering hypertension through research, education, and detection.”
324 East 30th Street
New York, NY 10016
212-889-3557
www.nathypertension.org

National Kidney and Urologic Diseases Information Clearinghouse
Provides information about kidney disease as it relates to high blood pressure.
A clearinghouse of NIDDK.
3 Information Way
Bethesda, MD 20892-3580
800-891-5390 or 301-654-4415

Native American Research Centers for Health
Research centers that link the Native American community with health research and that work to increase the number of Native American scientists and health professionals.
National Institute of General Medical Sciences
National Institutes of Health
45 Center Drive MSC 6200
Bethesda, MD 20892-6200
301-496-7301
www.nigms.nih.gov

New York Online Access to Health
A searchable health information resource in English and Spanish.
www.noah-health.org/index.html

Office for Protection from Research Risks
A source of information on the guidelines and ethics of research studies with humans.
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National Institutes of Health
Office for Protection from Research Risks
6100 Executive Blvd, Room 3D01
Rockville, MD 20892-7507

Office of Minority Health Resource Center
Serves as a national resource and referral service on minority health issues, including high blood pressure. Affiliated with the U.S. Department of Health and Human Services.
P.O. Box 37337
Washington, DC 20013-7337
800-444-6472
www.omhrc.gov/omhrc/

Office for Research on Minority Health
Promotes the health of racial and ethnic populations through research and education and through support of minority involvement in research careers. Affiliated with the National Institutes of Health.
6707 Democracy Blvd., Suite 800
MSC 5465
Bethesda, MD 20892-5465
800-444-6472 or 301-402-1366
ncmhd.nih.gov

PHCentral.org—Pulmonary Hypertension
Founded in the effort “to be the definitive internet resource for Pulmonary Hypertension related information for Patients, Caregivers and Medical Professionals.”
www.phcentral.org

Weight-Control Information Network
Health information and educational materials on weight loss. A clearinghouse of NIDDK.
1 WIN Way
Bethesda, MD 20892-3665
800-WIN-8098 or 301-984-7378
www.niddk.nih.gov/health/nutrit/win.htm

The World Hypertension League
A global federation that is “devoted to the advancement of hypertension prevention and control through joint efforts of all national leagues and societies.”
www.mco.edu/org/whl/index.html
www.sciencemag.org
www.sghms.ac.uk/depts/gp/Science%202002%20News.pdf

216.185.112.5/presenter.jhtml?identifier=4623
A Special Message for Women.
www.americanheart.org/presenter.jhtml?identifier=2123
Am I at Risk? www.americanheart.org/presenter.jhtml?identifier=2142
www.americanheart.org/downloadable/heart/1014995824974FS14HBP2WEB.pdf
Heredity as a Risk Factor. 216.185.112.5/presenter.jhtml?identifier=4610
High Blood Pressure Statistics. 216.185.112.5/presenter.jhtml?identifier=4621)
Small Babies Who Gain Weight Too Fast Have Higher BP as Adults.
www.americanheart.org/presenter.jhtml?identifier=3000664
Ten Commandments for the Person with High Blood Pressure
216.185.112.5/presenter.jhtml?identifier=578

American Society of Hypertension. Understanding Hypertension Pamphlet.
www.ash-us.org/2001a/info/hypertensionfaq.html


British Columbia Ministry of Health. Diet and High Blood Pressure.
www.hlth.gov.bc.ca/hlthfile/hfile68b.html#E46E5

British Heart Foundation. Any Questions?—What is low blood pressure?

Centers for Disease Control and Prevention, National Center for Health Statistics.
Hypertension. www.cdc.gov/nchs/fastats/hypertens.htm
Fact Sheet: High Blood Pressure.
www.cdc.gov/od/oc/media/pressrel/fs020531.htm
Table 68. Hypertension among persons 20 years of age and over, according to sex, age, race, and Hispanic origin: United States...
www.cdc.gov/cvh/fs-bloodpressure.htm
Family Blood Pressure Program. Blood Pressure and Genes. 
www.sph.uth.tmc.edu:8052/hgc/fbpp/BPGenetics.htm
Blood Pressure General Information. 
www.sph.uth.tmc.edu:8052/hgc/fbpp/General.htm

www.dietitian.com/salt.html

From Awareness to Action/National Alliance to Reach Blood Pressure Goals. 
About Hypertension. www.fromatoa.org/

Good News in Cholesterol. Cholesterol and Heart Disease Info Center. 
Good and Bad Cholesterol. 
www.goodnewscholesterol.com/cholestinfo/good.shtml

HealthAtoZ.com. JAVA's JOLT BAD FOR BLOOD PRESSURE? 
www.healthatoz.com/atoz/healthupdate/Alert07122001.html


High Blood Pressure Foundation. Causes and Treatments. 
www.hbpf.org.uk/underst.html


Jackson Heart Study. www.jsums.edu/~jhs/main.html

www.lifeclinic.com/focus/blood/disease.asp

www.kidshealth.org/PageManager.jsp?dn=KidsHealth&lic=1&ps=107&cat_id=1 41&article_set=20233


Los Angeles Eye Institute. High Blood Pressure and Your Vision. 
www.laei.org/pressure.htm

Medical College of Wisconsin Healthlink. Genetic Clues to the Riddle of High Blood Pressure. healthlink.mcw.edu/article/925840771.html
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Essential Guide of Hypertension: Hypertension Research
Essential Guide of Hypertension: Hypertension in Special Groups
Essential Guide of Hypertension: Medications and Hypertension
Essential Guide of Hypertension: Treatment Planning
Essential Guide of Hypertension: When Drugs Do Not Work
www.medem.com/search/default.cfm?act=next&querystr=essential%20guide%20to%20hypertension&from=1&to=10

High Blood Pressure in Children
www.medem.com/search/article_display.cfm?path=n:&mstr=/ZZZ1B14HGDC.html&soc=AAP&srch_typ=NAV_SERCH

News from the AMA: Depression Linked With Increased Risk of Heart Failure Among Elderly With Hypertension.
www.medem.com/MedLB/article_detaillb.cfm?article_ID=ZZZUKQQ9EPC&sub_cat=73


MEDLINEplus Medical Encyclopedia: Blood Pressure–Low.

MEDLINEplus Medical Encyclopedia: Hypertension.

MEDLINEplus Medical Encyclopedia: High Blood Pressure–High.

MEDLINEplus Medical Encyclopedia: Obesity.

MEDLINEplus Medical Encyclopedia: Physical Activity.

Different Types of Weight Gain.

Facts About the DASH Diet. (PDF)

Food Guide Pyramid.

Design, Rationale, and Objectives.
www.nhlbi.nih.gov/about/jackson/2ndpg.htm

Limiting Alcohol Intake.
www.nhlbi.nih.gov/hbp/prevent/l_alcohol/l_alcohol.htm

Quitting Smoking. www.nhlbi.nih.gov/hbp/prevent/q_smoke/q_smoke.htm
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Types of Blood Pressure Medications.
www.nhlbi.nih.gov/hbp/treat/bpd_type.htm

Tips to Help You Remember to Take Your Medicine
www.nhlbi.nih.gov/hbp/treat/tips.htm


www.nhlbi.nih.gov/guidelines/hypertension/express.pdf

The Jackson Heart Study: Design, Rational, and Objectives.
www.nhlbi.nih.gov/about/jackson/2ndpg.htm


National High Blood Pressure Education Month. Fact Sheet: Systolic High Blood Pressure. hin.nhlbi.nih.gov/nhbpep_kit/systolic.htm

National Kidney and Urologic Diseases Information Clearinghouse (NIDDK).

Tanner, Lindsey, AP Medical Writer. Nearly a Third of Adults Rated Obese.
Associated Press. October 8, 2002.

Texas Heart Institute. Anatomy of the Heart and Cardiovascular System.
www.tmc.edu/thi/anatomy1.html

University of Iowa Health Care. Cholesterol: ‘good’ And ‘bad’
www.uihealthcare.com/topics/cardiovascularhealth/card3025.html

University of Michigan Health System. What is Congestive Heart Failure?
www.med.umich.edu/1libr/heart/fail01.htm

www.usatoday.com/custom/usatoday-com/html-tory.asp?guid=7BABE038AD -64B6-4DFE-B27A-A5086C56A98E%7D

U.S. Food and Drug Administration. FDA Consumer Magazine. Lessening the Pressure: Array of Drugs Tames Hypertension.
www.fda.gov/fdac/features/1999/499_hbp.html
Glossary

ACE (An•gi•o•ten•sin-Con•ver•ting En•zyme) in•hi•bi•tors: a group of medications used to treat hypertension by causing blood vessels to relax.

aer•o•bic ex•er•cise: activities that increase breathing and heart rates.

an•gin•a: a painful tightening in the chest, which may spread to the jaw or arms.

ar•rhyth•mi•a: an irregularity in the rhythm of the heartbeat.

ar•ter•ies: any of the muscular elastic tubes that form a branching system and that carry blood away from the heart to the cells, tissues, and organs of the body.

ar•ter•i•oles: the small terminal branches of an artery, especially those that connect with capillaries.

ath•er•o•scler•o•sis, ar•ter•i•o•scler•o•sis: a condition involving the build-up of fatty deposits inside the arterial walls.

be•ta block•ers: a group of medications used to treat hypertension by reducing the work load on the heart.

blood pres•sure: pressure of blood against artery walls. Recorded as two numbers: systolic and diastolic.

blood ves•sels: the pipelines through which blood travels to all parts of the body.

cal•o•ries: small units of energy that are contained in food and released upon digestion by the body.

cap•il•lar•ies: the tiny blood vessels that connect arterioles and venules. These blood vessels form an intricate network throughout the body for the interchange of various substances, such as oxygen and carbon dioxide, between blood and tissue cells.

car•bon di•ox•ide: a gas that is formed during respiration and released upon exhaling (breathing out).

car•di•o•vas•cu•lar: term that describes the heart and blood vessels.

car•di•o•vas•cu•lar dis•ease: illness of the heart and blood vessels, including high blood pressure, heart attack, angina, stroke, and heart failure.

car•di•o•vas•cu•lar sys•tem: (also called the “circulatory system”) The body network made up of the heart and blood vessels.

cho•lest•er•ol: a waxy substance produced by the body and taken in with food. The body needs cholesterol for certain body functions, but too much cholesterol can lead to atherosclerosis, or “hardening of the arteries.”

chron•ic: long-lasting and on-going.

clin•i•cal tri•als: research tests, performed using people, that determine the success of a medical treatment, medicine, or prevention strategy. A clinical trial usually is conducted only after the test has been successful in the laboratory and on animals.

com•pli•ca•tions of high blood pres•sure: problems that occur because of hypertension. These include stroke, heart attacks, heart failure, kidney failure, and eyesight problems.

con•ges•tive heart fail•ure: a condition marked by weakness, swelling, and shortness of breath that is caused by the inability of the heart to maintain enough blood circulation in the lungs and body tissues.

cor•o•nary ar•ter•y dis•ease: a stage of atherosclerosis involving fatty deposits inside the arterial walls.

di•a•bet•es: a set of illnesses characterized by improper amounts of glucose (sugar) in the blood.
diagnosis: a professional medical opinion, based on an exam of the patient, about what is causing symptoms of illness.

diagnosis: the use of a machine to perform the function of the kidneys, which is to clean the blood.

diastolic pressure: minimum pressure that remains within the artery when the heart is at rest.

diuretics: a group of medications used to treat hypertension by reducing the amount of water in the body by increasing the flow of urine.

epidemiology: the branch of medicine that deals with the study of the causes, distribution, and control of disease in populations.

genes: units of hereditary information contained in each cell of the body.

遗传变异: an individual that is recognizably different from a standard type.

遗传学: the field of science that looks at how genes are passed down from one generation to another to influence traits.

健康不平等: the uneven impact of a health problem that may occur between groups of people.

heart attack: sudden problem with the heart where oxygen-rich blood cannot reach it, causing cells in the heart muscle to die.

heart disease: illness of the heart, the organ that pumps blood through the body. It is one of the possible complications of high blood pressure.

高血壓力: a condition in which blood is pushed through the body's blood vessels at greater force than normal. It can lead to tiredness, heart attack, stroke and other health problems. High blood pressure is also known as hypertension.

hypertension: the medical term for high blood pressure.

isolated systolic hypertension (ISH): elevated systolic blood pressure (more than 140 mmHg) in conjunction with normal diastolic blood pressure (less than 90 mmHg)

kidney disease: an illness of the kidneys that can lead to kidney failure. It is also called “neuropathy.” It is one of the possible complications of high blood pressure.

kidneys: the pair of organs that have the job of filtering the blood.

left ventricle: the portion of the heart that pumps oxygen-rich blood to the rest of the body.

mmHg: abbreviation for “millimeters (mm) of mercury (Hg).” It is used to express measures of blood pressure and refers to the height to which the pressure in your blood vessels would push a column of mercury.

mortality rate: the number of deaths from a certain cause.

obesity: the condition of being substantially overweight.

prehypertension: a condition marked by systolic pressure reading of 120-139 or diastolic pressure reading of 80-89 that makes one likely to develop high blood pressure later on.

primary hypertension: also known as “essential hypertension,” this is a disorder in which the blood pressure in the arteries of the lungs is abnormally high, in the absence of other diseases of the heart or lungs.
Glossary

ret•i•na: the part of the eye that senses light.

ret•i•nop•a•thy: a disease of the eye’s retina that can lead to blindness. It is one of the possible complications of high blood pressure.

salt: common table salt or sodium chloride.

sec•ond•ar•y hy•per•ten•sion: also referred to as “non-essential hypertension,” this is a form of high blood pressure in which a definite cause can be determined. It accounts for only 5 to 10 percent of all high blood pressure cases.

so•di•um: a mineral that can contribute to high blood pressure in some people. It is found in baking soda, some antacids, and the food preservative MSG (monosodium glutamate), among other items.

sphyg•mo•ma•nom•e•ter: a device used to measure blood pressure.

steth•o•scope: a medical instrument for listening to the sounds generated inside the body.

stroke: damage to the blood vessels in the brain because of loss of blood flow, which can result in the inability to speak or move part of the body.

symp•tom: a sign of a problem, such as a disease.

sys•tol•ic pres•sure: maximum pressure in the artery produced as the heart contracts and blood begins to flow.

treat•ment plan: a strategy put together by a doctor or team of health care professionals working with a patient. The patient is responsible for following the plan, with the goal of lessening or delaying the complications of high blood pressure.

vas•o•di•la•tors: a group of medications used to treat hypertension by causing blood vessels to expand, lowering blood pressure and reducing the work load on the heart.

veins: any of the membranous tubes that form a branching system and carry blood to the heart.

ven•ules: small veins, especially ones that join capillaries to the larger veins.

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