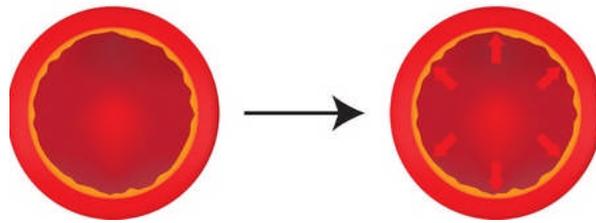


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Blood pressure is the force of blood pushing against of the walls of the arteries.



HYPERTENSION

Hypertension, also referred to as **HTN** or **high blood pressure**, is a medical condition in which the blood pressure is chronically elevated. Hypertension is common, with one in three American adults diagnosed with hypertension and one fourth of the remainder adults having prehypertension. Prehypertension is not a defined disease category; rather, it is a designation used to identify individuals at high risk of developing hypertension. More than 80 million Americans and one billion people worldwide have hypertension. Hypertension can be classified either as **essential** (primary) or **secondary**. Essential hypertension has no specific medical cause, and accounts for 90% of all new cases. Secondary hypertension results from high blood pressure and is a result of (i.e., secondary to) another medical condition, such as chronic kidney disease. Persistent hypertension is a major risk factor for strokes, heart attacks, congestive heart failure, chronic kidney disease, and dementia, and is the number one modifiable risk factor for approximately 12% of all deaths worldwide. Indeed, even a moderate elevation of arterial blood pressure is known to reduce life expectancy.

Hypertension is diagnosed when a person's systolic blood pressure is consistently 140 mmHg or greater (the top number) and/or the diastolic blood pressure is consistently 90 mmHg or greater (the lower number). As recently as 2014, the *Eighth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure*, defined blood pressure 120/80 or less to be THE NORMAL BLOOD PRESSURE and 120/80 mmHg to 139/89 mmHg as prehypertension. This group may be able to control their blood pressure through lifestyle modification. In patients with diabetes mellitus and/or almost all forms of kidney disease, studies have shown that blood pressure over 130/80 mmHg should be considered high and warrants further treatment. Furthermore, a blood pressure of 125/75 or lower should be the target

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for patients with kidney disease and more than one gram of protein in a 24 hour urine sample.

Hypertension is labeled **resistant** or **refractory** only if the blood pressure remains above the target blood pressure despite taking three or more different anti-hypertensive medications, one of them being a diuretic, to lower it.

Factors of essential hypertension

Although no specific medical cause can be determined in essential hypertension, it often has several contributing factors; these include obesity, salt sensitivity, insulin resistance, genetics, lack of physical activity, and age.

Obesity

The risk of hypertension is five times higher in obese individuals compared to those of normal weight; up to two-thirds of cases can be attributed to excess weight, indeed, more than 85% of cases occur in those with a BMI > 25.

Sodium or salt sensitivity

Sodium, the major ingredient of table salt, is an environmental factor that has received the greatest attention with regards to hypertension. Approximately one third of the essential hypertensive population is responsive to sodium intake. This is due to the fact that increasing amounts of salt in a person's bloodstream causes cells to release water (due to osmotic pressure) to equilibrate the concentration gradient of salt between the cells and the bloodstream; increasing the pressure against the blood vessel walls, which will consequently lead to a rise in the measured pressure inside the blood vessels. Both sea salt and Kosher salt are similar to table salt, regarding the sodium content and the potential contribution to hypertension.

Insulin resistance

The main purpose of insulin is to regulate the levels of glucose in the body. Insulin also exhibits vasodilating properties; in individuals with normal blood pressure, insulin may stimulate sympathetic activity without elevating arterial pressure. However, in more extreme conditions, such as metabolic syndrome, the increased sympathetic activity may over-ride the vasodilating effects of insulin. Insulin resistance, syndrome X, metabolic syndrome, dysmetabolic syndrome X, and hyperinsulinemia, are interchangeable terms that have been suggested to be responsible for the increased arterial pressure in some patients

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with hypertension. This feature is now widely recognized to be a component of metabolic syndrome.

Sleep apnea

Sleep apnea is a common, under-recognized cause of hypertension. It is often best treated with weight loss and nocturnal continuous positive airway pressure (CPAP), but other approaches include the Mandibular advancement splint (MAS), uvulopalatopharyngoplasty (UPPP or UP3), tonsillectomy and/or adenoidectomy.

Genetics (race and sex)

Although hypertension is more common in younger men than in younger women, the opposite is true for men and women age 60 and older. Hypertension is one of the most common complex disorders, with genetic heritability averaging 30%. More than 50 genes have been examined in genetic association studies of hypertension, and the number is continually growing.

Age

Over time, the blood vessels become stiffer; with reduced elasticity comes a smaller cross-sectional area in the systole, and consequently, a raised mean arterial blood pressure.

Inactivity

Lack of physical activity increases the risk of hypertension.

Signs and symptoms

Hypertension is usually found incidentally, as a case finding by healthcare professionals, during routine checkups. As such, hypertension can remain undiagnosed for many years, and is often referred to as a silent disease. The only test for hypertension is a blood pressure measurement. Hypertension in isolation usually has no symptoms, although some people report headaches, fatigue, dizziness, blurred vision, nose bleeds, frequent urination, facial flushing, transient insomnia or difficulty sleeping due to feeling hot or flushed, tinnitus (ringing in the ears), muscle cramps, excessive sweating, or palpitations (irregular or rapid heartbeat).



Complications of hypertension

While elevated blood pressure alone is not an illness, it often requires treatment due to its short- and long-term effects on many organs, known as end-organ damage. The higher the blood pressure, the increased the chance of end-organ damage. High blood pressure also increases the risk of:

- Cerebrovascular accident (CVA) or strokes and transient ischemic attacks (TIA).
- Myocardial infarction (heart attack).
- Hypertensive cardiomyopathy (heart failure due to chronically elevated or high blood pressure).
- Hypertensive retinopathy (damage to the retina).
- Hypertensive nephropathy (chronic renal failure due to chronically high blood pressure or chronic kidney disease, CKD).
- Vascular dementia.

Diagnosis of hypertension

A diagnosis of hypertension is generally based on persistently high blood pressure measurements. Usually this requires three separate measurements at least one week apart. In certain cases, if the elevation is extreme, or end-organ damage is present, the diagnosis may be applied and treatment commenced immediately.

The patient should not be on any adrenergic stimulants, such as those found in many cold medications (mainly decongestants, usually marked with a D) during the evaluation for hypertension. These products will raise the blood pressure and will make it difficult to diagnose true hypertension. Likewise, the patient should not be taking any non-steroidal anti-inflammatory agents (NSAIDs), or arthritis medications, such as Ibuprofen, since these agents may also raise the blood pressure.

Home blood pressure monitoring can provide a measurement of blood pressure at different times throughout the day, and in different environments such as at home and at work. Home monitoring may assist in the diagnosis of high or low blood pressure; it may also be used to monitor the effects of medication taken or lifestyle changes adopted in order to lower or regulate blood pressure levels.



Home monitoring of blood pressure can also assist in the diagnosis of white coat hypertension. The American Heart Association describes white coat hypertension as an increase in blood pressure as a result of visiting the doctor's office. Home monitoring will help to measure a patient's true blood pressure and can provide a log of blood pressure measurements over time; these are helpful in diagnosing and preventing potential health problems. Often, 24 ambulatory blood pressure measurements taken using a special machine, can help to provide an accurate hypertension diagnosis.

Investigations performed in newly diagnosed hypertension

Tests are undertaken to identify possible causes of secondary hypertension and seek evidence for end-organ damage to the heart, eyes (retina), and the kidneys. Given that diabetes and elevated blood cholesterol levels are additional risk factors for the development of cardiovascular disease, these are also tested for, as they will also require management.

Blood tests commonly performed include:

- Creatinine (renal function) - to identify underlying renal disease as a cause of hypertension and conversely, hypertension causing the onset of kidney damage. This test is also used as a baseline for later monitoring of the possible side-effects of certain antihypertensive drugs.
- Electrolytes (sodium, potassium, calcium, and magnesium).
- Fasting blood glucose - to identify the possibility of diabetes.
- Fasting lipid profile.
- Thyroid function tests.
- Serum uric acid.

Additional tests often include:

- Testing of urine samples for protein and/or for microalbumin, proteinuria or microalbuminuria, and to screen and detect underlying kidney disease or evidence of hypertensive renal damage.
- Electrocardiogram (ECG) - for evidence of the heart being under strain from working against a high blood pressure; this may present as thickening of the heart muscle (left ventricular hypertrophy or LVH), which is an independent risk factor for fatal cardiovascular events. The ECG may also detect any abnormalities that indicate previous silent cardiac events.
- Ultrasound of the kidneys.



TREATMENT OF HYPERTENSION

Lifestyle modification (non-pharmacologic treatment)

- Weight reduction and regular aerobic exercise (e.g., jogging or swimming) are recommended as the first steps in treating mild to moderate hypertension. Regular mild exercise improves blood flow and helps to reduce the resting heart rate and blood pressure. Although these steps are highly effective in reducing blood pressure, drug therapy is still necessary for many patients with moderate or severe hypertension to bring their blood pressure down to a safe level.
- Reducing the intake of dietary refined sugars and carbohydrates.
- Reducing sodium (salt) in the diet is proven very effective; it decreases blood pressure in approximately 60% of people. Many people choose to use a salt substitute to help to reduce their salt intake. It is recommended that you inform your health care provider if you are using a salt substitute, since it could contain potassium chloride.
- Additional dietary changes beneficial to reducing blood pressure include the DASH diet (**D**ietary **A**pproaches to **S**top **H**ypertension), which is rich in fruits, vegetables, and low fat or fat-free dairy foods. This diet is shown to be effective, based on research sponsored by the US National Institutes of Health. Furthermore, an increase in daily calcium and magnesium can increase dietary potassium, which can theoretically offset the effect of sodium and act on the kidney to decrease blood pressure; this has also been shown to be highly effective in reducing blood pressure.
- Discontinuing tobacco use and alcohol consumption has been shown to lower blood pressure. Although the exact mechanisms are not fully understood, blood pressure (especially systolic) always transiently increases following alcohol and/or nicotine consumption. Additionally, abstention from cigarette smoking is important for people with hypertension because it reduces the risk of many dangerous outcomes of hypertension, such as stroke and heart attack. Coffee drinking, or any caffeine ingestion, also increases blood pressure transiently but does *not* produce chronic hypertension.
- Reducing stress. For example with relaxation therapy, meditation, and other mind body relaxation techniques, and reducing environmental stress such as high sound levels and over-illumination, can all ameliorate hypertension.

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Pharmacologic treatment or medications

Unless hypertension is severe, lifestyle modifications, such as those discussed above, are strongly recommended before the initiation of drug therapy. Adoption of the DASH diet is one example of a lifestyle change that has been repeatedly shown to effectively lower mildly-elevated blood pressure. In the event that hypertension is high enough to justify the immediate use of medications, lifestyle changes are initiated concomitantly. The aim of treatment should be the control of blood pressure to $< 140/90$ mmHg for most patients, and lower in certain cases, such as in individuals with diabetes or kidney disease (some medical professionals recommend keeping levels $< 125/75$ mmHg). Since each drug may reduce the systolic blood pressure by 5–10 mmHg, multiple drugs are often necessary to achieve blood pressure control.



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GENERAL GUIDELINES ON HOW TO MEASURE BLOOD PRESSURE

- Rest and relax for 5 minutes without distractions (e.g. TV) before measuring.
- DO NOT measure when you are uncomfortable, anxious, stressed, or in pain.
- Wait at least 2 hours after a big meal.
- Wait at least half an hour after drinking coffee, smoking, or exercise.
- If necessary, empty your bladder and bowel before taking a reading.
- Place the cuff on your bare arm. DO NOT use a wrist monitor.
- Sit in a chair that supports your back with a beside a table that supports your arm.
- Place your arm such that it rests at heart level, use a pillow or towel for support if necessary.
- Keep your feet and ankles on the floor. DO NOT cross your legs.

RECORD your top number, (SYSTOLIC blood pressure), and the bottom number, (DIASTOLIC blood pressure). Also record your pulse rate OR heart rate.

Best wishes for a safe and normal blood pressure

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