

# HYPERTENSION

## AN OVERVIEW

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### IMPORTANT

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## Introduction

Hypertension, or high blood pressure, is a common disorder, often without symptoms and marked by high blood pressure persistently exceeding 140/90mm Hg.

There are three main types of hypertension, namely, 1) Essential Hypertension, 2) Secondary Hypertension, and 3) Malignant Hypertension.

**1) Essential Hypertension**, also called 'primary hypertension', is the most frequent kind, and it has no one known cause and is often the only manifested disorder. However, the risk of hypertension is increased by overweight, a high sodium level in the blood, a high cholesterol level, and a family history of high hypertension, stroke, and/or heart disease. High blood pressure is always a health risk, especially for developing heart disease.

**2) Secondary Hypertension** is high blood pressure linked to diseases of the kidneys, lungs, glands, and vessels.

**3) Malignant Hypertension**, also called 'accelerated hypertension', is marked by a diastolic pressure higher than 120, severe headaches, blurred vision and confusion, and may result in a heart attack or stroke.

Malignant hypertension is the most life-threatening form of hypertension, and is marked by very high blood pressure that may damage the tissues of small vessels, the brain, the eyes (especially the retinas), heart, and kidneys.

Malignant hypertension may be caused by a variety of factors, such as stress, a family history of the disease, being overweight, tobacco, birth control and other hormone based pills, high intake of table salt (sodium chloride), an inactive life-style, and general aging.

Many patients with this condition also have signs of low blood potassium, blood that is alkaline, and the release of high levels of an adrenal gland hormone (aldosterone).

## Known Causes

Known causes of hypertension include adrenal problems, over-active thyroid gland, certain pregnancies, and kidney disorders. Hypertension is more common in men than in women, and is twice as great in blacks as in whites. Persons with mild or moderate hypertension may have no symptoms, or they may experience headaches, especially on rising, ringing in the ears, lightheadness, easy fatigability, and the feeling that their heart is beating wildly. With sustained hypertension, artery walls become thickened and resistant to blood flow, and, as a result, the blood supply to the heart may be reduced, thus causing angina or heart attack. High blood pressure is often accompanied by anxiety attacks, rapid or irregular heart beat, profuse sweating, pallor, nausea, and, in some cases, fluid in the lungs.

Drugs used to treat hypertension include diuretics (e.g. thiazide derivatives); vasodilators (e.g. hydralazine and prazosin); sympathetic nervous system (SNS) depressants (e.g. rauwolfia alkaloids); sympathetic nervous system (SNS) inhibitors (e.g. guanethidine and methyldopa); and ganglionic blocking agents (e.g. clonidine and propranolol). Patients with high blood pressure are advised to follow a low-sodium, low-saturated-fat diet, to reduce calories, to control obesity, to exercise, to avoid stress, and to take adequate rest.

## Factors Related To Hypertension

There are at least ten major risk factors related to hypertension (high blood pressure):

- Age. Studies have shown a tendency for blood pressure to increase with age. In a study among people 55 years and older, at least 59% had hypertension.
- Genetic influence. A substantial number of people are born with a tendency towards hypertension. If one of your parents has high blood pressure you are twice as likely to have hypertension as someone whose parents have normal blood pressure.

- Ethnic background. For instance, in the USA, hypertension is much more prevalent among Negroes than among Caucasians.
- Gender. Typically, during the first part of their lives, men have higher blood pressure measurements than women. Then, as women move into their sixties, they catch up to and then exceed the measurements of the men. Usually, women suffer fewer complications from the same levels of hypertension than do men.
- Salt (sodium) Sensitivity. About half of those with hypertension are salt-sensitive. That is, their blood pressure rises when they consume excessive amounts of salt (sodium), and drops when they reduce their salt (sodium) intake.
- Obesity. Important scientific investigations have linked hypertension with obesity. In the 'Framingham Heart Study', patients who were 20% or more over their ideal weight were eight times more likely to become hypertensive. Excess upper-body fat has been associated with other threats to health, including:
  - Diabetes.
  - Hypertriglyceridemia (excessive levels of triglycerides, a fatty substance in the blood).
  - Low levels of HDL ('good') cholesterol, which is associated with protection against atherosclerosis (the build-up of fatty deposits in the blood vessels).
  - Coronary heart disease.
- Alcohol Abuse. Drinking any amount of alcohol, no matter small, has the potential to elevate blood pressure. However, research has indicated that some individuals are more alcohol-sensitive than others.
- Stress. Research has indicated that there is a definite connection between stress and hypertension. So, stress is now regarded as a definite risk factor for hypertension.
- A Sedentary lifestyle. Research concludes that the more physically fit you are, the less likely you are to suffer from hypertension. Conversely, the more sedentary you are, the greater is your risk of developing hypertension.
- Nutrition and element intake. This includes high creatinine levels (a substance produced when muscle tissue is broken down by the body, transported by the blood, and excreted in the urine), caffeine, smoking, fats, low dietary fibre, low potassium, and low calcium.

### Disease Process

Hypertension is a disease of the vascular regulatory system, in which the mechanisms that usually control arterial pressure within a certain (normal) range are altered/malfunctioning. The central nervous system and renal pressor system, as well as extracellular volume, are the predominant mechanisms that control arterial pressure. Thus, some combination of factors effects changes in one or more of these systems, ultimately leading to increased cardiac output and increased peripheral resistance. This elevates the arterial pressure, reducing cerebral perfusion and the cerebral oxygen supply, increasing the myocardial workload and oxygen consumption, and decreasing the blood flow to/and oxygenation of the kidneys.



### Potential Complications

Complications of hypertension include atherosclerotic disease, left ventricular failure, cerebrovascular insufficiency with or without stroke, retinal hemorrhage, and renal failure. When the pathologic

process is accelerated, malignant hypertension results, the blood pressure becomes extremely high, and nephrosclerosis, encephalopathy, and cardiac failure rapidly ensue.

### Treatment

- Treatment of underlying disease in secondary hypertension
- Systematic exercise
- Restriction of dietary sodium
- Decreased alcohol intake
- Quitting smoking, stress reduction
- Weight loss, if indicated
- Regular monitoring of blood pressure
- Adopting an appropriate dietary regime
- Taking appropriate medications/supplements
- Monitoring for potential long-term complications

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### How to Take a Blood Pressure Measurement

#### Using a Traditional Measuring Device

Blood pressure readings can be self-taken or taken by another person, and are measured as follows:

- To measure blood pressure there will be a measuring device (Sphygmomanometer - mercury based or aneroid type (picture right - aneroid type measuring device)) and a stethoscope (some measuring devices have the stethoscope 'built-in').
- Blood pressure is measured in terms of millimetres of mercury (mm Hg). The reading is made by either observing a column of mercury or a dial on the measuring device.
- The cuff, containing the bladder, of the measuring device is carefully wrapped around the upper arm. The cuff should be placed with the bladder part covering as much of the inside of the upper arm as possible.
- The stethoscope (picture right) is placed (if not built in) on the inside of the upper arm, just above the elbow joint.
- The measuring device is pumped, and the cuff bladder inflates (picture below) and restricts the blood vessels in the upper arm. The measuring device is pumped until the pulse beat detected by the stethoscope disappears (e.g.  $\leq 160$ mm Hg).
- The measuring device is slowly deflated, releasing the air out of the cuff bladder, at a rate of 2 to 3mm Hg per second (or heartbeat).
- When the deflation reaches a certain point the blood begins to rush back into the closed off blood vessels. This flow will cause a beat or thumping sound to be detected through the stethoscope. This is known as 'Korotkoff Phase 1'. This sound signals the point at which the body's blood pressure



overcomes the cuff resistance. This is the marker for the **SYSTOLIC** blood pressure reading. The reading (e.g. 130mm Hg) is taken by observing the mercury level or the dial on the measuring device.

- The deflation process continues, and the beat continues to be detected through the stethoscope. Precisely at the point when the beat stops, known as 'Korotkoff Phase 5', again the mercury level or dial reading is noted. This reading (e.g. 80mm Hg) represents the **DIASTOLIC** blood pressure.
- The two-figures 130mm Hg and 80mm Hg are combined into the final result, 130/80mm Hg. This is then read as, 'one-thirty-over-eighty'.
- The measuring device-cuff is allowed to deflate completely, and is removed from the upper arm.

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### Interpretation

The following tables can be used to interpret the measurements:

<b>CLASSIFICATION OF BLOOD PRESSURE IN ADULTS 18 YEARS AND OLDER</b>		
Blood Pressure Range Mm Hg (Millimetres of Mercury)	Category	Follow up by Doctor
<b>Systolic Blood Pressure, when Diastolic is less than 90 mm Hg</b>		
Less than 140 mm Hg	Normal	Recheck within 2 years
140 - 159 mm Hg	Borderline Isolated Systolic Hypertension	If Systolic is in 140 - 199 mm Hg range, confirm within 2 months.  If Systolic is at or above 200 mm Hg, evaluate or refer promptly to source of care within 2 weeks.
Greater than 160 mm Hg	Isolated Systolic Hypertension	
<b>Diastolic Blood Pressure</b>		
Less than 85 mm Hg	Normal	Recheck within 2 years
85 - 89 mm Hg	High Normal	Recheck within 1 year
90 - 104 mm Hg	Mild Hypertension	Confirm within 2 months
105 - 114 mm Hg	Moderate Hypertension	Evaluate or refer promptly to source of care within 2 weeks
Greater than 115 mm Hg	Severe Hypertension	Evaluate or refer immediately to source of care

<b>CLASSIFICATION OF BLOOD PRESSURE IN CHILDREN AND ADOLESCENTS</b>	
Note: The following levels of blood pressure have been proposed as the upper limits of normal.	
Age in Years	Blood Pressure in Millimetres of Mercury (mm Hg)
15 - 18 years	135/90 mm Hg
11 - 14 years	125/85 mm Hg
6 - 10 years	120/80 mm Hg
Below 6 years	110/75 mm Hg

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### Automatic Measuring Devices

Today, there are diverse blood pressure measuring devices. For automatic devices, carefully follow the operating instructions for posture, bladder placement, and activation, etc. When activated, the device automatically inflates the cuff, takes the relevant measurements, and displays the results (Systolic Pressure, Diastolic Pressure, and Heart Rate) on a small screen. The cuff is then completely deflated and the device is again ready for use.

With an automatic device, the cuff is typically fitted around the wrist (picture right) or the upper arm.



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**Appendix**  
**Hypotension**

**Hypotension (Low Blood Pressure)**

By most current standards, the average normal blood pressure reading for adults is 120/80 mm Hg.

The National Institutes of Health consider readings down to 110/70 mm Hg safe for most individuals.

In general, if an individual is not on antihypertensive medication and has measurements of 100/70 or below, they have entered the realm of hypotension (low blood pressure).

**Factors Related To Hypotension (Low Blood Pressure)**

There are three major factors related to hypotension (low blood pressure):

- 1) Over-medication.
- 2) Non-drug-related postural hypotension. This occurs on standing.
- 3) Other cardiovascular or organic problems (e.g. haemorrhage in the stomach, heart attack, problem with blood flow to the lungs, tumour, etc).

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