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Family, Youth and 4-H Education

Hypertension

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What Is Hypertension?

Hypertension is defined as systolic blood pressure (SBP) of 140 mm Hg or greater, diastolic blood pressure (DBP) of 90 mm Hg or greater or taking antihypertensive medication. The objective of identifying and treating high blood pressure is to reduce the risk of cardiovascular disease and associated morbidity and mortality. Therefore, it is useful to provide a classification of adult high blood pressure for the purpose of identifying high-risk individuals and to provide guidelines for follow-up and treatment. Hypertension is classified into three stages based on increasing severity as noted in the following table.

Classification of Blood Pressure for Adults Age 18 and Older[1]

Category	Systolic (mm Hg)		Diastolic (mm Hg)
Optimal[2]	<120	and	< 80
Normal	<130	and	< 85
High-normal	130-139	or	85-89
Hypertension[3]			
Stage 1	140-159	or	90-99
Stage 2	160-179	or	100-109
Stage 3	≥180	or	≥110

[1] Not taking antihypertensive drugs and not acutely ill. When systolic and diastolic blood pressures fall into different categories, the higher category should be selected to classify the individual's blood pressure status. For example, 160/92 mm Hg should be classified as stage 2 hypertension and 174/120 mm Hg should be classified as stage 3 hypertension. Isolated systolic hypertension is defined as SBP of 140 mm Hg or greater and DBP below 90 mm Hg and staged appropriately (e,g., 170/82 mm Hg is defined as stage 2 isolated systolic hypertension). In addition to classifying stages of hypertension on the basis of average blood pressure levels, clinicians should specify presence or absence of target organ disease and additional risk factors. This specificity is important for risk classification and treatment.

[2] Optimal blood pressure with respect to cardiovascular risk is below 120/80 mm Hg. However, unusually low readings should be evaluated for clinical significance.

[3] Based on the average of two or more readings taken at each of two or more visits after an initial screening.

Source: National Institutes of Health. *The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*, 1997.

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High Blood Pressure Statistics

- About 50 million Americans aged 6 and older have high blood pressure. (National Health and Nutrition Examination Survey III data)
- One in five Americans (1 in 4 adults) has high blood pressure.
- Of those with high blood pressure, 31.6 percent do not know they have it; 27.4 percent are on medication and have it under control; 26.2 percent are on medication but do not have their high blood pressure under control; and 14.8 percent are not on medication.
- The cause of 90-95 percent of high blood pressure cases isn't known; however, high blood pressure is easily detected and usually controllable.
- Individuals with lower educational and income levels tend to have higher levels of blood pressure.
- According to NHANES III study, the estimated prevalence of high blood pressure for U.S. adults ages 20-74 was 24.4 percent for non-Hispanic white males and 19.3 for females; 35.0 percent for non-Hispanic black males and 34.2 for females; and 25.2 percent for Mexican-American males and 22.0 for females.

Causes

There are two forms of high blood pressure: essential and secondary. About 95 percent of people with high blood pressure have essential hypertension. Essential or primary high blood pressure has no obvious cause. Essential high blood pressure results from a combination of factors related to:

- Motion (widening and narrowing) of the blood vessels
- Increased fluid in the blood
- Functioning of the blood flow sensors
- Production of chemicals that influence how the blood vessels function
- Secretion of hormones
- Volume of blood pumped by the heart
- Nerve control of the cardiovascular system

Prevention

The goal of prevention and management of hypertension is to reduce morbidity and mortality by the least intrusive means possible. This may be accomplished by achieving and maintaining systolic blood pressure (SBP) below 140 mm Hg and diastolic blood pressure (DBP) below 90 mm Hg and lower if tolerated, while controlling other modifiable risk factors for cardiovascular disease. Treatment to lower levels may be useful, particularly to prevent stroke, to preserve renal function and to prevent or slow heart failure progression. The goal may be achieved by lifestyle modification, alone or with pharmacologic treatment. Patients should be encouraged to adopt these lifestyle modifications, particularly if they have additional risk factors for premature cardiovascular disease.

- Lose weight, if you're overweight (calorie restriction and increased physical activity).
- Become more physically active; increase moderately intense physical activity, such as 30 to 45 minutes of brisk walking most days of the week.
- Eat more healthfully (DASH, Dietary Approaches to Stop Hypertension, eating plan).
- Reduce sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).
- Reduce intake of dietary saturated fat and cholesterol for overall cardiovascular health.
- Maintain adequate intake of dietary potassium (about 90 mmol per day).
- Maintain adequate intake of dietary calcium and magnesium for general health.
- Eat more grains (7 to 8 servings), fruits and vegetables (8 to 10 servings) and low-fat dairy products (2 to 3 servings).
- Meat, poultry and fish (2 or fewer servings) – these foods are rich sources of protein, B vitamins, iron and zinc.
- Legumes, nuts and seeds (4 to 5 servings a week) – legumes include beans, dried peas and lentils, which are low in fat and have no cholesterol; an excellent source of plant protein; provide variety of nutrients, including magnesium and potassium, plus phytochemicals and fiber.
- Quit smoking.
- Limit daily alcohol intake to no more than 1 ounce of ethanol – for example, 24 ounces of beer, 10 ounces of wine or 2 ounces of 100-proof whiskey; women and lighter weight people should limit their intake to no more than 0.5 ounce of ethanol per day.

Risk Factors

Certain genetic traits or lifestyle factors play an important role in the development of essential high blood pressure. The more risk factors you have, the greater the odds that you'll develop high blood pressure during your lifetime. Most risk factors can be controlled by lifestyle changes and medication.

High blood pressure risk factors that you cannot control include race, age, family history and sex.

Risk factors for high blood pressure that you can control include obesity, inactivity, tobacco use, sodium sensitivity, low potassium, excessive alcohol and stress.

If you have a chronic illness, such as high cholesterol, diabetes, sleep apnea or heart failure, you may be at increased risk for development of high blood pressure.

Secondary High Blood Pressure

Secondary high blood pressure has a known cause, such as kidney disease, adrenal disease, thyroid disease, blood vessel abnormalities, pregnancy, medications and illicit drug use. Secondary high blood pressure affects about 5 percent of people with increased blood pressure. This form of high blood pressure is often curable.

Diagnosis and Treatment

High blood pressure rarely produces symptoms. Therefore, it's important to have your blood pressure measured at each health care visit or at least every two years. It's during a routine medical appointment that most people learn their blood pressure is elevated.

Detecting high blood pressure requires having your blood pressure measured periodically over a few weeks or months to determine if it remains elevated. A medical instrument called a sphygmomanometer is used to measure the pressure within your arteries. This device includes an inflatable arm cuff that's wrapped around your upper arm with an attached air pump and a column of mercury or standardized pressure gauge. Blood pressure is expressed in terms of millimeters of mercury (mm Hg). This measurement refers to how high the pressure in your arteries can raise a column of mercury.

A blood pressure measurement consists of two numbers. The first number is the systolic pressure, the amount of pressure in your arteries when the heart contracts to release blood into the aorta. The second number is the diastolic pressure, the amount of pressure that remains in the arteries between beats while the heart rests and fills with blood. The two numbers are usually written as a fraction: Systolic pressure is above or to the left and the diastolic pressure is below or to the right. An optimal blood pressure reading is 120/80 mm Hg or less. Blood pressure is considered high if the systolic pressure is consistently 140 mm Hg or higher and the diastolic pressure is consistently 90 mm Hg or higher, or both.

Evaluation of patients with documented hypertension has three objectives:

- Identify known causes of high blood pressure.
- Assess the presence or absence of target organ damage and cardiovascular disease, the extent of the disease and the response to therapy.
- Identify other cardiovascular risk factors or connected disorders that may define prognosis and guide treatment.

Data for evaluation are acquired through complete medical history, physical examination, laboratory tests and other diagnostic procedures.

Treatment of your high blood pressure depends on your blood pressure stage and the results of the evaluation data.

The latest guidelines for treatment of high blood pressure from the National Heart, Lung, and Blood Institute divides patients into three risk groups – A, B and C.

Risk Group A – includes patients with high-normal blood pressure or stage 1, 2 or 3 hypertension who do not have clinical cardiovascular disease, target organ damage or other risk factors. Individuals with stage 1 hypertension in risk group A are candidates for a longer trial (up to 1 year) of vigorous lifestyle modification with vigilant blood pressure monitoring. If goal blood pressure is not achieved, drug therapy should be added. Those with stage 2 or stage 3 hypertension should receive drug therapy.

Risk Group B – includes patients with hypertension who do not have clinical cardiovascular disease or target organ damage but have one or more risk factors, but not diabetes mellitus. This group contains the majority of patients with high blood

pressure. If multiple risk factors are present, doctors should consider antihypertensive drugs as initial therapy. Lifestyle modification and management of reversible risk factors should be strongly recommended.

Risk Group C – includes patients with hypertension who have clinically manifest cardiovascular disease or target organ damage. Patients who have high-normal blood pressure as well as renal insufficiency, heart failure or diabetes mellitus should be considered for prompt drug therapy. Appropriate lifestyle modifications always should be recommended as secondary treatment.

Medications

Many antihypertensive drugs are available to help individuals successfully reduce their blood pressure. The major classes of blood pressure medication are described below.

Diuretics are the oldest and one of the most frequently prescribed medications to lower blood pressure. They're effective and the least expensive of all antihypertensive drugs. Diuretics accelerate the excretion of sodium and water from the kidneys, reduce the volume of circulating blood and lower the resistance of blood vessels. They are often used in combination with other medications. There are three classes of diuretics – thiazides, loop and potassium-sparing. The major side effect is increased urination. Thiazide and loop diuretics can cause potassium loss.

Beta blockers lower blood pressure by blocking the effects of the hormone norepinephine which causes the heart to beat faster and the blood vessels to constrict. They also slow the kidney's release of the enzyme renin. Renin stimulates the production of angiotensin II, a substance that narrows the blood vessels, thus increasing blood pressure. Two notable side effects are fatigue and a reduced capacity for strenuous physical activities.

Angiotensin-converting enzyme (ACE) inhibitors block the production of angiotensin I. When angiotensin I turns into angiotensin II, it constricts the blood vessels, increasing blood pressure. Limiting production of angiotensin allows another substance bradykinin (BRAD-e-KI-nin), which keeps the blood vessels widened, to remain in the blood vessels. About 20 percent of people who take ACE inhibitors develop a dry cough.

Angiotensin II receptor blockers block the action of angiotensin II and do not increase bradykinin. Side effects are uncommon. However, some individuals who take these drugs may experience dizziness, nasal congestion, back and leg pain, diarrhea, indigestion and insomnia.

Calcium antagonists work by affecting the muscle cells around the arteries. These muscle cells have tiny passages in their membranes called calcium channels. When calcium flows into them, the muscle cells contract and the arteries narrow. Calcium antagonists fill these channels and prevent calcium from getting into your muscle cells. Some calcium antagonists slow the heart rate, potentially reducing blood pressure. Calcium antagonists are either short-acting or long-acting. Side effects may include constipation, headache, rapid heartbeat, rash, swelling in feet and lower legs and swelling of gums.

Alpha blockers lower blood pressure by preventing the body's nervous system from stimulating the muscles in the walls of the smaller arteries. Therefore, the muscles don't narrow or constrict as much. Also, alpha blockers reduce the effects of the hormones norepinephrine and epinephrine which narrow blood vessels. They also lower total blood cholesterol and triglyceride levels. Alpha blockers are available in short-acting and long-acting forms. Possible side effects include dizziness, headache, pounding heartbeat, nausea and weakness.

Central-acting agents prevent the brain from sending signals to the nervous system to speed up the heart rate and narrow the blood vessels. Possible side effects include fatigue, drowsiness or sedation, impotence, dry mouth, headaches, weight gain, impaired thinking and psychological problems, including depression. Stopping use of some of central-acting agents can cause your blood pressure to escalate to dangerously high levels quickly.

Direct vasodilators prevent the muscles in the artery walls from tightening and narrowing. Common side effects include a fast heartbeat and water retention. Other possible side effects include gastrointestinal problems, dizziness, headaches, nasal congestion, excessive body hair growth and swollen gums.

If blood pressure cannot be controlled effectively with one drug, your doctor may increase the dosage, try a different drug or add another drug to the drug you're already taking. Combination drug therapy can increase from 50 to 80 percent the number of people who respond positively to high blood pressure medication.

Home Monitoring

Self-measurement has four advantages:

- Identifies sustained high blood pressure from "white-coat" hypertension
- Assesses response to antihypertensive medication
- Improves patient adherence to treatment
- Potentially reduces costs

Blood pressure monitors are available in three forms:

Mercury-column models measure how high your blood pressure can raise the column of mercury inside the glass gauge. These monitors are the most accurate and are the standard by which other monitors are judged.

Spring-gauge models feature a round dial activated by a spring-pressure gauge. Each degree the needle moves in the dial matches a millimeter of mercury. The accuracy of this model has to be verified yearly by comparing it with a mercury-column monitor.

Electronic models require you to place the cuff on your arm and push a button. The cuff automatically inflates with air and slowly deflates. Built-in sensors detect your blood pressure and display the reading on the screen. To get an accurate measurement, place the sensor directly over the brachial (main) artery. Electronic monitors also need to be check for accuracy yearly.

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