

LEARNING MADE EASY

# 100 Questions

& Answers

## About High Blood Pressure

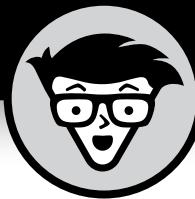
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**Simon Poole, MD**

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Mediterranean Lifestyle Ambassador





# 100 Questions & Answers About High Blood Pressure

by **Simon Poole, MD,  
and Amy Riolo**

for  
**dummies**<sup>®</sup>

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# 100 Questions & Answers About High Blood Pressure For Dummies®

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# Introduction

Early half of all American adults have high blood pressure. Some people don't discover they have dangerously high blood pressure until they have a stroke or heart attack. But the good news is: Checking and monitoring blood pressure is simple, and treatments are effective. We wrote this book to answer common questions about high blood pressure — what blood pressure is, what causes it to be high, the complications it can cause, and the treatment options available, from lifestyle changes to medication.

## About This Book

This book is a reference, which means you don't need to read the chapters in order from beginning to end and you don't have to remember anything — there isn't a test at the end of it.

Within this book, you may note that some web addresses break across two lines of text. If you're reading this book in print and want to visit one of these web pages, simply key in the web address exactly as it's noted in the text, pretending as though the line break doesn't exist. If you're reading this as an e-book, you've got it easy — just click the web address to be taken directly to the web page.

# Foolish Assumptions

In writing this book, we made just a couple of assumptions about you, the reader:

- » You have high blood pressure or know someone who has high blood pressure.
- » You have questions, and you want answers.

If those basic assumptions apply to you, you've come to the right place.

## Icon Used in This Book



When you see the Tip icon, you'll find information that will make your life a little easier, at least when it comes to high blood pressure.

## Where to Go from Here

If you aren't sure where to begin, head to the Table of Contents and skim through the questions until you find one that catches your eye. Or, if you have a specific topic in mind, search for it in the Index. Want to know absolutely everything? Turn the page and start in with Part 1.

# 1 **Understanding High Blood Pressure**

## IN THIS PART . . .

This part explains what blood pressure is, what causes it to be high, and what the risk factors are for developing high blood pressure. It also explains how high blood pressure is diagnosed. If you've recently received a diagnosis of high blood pressure or you have a family history of the condition, this part is for you.

## DID YOU KNOW?

*If all your blood vessels were laid end to end, they'd stretch over 60,000 miles. Your blood pressure helps keep blood moving through every inch of those blood vessels.*

# Chapter **1**

# Defining High Blood Pressure

Every time you visit your doctor's office, you probably have your blood pressure taken. Odds are, you know it shouldn't be high, but you may not know what blood pressure is, what counts as high blood pressure, what happens if your blood pressure is high, and whether you can prevent high blood pressure. If so, you've come to the right chapter. Read on!

## What Is Blood Pressure?

Every cell in the body requires a steady supply of blood carrying oxygen and essential nutrients to function, grow, and repair. The heart pumps blood through the *circulatory system*, a network

of blood vessels called *arteries*. Blood pressure is the force of the blood pushing against the walls of the arteries as the heart pumps it around the body. Blood pressure rises and falls with each heartbeat and can be affected by factors such as age, weight, fitness level, stress, and the health of the blood vessels themselves.

## What Is Systolic Blood Pressure?

Systolic blood pressure is the higher number of the two given in a blood pressure reading, representing the peak pressure in the arteries. This occurs at the precise moment the heart contracts and pumps blood out to the body through the circulatory system. It reflects the pressure on artery walls during the heart's active pumping phase.

For most adults, a systolic reading below 120 millimeters of mercury (abbreviated mmHg) is generally considered normal. However, a consistently high systolic blood pressure is typically diagnosed only after several readings are taken, often in different settings and at various times, to account for temporary fluctuations and ensure accuracy.

# What Is Diastolic Blood Pressure?

Diastolic blood pressure is the bottom number in a blood pressure reading. It measures the pressure in arteries while the heart is relaxing between beats. During this time, the heart refills with blood and prepares for the next contraction, so diastolic pressure gives an important indication of the health and flexibility of blood vessels as they maintain pressure and accommodate blood flow during this resting phase. A normal diastolic reading is generally below 80 mmHg.

Systolic blood pressure often receives more attention, especially because it can rise considerably in older adults due to age-related stiffening of the arteries, diastolic blood pressure is still crucial, particularly for younger people. High diastolic blood pressure can be an important factor in assessing overall cardiovascular risk because persistently raised pressure during the heart's resting phase indicates that the arteries are less able to relax and expand, leading to a constant strain on and potential damage to artery walls.

# What Is High Blood Pressure?

High blood pressure, also known as *hypertension*, is a situation in which the force of circulating blood pushing against artery walls is consistently

higher than normal. This extra pressure can result in arteries and organs being damaged. It also forces the heart to work harder than it should to pump blood through the circulatory system.

## What Are the Symptoms of High Blood Pressure?

High blood pressure is sometimes called the “silent killer” because it usually doesn’t cause noticeable symptoms, even when it reaches dangerously high levels.

Rarely, particularly when blood pressure rises to dangerously high levels in a condition known as *hypertensive crisis* or *malignant hypertension*, people may experience headaches, dizziness, nosebleeds, blurred vision, or shortness of breath.

High blood pressure is sometimes diagnosed when a person develops complications of high blood pressure such as organ damage in the form of heart disease, stroke, or kidney failure.

Because there are often no symptoms of high blood pressure, people over 40 years of age, as well as those with risk factors such as obesity, a family history of high blood pressure, or other health conditions, should have their blood pressure checked regularly. Early detection and management can prevent serious complications.



Many people live with high blood pressure for years without realizing it, which is why regular checkups are so important.

## How Can High Blood Pressure Affect Your Health?

High blood pressure can have serious long-term consequences for health. Over time, the increased pressure can damage the walls of arteries, making them less flexible and more prone to blockages or ruptures. This occurs because the constant high pressure causes small injuries to the inner lining of the arteries, which triggers inflammation and the buildup of fatty deposits called *plaques*, made up of cholesterol, fat, calcium, and other substances accumulating within the artery walls. The process of plaque development is known as *atherosclerosis*.

Inflammation plays a key role in atherosclerosis, because it attracts immune cells, resulting in further damage. As plaques develop and grow larger, they can narrow or even block arteries, reducing blood flow to vital organs and tissues. This can lead to cardiovascular disease, where the blood supply to essential organs is compromised, resulting in life-threatening or life-altering conditions such as heart attack, stroke, heart failure, dementia, kidney disease, and peripheral artery disease.

Another consequence of high blood pressure can be to cause strain to the heart, weakening

its ability to pump blood efficiently through the circulatory system, especially if atherosclerosis is affecting the arteries that supply blood to the heart itself.

## Can High Blood Pressure Be Prevented?

A combination of diet and lifestyle strategies can help to prevent high blood pressure. Evidence shows that maintaining a healthy body weight, eating a healthy diet, exercising, and properly managing stress can help to prevent heart disease.

The ideal diet focuses on fresh vegetables and fruits, whole grains, lean proteins, and extra-virgin olive oil. Processed foods, trans fats, excess sodium, and sugary drinks should be avoided. Depending on your individual risk factors, you should reduce your sodium intake to less than 1,500 to 2,300 milligrams per day.

Aim for 150 minutes of moderate-intensity exercise or 75 minutes of vigorous exercise per week, and get seven to nine hours of quality sleep per night to help to keep high blood pressure at bay.

# What Causes Blood Pressure to Fluctuate throughout the Day?

Blood pressure naturally rises and falls throughout the day in response to normal activities. Physical movement, emotional stress, meals, and even talking can temporarily increase blood pressure, while rest and relaxation generally brings it down. Blood pressure also follows a daily pattern, usually dipping at night and rising again in the morning as the body becomes more active.

These fluctuations are normal, but consistently high readings at different times of day may suggest an underlying problem. Understanding these variations helps you and your doctor interpret blood pressure measurements more reliably and determine whether changes are due to everyday influences or a sign that treatment may be needed.



## DID YOU KNOW?

*For approximately 90 percent of people with high blood pressure, there is no single cause. Instead, a combination of lifestyle, genetics, stress, and environmental factors contributed to their developing high blood pressure.*

# Chapter **2**

# Identifying the Causes and Risk Factors for High Blood Pressure

Whether you already have high blood pressure or you have a family history of high blood pressure, you may be wondering what causes it and whether you're at risk. Some risk factors (like diet, exercise, and sleep) you can control; others (like age or family history) you can't. This chapter gives you the lay of the land.

# What Causes High Blood Pressure?

High blood pressure usually occurs from a combination of genetic, lifestyle, and environmental factors. When there is no single identifiable cause, it's described as *primary* or *essential hypertension*. Common risk factors include

- » Being overweight
- » Eating a poor diet, including consuming too much salt or alcohol
- » Leading a sedentary lifestyle
- » Smoking
- » Experiencing chronic stress
- » Growing older
- » Having a family history of the condition

In some situations, high blood pressure can be caused by an underlying medical condition such as kidney disease, hormonal imbalances, or certain medications. This is called *secondary hypertension*. Identifying and treating these underlying causes can often help lower blood pressure.

## What Are the Risk Factors for High Blood Pressure?

A number of factors can increase your chances of developing high blood pressure. Lifestyle choices play a significant role. Having a poor-quality

diet (including consuming too much alcohol or salt), being overweight, smoking, and having a sedentary lifestyle are all known to contribute to raising blood pressure. Stress, poor sleep quality, and some chronic health conditions such as diabetes or kidney disease have also been shown to be associated with higher risk.

Factors that are outside a person's control, such as increasing age, family history, and ethnicity, are known to influence risk. For example, individuals of African or Caribbean descent and those over age 65 are more prone to developing high blood pressure.

## Can High Blood Pressure Be Hereditary?

High blood pressure can have a hereditary component, with a combination of genetic predisposition, lifestyle, and environmental factors usually contributing to its development. Many genes, each with a small effect, are thought to be involved, which is why having a family history of high blood pressure may slightly increase your risk, though healthy lifestyle choices can prevent or delay the development of high blood pressure.

In much rarer cases, high blood pressure can be directly caused by mutations in single genes, which may affect particular metabolic pathways, leading to *monogenic hypertension syndromes*. These conditions, unlike the more common

primary hypertension, follow clear inheritance patterns and often present with severe or early-onset high blood pressure.

## How Does Age Affect Blood Pressure?

As people age, blood pressure often increases. This happens because blood vessels naturally become stiffer and less flexible with age, making it more difficult for blood to flow smoothly. Other age-related changes such as weight gain, reduced physical activity, or chronic diseases can also contribute to higher blood pressure.

Early detection and management of rising blood pressure with age can help prevent complications such as heart disease and stroke. However, management guidelines may take into account other factors such as a greater likelihood of serious side effects of medication. In other words, your doctor may allow your blood pressure to be slightly higher but still controlled in order to balance the benefits of treatment with potential adverse reactions.

Not everyone who has high blood pressure, especially if it's mild, will go on to develop complications, and this process may take many years. For this reason, it's important to balance the benefits of optimum blood pressure control with the risk of harm and effects of treatment on your quality of life. For some people, the potential benefits of aggressive blood pressure lowering

may be outweighed by the risk of adverse effects like dizziness or falls, particularly as medication regimens become more complex.



TIP

Your doctor should tailor your treatment plan to your specific needs, balancing the potential benefits against your individual circumstances and overall health.

## How Can Drugs Affect Blood Pressure?

Various types of drugs can either raise or lower blood pressure. Blood pressure medications (for example, ACE inhibitors, beta blockers, and diuretics) are specifically designed to lower blood pressure. Medications that lower blood pressure are also often used to reduce the risk of complications of cardiovascular disease.

Some medications — including decongestants, certain pain relievers (including nonsteroidal anti-inflammatory drugs [NSAIDs], like ibuprofen), some antidepressants, and many birth control pills — may increase blood pressure in some individuals. Nonmedical drug use, such as taking cocaine or amphetamines, can cause dangerous spikes in blood pressure and pose significant risks.



TIP

Medications used for other conditions may have the side effect of lowering blood pressure. If you're prescribed these drugs and you're already taking medication to treat high blood pressure,

there is a potential risk that your blood pressure may become too low, resulting in side effects like dizziness, falls, or even loss of consciousness.

## How Does Smoking Affect Blood Pressure?

Smoking is harmful to your health and can lead to high blood pressure. If you smoke, especially if you have high blood pressure, you should quit smoking.

The chemical ingredients in cigarettes that cause them to increase blood pressure include

- » Nicotine (which also increases heart rate)
- » Carbon monoxide, a poisonous gas in cigarette smoke that damages the lining of blood vessels
- » Tar and other chemicals in smoke, which can build up in the blood vessels, cause them to narrow, and increase blood pressure

## Can Alcohol Consumption Impact Blood Pressure?

Moderate and excessive alcohol consumption can have a significant impact on blood pressure. People with high blood pressure or a family

history of it should limit their alcohol intake. If you already have high blood pressure, or if you're particularly sensitive to the effects of alcohol, even moderate consumption (up to one drink per day for women and up to two drinks per day for men) can increase blood pressure.

One exception to this rule may occur with the consumption of red wine. The high level of *polyphenols* (health-boosting compounds) found in red wine can relax blood vessels and improve blood flow, so moderate red wine consumption may have a beneficial effect on blood pressure. That said, if you don't already drink, you shouldn't start drinking red wine in an attempt to lower blood pressure.

In general, alcohol consumption increases the production of a hormone called *renin*, which raises blood pressure. It also releases hormones that constrict blood vessels and increase heart rate by stimulating the nervous system. Alcohol has a dehydrating effect on the body, which can also cause elevated blood pressure.



TIP

The more alcohol you drink, the more your blood pressure will increase.

## Can Diet Affect Blood Pressure?

A poor diet can negatively affect blood pressure levels. On the other hand, a diet rich whole grains, vegetables, fruits, nuts, seeds, and fish,

along with lean protein and plenty of fresh herbs and spices, can help prevent high blood pressure.



TIP

Processed and packaged foods provide most of the sodium in people's diets, so eliminating these foods can have a significant impact on blood pressure. Skip items labeled *low fat* and *low sugar* — they often contain more sodium than the traditional varieties.

The Mediterranean diet and the Dietary Approaches to Stop Hypertension (DASH) diet have been proven to be effective in lowering and preventing high blood pressure.



TIP

Talk with your healthcare provider before making significant dietary changes, especially if you have high blood pressure or kidney disease. You may also want to consult with a nutrition professional to help tailor a meal plan to your specific needs.

## How Does Lack of Exercise Lead to High Blood Pressure?

Lack of exercise can cause inflammation, weight gain, and difficulty managing stress and sleeping well, which in turn can lead to high blood pressure. Conversely, exercise can reduce high blood pressure and prevent high blood pressure in the first place.

Getting 150 minutes of moderate-intensity exercise or 75 minutes of vigorous exercise per week, along with seven to nine hours of quality sleep per night, will help to keep high blood pressure at bay. Various types of exercise can lower blood pressure:

- » **Aerobic exercise:** Continuous, rhythmic activity that increases heart and breathing rate
- » **High-intensity interval training (HIIT):** Short bursts of vigorous activity alternated with brief recovery periods
- » **Dynamic resistance training:** Movement-based strength exercises that involve lifting or moving weights through a full range of motion
- » **Isometric exercise:** Static muscle contractions held without movement, such as pressing against an immovable object like a wall



TIP

If you have very high or low blood pressure, consult a healthcare professional before beginning an exercise regimen. Exercising causes blood pressure to increase while you're performing it. Systolic blood pressure (the top number) can significantly increase during cardiovascular exercise, sometimes over 200 mmHg. Diastolic blood pressure (the bottom number), on the other hand, usually remains stable or may even decrease slightly.



TIP

Temporary moderate increases in blood pressure during exercise are normal and beneficial for blood pressure and other aspects of health in the long term.

## Does Stress Lead to High Blood Pressure?

Poorly managed stress can lead to high blood pressure. On the other hand, managing stress can reduce it. When you experience stress, the body releases hormones such as adrenaline and cortisol, which can cause the body to retain sodium and water, increase heart rate, and restrict blood vessels.

A particular stressful event may cause blood pressure to increase temporarily, lasting from a few minutes to hours. Poorly managed chronic stress, on the other hand, causes prolonged elevations in blood pressure, which can cause high blood pressure.

Stress effects each individual differently. How much stress increases blood pressure has to do with the intensity of the stressor, your baseline blood pressure, as well as your overall health and how you cope with stress. Stress can also lead to unhealthy coping behaviors such as overeating, smoking, or excess alcohol use.



TIP

Eating a healthy diet, exercising, doing yoga, practicing breath work, meditating, getting enough sleep, socializing with friends, getting plenty of fresh air, and pursuing activities that

you enjoy can all help you to manage stress better. If you aren't able to manage stress on your own, seek out advice from your healthcare provider and consider therapy.

## Can Unresolved Trauma Lead to High Blood Pressure?

Unresolved trauma causes an increase in stress hormones like cortisol and adrenaline because the body is in a constant state of “fight-or-flight.” Childhood trauma has been linked to high blood pressure in adults not only because it increases traditional risk factors (such as obesity), but because of the direct physiological effects of the trauma.

The surge in stress hormones caused by unresolved trauma can cause the heart and blood vessels to work harder, leading to increased heart rate and elevated blood pressure. They also increase inflammation, which can damage blood vessels over time and increase the risk of cardiovascular disease. Trauma causes those who experience it to be “stuck” in a high-alert state, making them increasingly sensitive to stressors.

## How Does Salt Intake Affect Blood Pressure?

Excessive salt intake is believed to negatively impact blood pressure levels because it can cause the body to retain water, which increases blood

volume. Increased blood volume causes more pressure on blood vessel walls, which makes the heart work harder. Over time, this can cause stiffer blood vessels.

Some people seem to be more sensitive to salt, meaning that their blood pressure rises significantly when they eat salt; other people, who are *salt-resistant*, see little change. This difference is caused by a mix of factors, including genetics (which affect how the kidneys handle salt), age, ethnicity, weight, and general health.

Consuming too much salt can also lead to *vascular remodeling* (structural changes in the blood vessel walls that make them stiffer or thicker) and other physiological changes that cause high blood pressure.

## What Is the Role of Inflammation in High Blood Pressure?

A great deal of evidence shows that chronic, low-grade inflammation can lead to high blood pressure.

Inflammation can cause damage to cells and proteins. Inflammation can harm the natural balance between substances that dilate and constrict blood vessels. It also causes smooth muscle cells to increase, causing less flexible artery walls. When blood vessels tighten, blood pressure rises.

Chronic inflammation can lead to organ damage, which in turn affects blood pressure. It has also been known to cause the kidneys to retain sodium and water, which, in turn, increases blood pressure.

## What Is White-Coat Syndrome and Why Does It Matter?

*White-coat syndrome* is a condition in which a person's blood pressure readings are higher in a medical setting than they are at home, often because of anxiety or stress during a medical appointment. Many people feel nervous when visiting a doctor, and this temporary rise in blood pressure can make it seem as though their blood pressure is consistently high when it may not be.

Although white-coat syndrome is usually harmless because the rise only occurs in limited situations, it still matters because it can sometimes mask the early stages of true high blood pressure or lead to unnecessary treatment.



Home or ambulatory blood pressure monitoring can help confirm whether the higher readings are due to the clinical environment or reflect a genuine ongoing issue.



## DID YOU KNOW?

*Your blood pressure can change depending on where it's taken. Readings at the doctor's office are often higher than they are at home. As many as 20 percent of people have white coat syndrome, in which just being in a doctor's office causes their blood pressure to rise.*

## Chapter 3

# Diagnosing High Blood Pressure

The diagnosis of high blood pressure is fairly straightforward. In fact, the first accurate way to measure blood pressure was invented in 1896, and it still forms the basis of modern devices today. This chapter explains how blood pressure is measured, how high blood pressure is detected, and when you should talk to a healthcare provider about high blood pressure.

# How Is High Blood Pressure Usually Detected?

High blood pressure is often detected during routine health checks or medical appointments, because it rarely causes noticeable symptoms. Many people first learn they have high blood pressure when a doctor or nurse measures it as part of a standard physical exam.

High blood pressure can also be detected in community health campaigns, workplace wellness programs, or at pharmacies that offer blood pressure monitoring services.



TIP

You can use a blood pressure monitor to periodically check yourself at home, making it possible to diagnose high blood pressure before complications develop.

# How Is Blood Pressure Measured?

Blood pressure is usually measured using a machine called a *sphygmomanometer*, which consists of an inflatable cuff that wraps around the upper arm, usually attached to an electronic monitor or pressure display. The cuff is inflated to temporarily stop blood flow, and then gradually released while a healthcare professional listens for blood flow sounds with a stethoscope or a digital monitor records the pressure.

The result is given as two numbers — the systolic pressure over the diastolic pressure (for example, 120/80 mmHg).

## Why Is Blood Pressure Measured in Millimeters of Mercury?

The unit mmHg is short for *millimeters of mercury* (Hg is the chemical symbol for mercury). This is a measure of pressure that persists today as the standard, even though mercury rising in millimeters up a gauge is no longer used in most modern blood pressure monitors. This unit originated because the earliest accurate measurement devices, the mercury sphygmomanometers, physically gauged the pressure by seeing how high a column of mercury rose in millimeters. Although most modern monitors have abandoned liquid mercury for safety and portability, the mmHg reading is preserved to ensure that critical medical data remains historically consistent and universally comparable.

## What Is a Blood Pressure Cuff?

A blood pressure cuff is part of the sphygmomanometer used to measure blood pressure. The cuff is typically made of a sturdy fabric band,

designed to be wrapped and secured snugly around the upper arm and connected to a measuring device. When the cuff is inflated, it compresses the main artery to the lower arm, temporarily stopping blood flow. As the cuff is gradually deflated, sensors in an automatic machine (or a trained healthcare provider listening through a stethoscope) can detect the pressure changes in the artery, allowing for the calculation of both systolic and diastolic blood pressure values.



TIP

The fit of the cuff is crucial for obtaining accurate readings. If the cuff is too large or too small, it will lead to incorrect measurements. Small, medium, or large cuffs are indicated for different arm circumferences. Regular calibration and proper use of the cuff are important to ensure reliable results and effective blood pressure management.

## How Often Should Blood Pressure Levels Be Checked?

How often you should check your blood pressure depends on your age and overall state of health. Healthy adults with normal blood pressure should have it checked at least once every year or two. If you have a history of heart disease or risk factors like diabetes, obesity, or smoking, your doctor may recommend more frequent checks — perhaps every few months — and they'll often advise that you use a blood pressure machine at home.

People already diagnosed with high blood pressure need to monitor it regularly, perhaps weekly or even more frequently, especially when starting or adjusting treatment, to help keep it under control.

## What Is Considered a Normal Blood Pressure Level?

A normal blood pressure level is typically below 120/80 mmHg, though what's considered an acceptable level takes into account variations in readings, the circumstances in which measurements are taken, and other factors such as age. Blood pressure between 120 and 129 mmHg systolic (the upper number) and less than 80 mmHg diastolic (the lower number) is considered elevated, and readings of 130/80 mmHg or higher are generally classified as high blood pressure.



TIP

Keeping your blood pressure in the normal range helps reduce the risk of heart disease, stroke, and other serious health problems.

## How Is High Blood Pressure Diagnosed?

High blood pressure is usually diagnosed by identifying several high blood pressure measurements over time.



TIP

A single high reading doesn't necessarily mean you have high blood pressure, because blood pressure can temporarily rise due to stress, caffeine, alcohol, certain drugs, or with strenuous physical activity.

To confirm a diagnosis, a series of measurements should be taken over time and in different settings, perhaps through home monitoring. In some cases, a 24-hour test called *ambulatory blood pressure monitoring* may be used to track your blood pressure with a machine that you wear and that regularly records your blood pressure throughout the day and with different activities.

Diagnosis is based on whether your readings consistently fall at or above the threshold for high blood pressure, which is 130/80 mmHg or higher.

When levels are very high and pose a more immediate risk of complications, high blood pressure may be diagnosed more rapidly.

## How Reliable Is a Single High Blood Pressure Measurement?

A single high blood pressure reading is not always reliable because several factors can cause a temporary increase. Taking a number of readings over time gives a much more accurate

understanding of long-term blood pressure levels and a much better appreciation of whether the levels pose a risk of complications. However, a single reading that is very high does increase the likelihood that high blood pressure is present, so it should always be taken seriously.

If one reading is unusually high, your doctor may ask you to return for follow-up checks or tell you to monitor your blood pressure at home to get a clearer picture.

## When Should You Seek Medical Care about High Blood Pressure?

You should seek medical care if your blood pressure is high for the first time in a screening setting or while testing at home with readings that are consistently elevated at levels generally considered to be 130/80 mmHg or higher. If you experience symptoms such as chest pain, severe headache, shortness of breath, or vision changes (all of which may indicate a hypertensive crisis), you should seek urgent medical care.



TIP

Ask your healthcare provider to check your blood pressure if you have an increased risk of cardiovascular disease or a family history of high blood pressure.

If you've already been diagnosed with high blood pressure and you're receiving advice or

treatment and follow-up to manage it, your healthcare provider should tell you the threshold for when you should seek medical care to discuss the need to intervene with a change or increase in therapy. If they haven't given you this information, ask for it.



# Managing High Blood Pressure

## IN THIS PART . . .

This part covers all the ways you can manage and treat high blood pressure. It starts with lifestyle approaches — everything from exercise to meditation to managing stress and more. Then it covers the dietary changes you can make to reduce your blood pressure. It outlines the medications commonly used to treat high blood pressure. And it covers special situations: high blood pressure in pregnancy, in children, and in menopause.

## DID YOU KNOW?

***Walking briskly for just 30 minutes a day can sometimes lower your blood pressure as much as taking a pill.***

# Chapter **4**

# Lifestyle Approaches to Managing High Blood Pressure

Eating a healthy diet, getting enough quality sleep, and learning stress management techniques can help prevent and lower high blood pressure. This chapter explains the many steps you can take to lower your blood pressure without medication. Even if you need to take medication, these lifestyle changes are key to managing the condition. And the good news is, they aren't difficult. Dare we say it? Yes, we do: You may even enjoy them!

# Can High Blood Pressure Be Managed without Medication?

For many people, particularly those whose high blood pressure is detected early or is mild, and who have few or no other risk factors like existing heart disease or diabetes, it may be possible to manage the condition without medication. Lifestyle changes, such as adopting a better diet, increasing physical activity, losing weight, reducing alcohol intake, quitting smoking, and managing stress, can be very effective. For these folks, health professionals may recommend a period of several months of lifestyle interventions and regular monitoring (taking and recording blood pressure readings regularly). Periodic reviews are important to assess whether these strategies are sufficient or if additional treatment is needed, especially because people who have been through a time when their blood pressure has been high are at greater risk of developing high blood pressure years later.



TIP

Making healthy lifestyle changes not only is great for blood pressure control, but also has much wider benefits, so even if these steps aren't enough to help you achieve an optimum blood pressure, they'll reduce your risk of cardiovascular disease and other diseases.

# Which Lifestyle Changes Can Help Lower Blood Pressure?

The proper diet and lifestyle can help to lower blood pressure. Following an anti-inflammatory diet, such as the Mediterranean diet or Dietary Approaches to Stop Hypertension (DASH), has been shown to lower blood pressure.

Getting seven to nine hours of quality sleep, managing stress (by doing yoga, practicing breath work, meditating, practicing gratitude, and/or napping), enjoying time with others, and engaging in pleasurable activities are all excellent ways to lower blood pressure.



If making lifestyle changes is difficult for you, you don't have to do it alone. Consider seeking the help of your healthcare provider for your specific needs. Nutrition professionals can help you determine the proper meal plan, while therapists and coaches can help you overcome obstacles, release old patterns, and develop better habits.

## How Does Weight Loss Impact Blood Pressure?

Weight loss can significantly reduce blood pressure. Losing just 5 percent to 10 percent of body weight has been shown to lower blood pressure by 5 to 10 mmHg. The magnitude of reduction

depends on your baseline weight, the amount of weight loss, and your salt sensitivity. Benefits from the weight loss have also proven to be sustained over time.

Combined with other healthy lifestyle changes — such as exercise, stress management, and a healthy diet — weight loss can significantly reduce the risk of heart disease.



TIP

Talk with your healthcare provider to determine your ideal weight and weight loss options, if necessary.

## Can Stress Affect Blood Pressure?

Both stressful situations and prolonged periods of stress cause dysregulation of stress hormones like cortisol and adrenaline because the body is in a constant state of “fight-or-flight.”

The increase in stress hormones can cause the heart and blood vessels to have to work harder, leading to increased heart rate and elevated blood pressure. They also increase inflammation, which can damage blood vessels over time and increase the risk of cardiovascular disease.

In addition to the body’s direct response from stress, there are also indirect consequences of stress that impact blood pressure, such as the increase in the likelihood of engaging in unhealthy behaviors that also contribute to high

blood pressure. Smoking, excessive alcohol consumption, overeating or poor diet, and lack of sleep and exercise can also be coping mechanisms for stress that can cause an increase in blood pressure and the development of high blood pressure.

## What Is the Role of Exercise in Managing Blood Pressure?

Exercise plays a major role in managing blood pressure. Getting enough exercise can help prevent high blood pressure and help you lower your blood pressure if you've already been diagnosed. Just 150 minutes of moderate-intensity exercise or 75 minutes of vigorous exercise per week, along with seven to nine hours of quality sleep per night, will help to keep high blood pressure at bay.

Various types of exercise can lower high blood pressure levels:

- » **Aerobic exercise:** Continuous, rhythmic activity that increases heart and breathing rate
- » **High-intensity interval training (HIIT):** Short bursts of vigorous activity alternated with brief recovery periods
- » **Dynamic resistance training:** Movement-based strength exercises that involve lifting or moving weights through a full range of motion

» **Isometric exercise:** Static muscle contractions held without movement, such as pressing against an immovable object like a wall



TIP

If you have very high or low blood pressure, consult a healthcare professional before beginning an exercise regimen. Exercising does cause blood pressure to increase while you're performing it.

## How Does Aerobic Exercise Affect Blood Pressure?

Aerobic exercises like brisk walking, dancing, swimming, jogging, and cycling strengthen the heart, improve cardiovascular health, and lower high blood pressure. The goal is to achieve a minimum of 150 minutes of moderate-intensity aerobic activity or 75 minutes of vigorous aerobic activity per week, spread out across most days.

Jumping rope provides a high-intensity cardio workout. Hiking, an activity that adds beneficial outdoor time, can also improve cardiovascular health and blood pressure.



TIP

Choose the forms of exercise that appeal to you most and try to enjoy them daily for maximum benefits and balanced blood pressure. The intensity of exercise should be consistent with your level of fitness. If in doubt, check with your doctor.

# Can Strength Training Help Lower Blood Pressure?

Strength training can be very effective in lowering blood pressure, especially for those who already have high blood pressure, but it needs to be done effectively to avoid putting strain on the heart.

Strength training improves cardiovascular health by increasing heart rate and blood flow. By strengthening heart and blood flow, it can help reduce the risk of cardiovascular disease associated with high blood pressure. Muscle mass gained from strength training can also help to lower blood pressure by increasing the body's ability to handle stress.



TIP

It's important that strength training doesn't cause your blood pressure to temporarily increase to unhealthy levels. Talk to your healthcare provider before beginning a strength-training regimen.

# How Does Yoga Help Lower Blood Pressure?

Practicing yoga is an effective means of lowering blood pressure. Yoga can increase oxygen intake and lower blood pressure by reducing stress and improving relaxation through a combination of physical poses, breathing exercises, and

meditation. It also helps to promote relaxation, decrease heart rate, and lower blood pressure by reducing stress hormones.

Consistent, gentle yoga practice has been shown to reduce systolic and diastolic blood pressure. In fact, yoga is one of the best forms of stress management.



TIP

Avoid or modify strenuous poses and inversions to prevent your blood pressure from rising.

## How Do Breath Work and Meditation Help Lower Blood Pressure?

Both breath work and meditation are excellent ways to manage stress, and they can both help lower blood pressure. The focus on breathing promoted by both breath work and meditation can strengthen the body's ability to take in oxygen, which in turn can help to lower blood pressure.

Breath work and meditation work by reducing stress and activating the body's relaxation response. Here are several techniques that may help to lower blood pressure:

- » **Diaphragmatic breathing:** Focusing on deep, slow breaths that fully engage the diaphragm, which stimulates the vagus nerve and promotes relaxation

- » **Mindful meditation:** Paying nonjudgmental attention to the present moment, which reduces stress hormones and calms the nervous system
- » **Transcendental meditation (TM):** Using a silent mantra to settle the mind into a state of deep rest, leading to a decreased metabolic rate and lower stress
- » **Guided imagery:** Using mental visualization of peaceful or relaxing scenes to promote a calm, reduced-tension physical state
- » **Equal breathing (sama vritti):** Inhaling and exhaling for the same count, which creates a balanced, rhythmic breath pattern to soothe the autonomic nervous system

In most cases, breath work and meditation aren't stand-alone cures for high blood pressure. They're stress management and relaxation techniques that can help to prevent high blood pressure and, when combined with a healthy diet and lifestyle, can help to manage blood pressure levels.



TIP

You can learn more in *Breathing Exercises For Dummies* by Shamash Alidina (Wiley).



## DID YOU KNOW?

*An anti-inflammatory diet and healthy lifestyle can help prevent high blood pressure.*

## Chapter 5

# Dietary and Nutritional Interventions for High Blood Pressure

Proper nutrition plays an important role in lowering blood pressure and preventing high blood pressure in the first place by combining many small, individual, beneficial effects in a cumulative way. This chapter explains which diets work best for managing

blood pressure. It also explores how specific supplements, ingredients, and foods may help.

## What Is the Mediterranean Diet and How Does It Affect Blood Pressure?

Named the number-one diet for several consecutive years in a row by *U.S. News & World Report*, the Mediterranean diet can help to prevent and reverse a high blood pressure diagnosis. Known for its anti-inflammatory benefits, which can help to reduce blood pressure, the Mediterranean diet recommends a predominantly plant-based diet based on seasonal fresh produce, extra-virgin olive oil as the predominant source of fat, beans, legumes, seeds, nuts, lean protein, seafood, eggs, and dairy, with plenty of fresh herbs and spices for flavoring.

The Mediterranean diet, which is also a lifestyle, promotes communal eating and activities, plenty of physical exercise, and fresh air — all of which promote better sleep and stress management, essential components for lowering blood pressure.

Processed foods, sugary drinks, excess salt, and chemical additives are not a part of the Mediterranean diet. The fresh produce recommended in the diet also provides essential nutrients like magnesium and potassium, which have been shown to improve the body's ability to process sodium.

# How Does the DASH Diet Help to Manage Blood Pressure?

Sharing some common denominators with the Mediterranean diet, Dietary Approaches to Stop Hypertension (DASH) promotes the eating of vegetables, fruits, whole grains, poultry, nuts, and seeds. Rated the number-one diet for heart health and hypertension by *U.S. News & World Report* in 2025, it also advises limiting fatty meats, sugary beverages, and sodium.

Unlike the Mediterranean diet, DASH promotes the use of fat-free or low-fat dairy. It also allows for a weekly total consumption of more whole grains and animal-based protein than the Mediterranean diet does. DASH permits the use of vegetable oils and doesn't promote as much extra-virgin olive oil usage as the Mediterranean diet does. It also doesn't specify non-dietary lifestyle aspects of well-being that can help to keep blood pressure in check.

# What Is the Role of Magnesium in Managing Blood Pressure?

Studies have found that people who consume adequate amounts of magnesium in their diet have lower blood pressure. In addition, magnesium helps regulate the balance of sodium and

potassium in the body, which is essential for blood pressure control.

Magnesium helps relax blood vessels by blocking calcium channels, which are responsible for constricting blood vessels. This relaxation allows blood to flow more easily, lowering blood pressure.

Magnesium also has antioxidant properties that prevent the damage caused by oxidative stress (including damaging blood vessels and causing high blood pressure).



TIP

Some prescribed medications, including proton pump inhibitors used for indigestion or stomach problems, can cause low levels of magnesium.

If you're considering taking a magnesium supplement, consult with a healthcare professional first. They can help you determine if you need one and, if so, which variety of magnesium is right for you. They can also tell you if any possible interactions could occur.

## How Does Vitamin D Impact Blood Pressure?

Observational studies show a correlation between low vitamin D levels and higher blood pressure, but supplementing with vitamin D has not been shown to consistently lower blood pressure. Vitamin D helps to regulate certain essential minerals, such as calcium, which is essential

for blood vessel relaxation and contraction. Vitamin D's anti-inflammatory properties may help improve blood vessel health, and it may also improve vascular tone.

## What Is the Role of Herbal Supplements in Managing Blood Pressure?

Some people choose to support blood pressure treatment by taking herbal supplements. It's important to note that these shouldn't be used as direct substitutes for prescribed medicine.

The most popular herbal supplements currently being promoted to help lower blood pressure are

- » Berberine extract
- » Bergamot
- » Garlic
- » Ginger
- » Hawthorn berry extract
- » Hibiscus tea

The evidence of benefit of many herbal supplements is not yet well established due to a lack of robust scientific studies.



Consult with your healthcare provider before taking new supplements.

TIP

# What Is the Role of Antioxidants in Managing Blood Pressure?

Several antioxidants found in ordinary foods can help to lower blood pressure. Table 5-1 lists some examples, along with other benefits they provide.

**TABLE 5-1** Antioxidants and Their Benefits

Antioxidant	Found In	Other Benefits
Allicin	Garlic	Reduce arterial stiffness
Anthocyanins	Berries	Lower blood pressure and triglycerides
		Increase high-density lipoprotein (HDL) cholesterol
		Improve cognitive and vision function
Flavonoids and vitamin C	Citrus fruits, dark chocolate	Reduce oxidative damage
Lycopene	Tomatoes	Support heart health
		Reduce inflammation and oxidative stress
Nitrates	Leafy greens (such as kale, collards, and spinach), beetroot	Manage blood pressure

# Can Fermented Foods and Probiotics Help Lower Blood Pressure?

Fermented foods and probiotics can help to lower blood pressure by reducing inflammation, producing beneficial compounds like short-chain fatty acids, and improving vascular function. The efficacy of these foods appears to be greater in those with high blood pressure.

Fermented foods and probiotics improve the health of your gut's *microbiota* (microorganisms that live in the gut), which plays an important role in many aspects of health, including blood pressure regulation. No specific strain or dosage of fermented foods and probiotics is recommended for high blood pressure, because the specific needs are based on the individual's gut health. These foods should be incorporated as a part of a healthful diet and medically approved treatment plan.

# Can Polyphenols Help Prevent and Treat Blood Pressure?

*Polyphenols* are bioactive compounds (groups of health-boosting plant chemicals) that are found in plant foods known for their anti-oxidant, anti-inflammatory, and antibacterial effects. More than 8,000 polyphenols have been

identified to date. Diets like the Mediterranean diet that are rich in plant polyphenols are known to reduce the risk of high blood pressure and other health issues.

Polyphenols are often found in colorful and pungent foods like fruits, vegetables, herbs, and spices. Good-quality extra-virgin olive oil is known for containing particularly powerful polyphenols, such as hydroxytyrosol and oleuropein.

Some polyphenol-rich foods — including green tea, cocoa, berries, nuts, and soy products — have been shown to reduce blood pressure.



TIP

Consuming extra-virgin olive oil with those foods coaxes even more nutrients out of them.

## What Role Does Fiber Play in Managing Blood Pressure?

Fiber helps manage blood pressure in several ways: It promotes healthy weight management, improves blood flow, relaxes blood vessels, and improves gut health. Fiber is also known to bind to cholesterol to prevent it from being absorbed.

High-fiber diets, like the Mediterranean diet and DASH diet, are associated with lower blood pressure levels. Consuming fiber fosters healthy gut bacteria, which are known to produce short-chain fatty acids (SCFAs), and SCFAs have been shown to lower blood pressure. Fiber also leads

to improved blood flow and reduced pressure on arteries.

Foods rich in fiber are filling, so eating them helps people feel full faster, which can lead to weight loss. Excessive weight is linked to high blood pressure, so this is an important benefit.



TIP

Increase the fiber in your diet gradually to prevent digestive discomfort. And be sure to drink more water if you're consuming more fiber.

## How Do Saturated Fat and Trans Fats Affect Blood Pressure?

Some types of saturated fats and trans fats can negatively impact blood pressure because they're known to increase low-density lipoprotein (LDL) cholesterol (commonly known as the "bad" cholesterol). The buildup of plaque from cholesterol caused by some saturated fats and trans fats can make your arteries narrower and less flexible. It also causes hardened and narrow arteries, which forces the heart to work harder and puts more pressure on artery walls. Diets high in some types of saturated and trans fats can also contribute to weight gain, which is a major factor in blood pressure levels.

Regular and excessive consumption of saturated and trans fats is also known to cause weight gain, which causes high blood pressure.

# Can Omega-3 Fatty Acids Help Lower Blood Pressure?

Omega-3 fatty acids are believed to reduce inflammation, which contributes to high blood pressure. They also help blood vessels to relax, which lowers blood pressure. Omega-3 fatty acids may help to improve the function of the lining of blood vessels as well.

The Mediterranean diet relies on a few servings per week of seeds, walnuts, and fish, all of which are high in omega-3 fatty acids. People following that diet have lower rates of high blood pressure.



TIP

Consuming just 2 to 3 grams of omega-3 fatty acids per day lowered systolic blood pressure (the upper number in a blood pressure reading) by an average of 4.5 mmHg. Flax seeds, chia seeds, walnuts, and fish such as mackerel, tuna, and salmon are high in omega-3 fatty acids.

# What Are Plant Sterols and How Do They Affect Blood Pressure?

*Plant sterols* are naturally occurring compounds found in small amounts in fruits, vegetables, nuts, seeds, legumes, and extra-virgin olive oil. They have a chemical structure similar to cholesterol and work by blocking its absorption in

the intestine, which helps to lower LDL cholesterol. Because high cholesterol often accompanies or worsens high blood pressure, lowering cholesterol through dietary intake of plant sterols can indirectly support better blood pressure control and overall cardiovascular health.

Some research suggests that plant sterols may also have a modest direct effect on reducing blood pressure, likely due to their anti-inflammatory and antioxidant properties, which help improve the flexibility and function of blood vessel walls.



TIP

Including plant-sterol-rich foods as part of a heart-healthy diet, such as the Mediterranean diet or DASH diet, can contribute to lowering cholesterol and achieving healthier blood pressure levels.

## How Does Red Rice Yeast Affect Blood Pressure?

Recently, red rice yeast has gained media attention for its possible ability to lower blood pressure levels. It's even advocated by some doctors in the United States.

Red rice yeast products containing significant amounts of monacolin K may effectively help lower systolic blood pressure. Monacolin K is chemically similar to the active ingredient in the prescription cholesterol-lowering drug lovastatin. These types of medications work by

inhibiting an enzyme involved in cholesterol synthesis in the liver, which significantly lowers LDL cholesterol. This improvement in overall cardiovascular health and lipid profiles, which prevents vascular damage, can contribute to improved blood pressure regulation.



TIP

Because of the variation in quality of products, and the conflicting evidence on whether it's most effective when used alone or when combined with conventional blood-pressure-lowering therapies, be sure to consult your healthcare provider before deciding to take red rice yeast.

## Can Garlic Help Lower Blood Pressure?

Garlic contains an antioxidant called allicin that has been shown to reduce blood pressure. Allicin also has anti-inflammatory properties and helps to regulate blood pressure by inhibiting the production of an angiotensin-converting enzyme (ACE) that is involved in constricting blood vessels.

Garlic also is known to reduce oxidative stress, which damages blood vessels. It promotes the widening of blood vessels, a process called *vasodilation*, which can lower blood pressure.

Garlic has long been used as a folk remedy for helping to promote cardiovascular health.



TIP

Check with your healthcare provider to ensure that large quantities of garlic won't interact with any medications you may be taking.

## How Does Soy Protein Impact Blood Pressure?

Soy protein can lower blood pressure, especially in younger adults and people with higher blood pressure. It may lower blood pressure through mechanisms like producing amino acid chains and increasing nitric oxide production. When soy protein is digested, small chains of amino acids that can help to lower it are produced. *Isoflavones* (bioactive compounds found in berries, cruciferous vegetables, flaxseeds, legumes, soybeans, and soybean-based products) are believed to boost nitric oxide activity, which widens blood vessels and may reduce blood pressure.



TIP

Incorporating low-sodium soy products into a heart-healthy diet can be a positive way of managing blood pressure. Soy protein supplementation in the form of capsules and powders has been shown in some studies to reduce systolic and diastolic blood pressure, especially in those who have high blood pressure, though the evidence is not consistent and the effects are variable, so it's important to discuss this with your health professional.

# Can Green Tea Help Lower Blood Pressure?

Green tea has anti-inflammatory and antioxidant properties, both of which can lead to the reduction of blood pressure.

Antioxidants called catechins found in green tea may also relax blood vessels and reduce inflammation, which in turn leads to a decrease in blood pressure. Consuming green tea appears to be especially beneficial to people who already have high blood pressure.



TIP

Consuming two to three cups of green tea per day is recommended to lower blood pressure.

In recent years, green tea extract has become increasingly popular. It may also be effective, but be sure to consult with a healthcare professional before taking supplements.

# Can Bergamot Help Lower Blood Pressure?

Bergamot, a citrus fruit native to Calabria, Italy, may help lower blood pressure. You may not have eaten the fruit, but you may have tasted it in Earl Grey tea or smelled it as a base note in many of the world's most popular colognes. Bergamot contains antioxidants called *flavonoids*, which have been found to support *endothelial function* (the many

physiological duties of the thin layer of the cells that line the blood vessels) and *vasodilation* (widening of blood vessels). Bergamot has also been shown to reduce inflammation and oxidative stress, which plays a role in blood pressure management.

Aromatherapy using bergamot oil has been shown to lower stress, which may indirectly support blood pressure management. Outside of Southern Italy, bergamot is predominately enjoyed in supplement form, while in Italy it can be eaten as a fresh fruit or enjoyed in juice and other culinary products.



TIP

Consult with your doctor before taking supplements to avoid any potential interactions.



## DID YOU KNOW?

*There are more than 50 different blood pressure drugs, and it often takes some time and experimentation to find the best single or combination therapy for a person with high blood pressure.*

# Chapter 6

# Medications

# for High Blood

# Pressure

**H**igh blood pressure left untreated is dangerous, but the good news is that there are dozens of medications to treat high blood pressure. Your healthcare provider will likely be able to find exactly the right drug, or combination of drugs, to get your blood pressure under control. This chapter covers some of the many options for treating high blood pressure, their side effects, and what to expect from treatment.

# What Are the Best Treatment Options for High Blood Pressure?

The best treatments for high blood pressure are those that get your blood pressure under control with no adverse side effects, reduce the risk of complications of high blood pressure, and result in broad benefits to health beyond simply reducing blood pressure.

Lifestyle modifications (see the preceding chapter) can achieve all of these goals. Key life-style strategies include adopting a heart-healthy diet, getting enough exercise, managing your weight, limiting or entirely cutting out alcohol, quitting smoking, and reducing stress.

For many people, these changes can make a significant impact, but when blood pressure remains elevated or there are additional risk factors, doctors often recommend adding pre-scription medications. Individualized treatment plans take into account a person's overall health, age, and specific needs.

# What Medications Are Commonly Prescribed for High Blood Pressure?

There are several major groups of medications that work in different ways to help control blood pressure. These include diuretics, which help

the body eliminate excess fluid; angiotensin-converting enzyme (ACE) inhibitors and angiotensin receptor blockers (ARBs), which relax blood vessels; calcium channel blockers (CCBs), which help relax blood vessels and reduce the heart's workload; and beta blockers, which slow the heart rate and reduce its force. Sometimes, a combination of these medications is used to achieve the best results. The choice of medication depends on a person's specific health profile, including any other medical conditions and potential side effects or drug interactions.

## What Are the Side Effects of Blood Pressure Medications?

Most people tolerate blood pressure medications well, but side effects can occur, and they vary depending on the type of medication. Some side effects are shared between groups.

Dizziness and fatigue may be symptoms of *hypotension* (low blood pressure), where the effect of the medication may be too powerful, reducing blood pressure too much.

Medications that relax blood vessels may cause headaches, and those that change fluid levels or act on the kidney can have an effect on kidney function or the body's level of salts.

Medications may also have side effects specific to the class or the individual drug, and some people experience allergic reactions or other

adverse effects that are not related to the way in which the medication works.



TIP

Not everyone experiences side effects, and they can often be managed by adjusting the dose or switching to a different medication. Be sure to discuss any concerns or side effects with your healthcare provider to ensure safe and effective treatment.

## How Long Does It Take to Lower Blood Pressure with Medication?

The length of time it takes to lower blood pressure depends on the medication and the speed with which the doctor prescribing the drug increases the dosage or adds in other therapies. The aim of treatment is to achieve safe, optimum blood pressure control at the minimum dose or medication required, using a drug or combination of drugs that are most effective and likely to best suit the individual.

Doctors usually monitor progress over a period of weeks to months, making adjustments to the treatment plan as needed to achieve the target blood pressure. If a person presents with a hypertensive crisis, sometimes called *malignant hypertension*, with very high blood pressure, there is a greater urgency to control blood pressure right away.

# What Are Other Benefits of Taking Blood Pressure Medicine?

The most important benefit of taking blood pressure medicine is to reduce the risk of cardiovascular disease and its complications, which include heart attacks, strokes, and kidney damage. Lowering high blood pressure directly protects the blood vessels that supply the heart, brain, kidneys, and other organs, which is the fundamental reason for treatment and the primary way these medications improve long-term health. Without this reduction in risk for these major conditions, there would be little point in treating high blood pressure.



TIP

Blood pressure medications can play important roles in managing other cardiovascular conditions. For example, certain classes of these drugs are also used to treat heart failure, helping to improve symptoms and prolong life by reducing the heart's workload and preventing further damage. Some medications help control abnormal heart rhythms (called *arrhythmias*), while others are effective in managing *angina* (a symptom of heart disease characterized by chest pain or discomfort due to insufficient blood flow to the heart muscle) by improving blood flow to the heart muscle or offer protection against the progression of diabetes-related kidney disease.

# What Is the Role of Diuretics in Managing Blood Pressure?

Diuretics, often called “water pills,” reduce blood pressure by increasing the excretion of salt and water from the body through the kidneys into the urine. This reduces the volume of fluid in the circulation, which decreases pressure on the artery walls and makes it easier for the heart to pump.

Diuretics are generally well tolerated, but they can increase urination and may affect the levels of salt in the blood, so patients need monitoring. Despite these and other possible side effects, diuretics remain a common therapy used to reduce the risk of heart attack, stroke, and other complications linked to high blood pressure. They’re often used alone or in combination with other medications to achieve optimal blood pressure control. Examples of diuretics used for high blood pressure include bendroflumethiazide, indapamide, and chlorthalidone.

# How Do Beta Blockers Work to Lower Blood Pressure?

Beta blockers are a group of medications that help lower blood pressure by slowing the heart rate and reducing the force of each heartbeat. They’re less effective at preventing strokes than other medications, so they’re less frequently used as a first-line single treatment.



TIP

Beta blockers may be particularly useful for people who have high blood pressure along with other heart problems (such as irregular heart rhythms, angina, or a history of heart attack) because they can stabilize the heart rhythm and reduce the work of the heart.

Some people may experience side effects like tiredness or cold hands and feet, but beta blockers can still play an important role when used appropriately, either on their own or in combination with other blood pressure medicines. Examples of beta blockers include bisoprolol, metoprolol, and carvedilol.

## What Are ACE Inhibitors and How Do They Affect Blood Pressure?

Angiotensin-converting enzyme (ACE) inhibitors reduce blood pressure by blocking the production of angiotensin II, a hormone that narrows blood vessels. This makes the blood vessels relax and widen, lowering resistance and making it easier for blood to flow. ACE inhibitors are widely used not only for high blood pressure, but also to protect the heart and kidneys, particularly in people with diabetes or heart failure.

ACE inhibitors are generally well tolerated, though some people may experience a dry cough or rare allergic reactions. ACE inhibitors have proven benefits in reducing cardiovascular

events and slowing kidney damage, making them a frequent choice in managing high blood pressure and related conditions. Examples of ACE inhibitors include lisinopril, ramipril, and enalapril.

## How Do ARBs Work to Lower Blood Pressure?

Angiotensin receptor blockers (ARBs) lower blood pressure by blocking the receptors that the hormone angiotensin II binds to, preventing it from narrowing blood vessels. This results in relaxed arteries and reduced blood pressure.



TIP

ARBs are often prescribed as an alternative to ACE inhibitors, especially for patients who experience side effects like cough on ACEs. They share similar protective benefits for the heart and kidneys and are generally well tolerated. Examples of ARBs include losartan, valsartan, and candesartan.

## What Is the Role of CCBs in Managing Blood Pressure?

Calcium channel blockers (CCBs) work by specifically targeting the movement of calcium into the cells of the heart and blood vessels. By inhibiting the influx of calcium, these medications cause the muscle cells in the walls of the arteries to relax, leading to a widening (or *vasodilation*)

of the blood vessels. This relaxation reduces the resistance to blood flow, which decreases blood pressure. CCBs have been shown to be particularly beneficial for certain demographic groups, such as older adults and individuals of African or Caribbean descent, who often respond very well to this class of medication as a first-line treatment. Examples of calcium channel blockers include amlodipine, diltiazem, and verapamil.

## Are Any Other Medications Used to Reduce Blood Pressure?

Several other classes of medications are available and are occasionally used to reduce blood pressure. These include alpha blockers, direct vasodilators, and centrally acting agents that influence the nervous system. Alpha blockers work by relaxing certain muscles and blood vessels, while direct vasodilators act on the smooth muscle of blood vessels to cause dilation. Medications that act on the nervous system, such as clonidine, work by reducing the signals from the brain that tell the blood vessels to constrict.

These alternative medications are generally reserved for specific situations. They're most often considered when blood pressure remains inadequately controlled despite the use of standard first-line therapy combinations, or when a person presents with specific medical conditions or intolerances that make common treatments unsuitable.



## DID YOU KNOW?

*Having high blood pressure during pregnancy can have very serious consequences for both the mother and the baby.*

# Chapter **7**

# Special Situations: Pregnancy, Children, and Menopause

**H**igh blood pressure affects people of all ages, in all stages of life. This chapter focuses on a few special groups — pregnant women, children, and women in menopause — and explains the risks they face and the treatments used to manage those risks.

# How Does High Blood Pressure Affect Pregnancy?

High blood pressure poses many problems during pregnancy. It can cause less blood flow to the placenta, which can reduce oxygen and nutrient delivery to the fetus, potentially leading to a series of other problems. High blood pressure during pregnancy may also cause the placenta to separate from the inner wall of the uterus before delivery, as well as heavy bleeding, which could be potentially life-threatening.

Having high blood pressure during pregnancy could cause slowed or decreased fetal growth. In some cases, poorly controlled high blood pressure during pregnancy can result in injury of major organs. It may also cause premature delivery and future cardiovascular disease.



TIP

If you're pregnant and you have high blood pressure, or other risk factors such as excess weight gain, family history, multiple pregnancies, poor health, or other conditions, your doctor will need to monitor you closely. If you had chronic high blood pressure prior to pregnancy, you may develop protein in the urine or other complications.

Gestational hypertension can develop after 20 weeks of pregnancy. Although it doesn't cause organ damage or excess protein in the urine, it can lead to preeclampsia, which can damage organ systems and needs to be treated and monitored. Untreated preeclampsia can lead to

serious and sometimes fatal complications for the mother and infant.

## Can Children Have High Blood Pressure?

Children can develop high blood pressure, and it can lead to many health problems later in life. An estimated 3 percent to 5 percent of children and adolescents have high blood pressure, and the surge in childhood obesity is causing these numbers to grow. Unhealthy diets, obesity, family history of high blood pressure, and lack of physical activity are the main culprits for the growing numbers of children with high blood pressure. In very young children, however, high blood pressure may be the result of an underlying and identifiable medical condition.

Blood pressure should be regularly monitored during yearly checkups in healthy children starting at age 3. If a child has risk factors (such as obesity, diabetes, kidney disease, or a heart condition) or is taking medications that may raise blood pressure, their pediatrician will likely want to check their blood pressure more frequently. If a child is diagnosed with high blood pressure, regular exercise, a healthy diet, and possibly losing weight will be the first suggested treatments. Medication will be prescribed if these steps fail to reduce blood pressure enough.



TIP

The normal range of blood pressure readings is significantly different for children under 13 years of age than it is for adults. Normal readings depend on your child's age and height. Talk to your child's pediatrician if you have questions. You can also go to [www.bcm.edu/bodycomplab/mainbodycomp.htm](http://www.bcm.edu/bodycomplab/mainbodycomp.htm) and click Pediatric Blood Pressure for more information.

## What Are the Signs of High Blood Pressure in Children?

High blood pressure usually doesn't cause symptoms. In a severe blood pressure emergency, known as *hypertensive crisis*, however, chest pains, headaches, vomiting, seizures, pounding heartbeat, and shortness of breath can occur. Seek emergency medical care if a child has any of these symptoms.



TIP

Starting at age 3, blood pressure should be checked at annual checkups. If a child had a premature birth, low birth weight, certain kidney problems, congenital heart disease, or other complications, blood pressure screenings should be conducted from birth. If your child is obese or has a risk factor for high blood pressure, talk to your child's doctor about the best plan of action.

# How Is Blood Pressure Treated in Children?

If there are underlying medical causes for the high blood pressure, those causes should be addressed first. Otherwise, medication is not generally administered to children as much as it is to adults.

If a child is diagnosed with high blood pressure, lifestyle changes will be the first plan of action. Getting regular exercise, eating a healthy diet, and possibly losing weight will be the first suggested treatments. Medication will be prescribed if lifestyle modifications aren't effective.

# How Does Menopause Affect Blood Pressure Levels?

Women who experience blood pressure surges during the various stages of menopause are often shocked because they never experienced them before. One of the main reasons for an increase in blood pressure during menopause is the decrease in hormone levels — namely, estrogen, which is known for regulating blood pressure in women.

Many women also experience weight gain and increased inflammation around menopause, which can contribute to high blood pressure. In addition, hormonal changes in women affect

mood, which makes getting enough sleep and managing stress more challenging. Lower levels of energy at this time can sometimes inhibit regular physical activity, too. In other words, menopause causes changes in blood pressure both directly and indirectly.

Each woman's body is different, so it's important to find the right balance of actions that can help regulate your blood pressure. These actions may include hormone therapy, sleep solutions, supplements, and blood pressure medication. Regularly exercising (both aerobic and strength training) and eating hormone-boosting foods (such as avocados, berries, chickpeas, cruciferous vegetables, extra-virgin olive oil, flaxseeds, nuts, and organic soy products), as part of a healthful, balanced diet, are important during this time.



TIP

Speak with your healthcare provider if you're experiencing elevated blood pressure and other symptoms during menopause. There is not one easy cure for all of them, but your medical team should be able to help you find some relief to make the transition easier.



# **Complications and Health Impacts**

## IN THIS PART . . .

This part walks through the negative impacts of high blood pressure — from cardiovascular complications to other health impacts, like kidney disease, erectile dysfunction, and dementia. It covers the long-term effects of untreated high blood pressure, driving home the importance of managing your blood pressure. And it ends with a discussion of current research and emerging treatments, giving you reason to be excited about the future!

## DID YOU KNOW?

*Every 20-point rise in systolic blood pressure approximately doubles the relative risk of dying from heart disease.*

# Chapter 8

# Cardiovascular Complications

**H**igh blood pressure can lead to cardiovascular complications, including heart attack, stroke, and peripheral artery disease. This chapter explains how untreated high blood pressure contributes to those conditions.

## How Does High Blood Pressure Contribute to Atherosclerosis?

*Atherosclerosis* is a gradual process in which fatty deposits, known as *plaques*, build up along the inner walls of the arteries. Over time, this process

can cause the arteries to narrow and harden, restricting the flow of oxygen and nutrients in the blood to vital organs and tissues. The development of atherosclerosis is complex, involving factors such as inflammation and oxidation of cholesterol (damage to circulating cholesterol from unstable molecules called *free radicals* in the body from normal metabolic processes, as well as external sources like poor diet, pollution, cigarette smoke, certain drugs, and radiation). Atherosclerotic plaques can grow large enough to significantly reduce blood flow, distort and weaken blood vessels, or even break apart, triggering dangerous blood clots that may block arteries completely.



TIP

High blood pressure plays a central role in the progression of atherosclerosis by putting extra strain on artery walls. The constant force of elevated blood pressure can damage the delicate inner lining of the arteries, creating small injuries where plaque is more likely to form.

## Can High Blood Pressure Lead to Heart Disease?

High blood pressure significantly increases the risk of heart disease by contributing to atherosclerosis (see the preceding section). The extra force from high blood pressure damages artery walls, making it easier for fatty deposits to form, resulting in inflammation and narrowing of the coronary arteries, which are the blood vessels that supply the heart.

Persistently high blood pressure also places ongoing strain on the heart, forcing it to pump harder than normal. Over time, this can cause the heart muscle to thicken in a condition called *ventricular hypertrophy*; the heart muscle becomes less efficient, raising the risk of heart failure and further complications such as *arrhythmias*, where the heartbeat becomes erratic rather than regular.

## What Is the Relationship between High Blood Pressure and Stroke?

A stroke happens when blood flow to the brain is interrupted, causing brain cells to die and resulting in symptoms like sudden weakness or numbness on one side of the body, difficulty speaking or understanding speech, and sudden vision changes. There are two main types of stroke:

- » **Ischemic stroke:** Occurs when a blood clot blocks an artery in the brain
- » **Hemorrhagic stroke:** Occurs when a weakened artery bursts and bleeds into the brain

Ischemic strokes are more common and often result from atherosclerosis in the brain's arteries, while hemorrhagic strokes are usually caused by the small, fragile vessels rupturing

under high pressure. Both types of stroke are strongly linked to high blood pressure, because it increases the likelihood of artery damage and blood clot formation. Sometimes clots can shear off the blood vessel wall and travel, blocking off smaller arteries in the brain.

## Can High Blood Pressure Cause Peripheral Artery Disease?

Peripheral artery disease (PAD) is a condition in which high blood pressure, combined with other risk factors (such as smoking, diabetes, obesity, high cholesterol, and poor diet), results in atherosclerosis and blood vessel damage supplying the limbs. This situation can lead to poor circulation through the large or smaller arteries and cause symptoms like pain while walking, and, in serious cases, tissue damage or ulcers.

Sometimes the blood flow can be blocked completely, resulting in a condition called *critical ischemia*, where the lack of nutrients and oxygen to the tissues results in cell death. Critical ischemia can lead to *gangrene*, in which amputation may be required to limit the damage spreading.

## DID YOU KNOW?

*High blood pressure is one of the leading causes of kidney failure.*

# Chapter 9

# Other Health Impacts

Many people think of the cardiovascular system when they think of high blood pressure, and with good reason: The two are closely linked (see Chapter 8). However, untreated high blood pressure affects the entire body. This chapter explains the full impact of high blood pressure on the body. If you need a reminder of why high blood pressure should not be ignored, read on.

# What Is the Impact of High Blood Pressure on Liver Health?

High blood pressure doesn't usually cause liver damage directly, but liver problems can occur when there is obesity or fatty liver disease, which can be associated with high blood pressure.

A specific form of high blood vessel pressure, called *portal hypertension*, can affect blood flow in the liver. This is a different condition from generalized high blood pressure and is localized to the veins in the liver most commonly due to severe liver disease. Portal hypertension leads to complications such as fluid buildup in the abdomen (called *ascites*), an enlarged spleen, and bleeding from swollen veins in the esophagus or stomach. It's usually diagnosed through specialized tests rather than a standard blood pressure cuff, and it's managed differently, focusing on treating the underlying liver disease and preventing complications.

# How Does High Blood Pressure Affect Kidney Function?

The kidneys rely on healthy blood vessels to filter waste from the blood. High blood pressure can damage these vessels over time, with

atherosclerosis causing blood vessel damage, reducing kidney function, and increasing the risk of chronic kidney disease. In severe or long-standing cases, it may lead to kidney failure.



TIP

Blood tests can detect early chronic kidney disease (CKD), which may indicate the need for tighter blood pressure control, perhaps with the use of an ACE inhibitor or ARB medication (see Chapter 6), and optimizing other risk factors for CKD (such as quitting smoking and managing diabetes).

## What Is the Relationship between High Blood Pressure and Metabolic Syndrome?

High blood pressure is a key component of metabolic syndrome, a cluster of related conditions that often occur together and increase the risk of developing cardiovascular disease. Metabolic syndrome includes high blood pressure, abdominal obesity, high blood glucose, abnormal cholesterol levels, and *insulin resistance*, where cells don't properly respond to the hormone insulin, which is important for blood glucose regulation. When these conditions are present together, they significantly increase the risk of heart disease, stroke, and type 2 diabetes. Managing high blood pressure is crucial in addressing these broader health risks.

# Can High Blood Pressure Affect Mental Health?

High blood pressure and mental health can influence each other. Chronic stress and anxiety can directly contribute to raising blood pressure through the body's "fight-or-flight" response, causing temporary spikes that, after a while, may lead to sustained high blood pressure.



TIP

Receiving a diagnosis of high blood pressure and the ongoing management of the condition can itself be a source of significant stress, anxiety, and even depression, particularly if it feels poorly controlled or overwhelming. It's important to seek professional help and support if this occurs.

Beyond these emotional aspects, long-term, uncontrolled high blood pressure poses a serious threat to brain health. This may be due to the damage high blood pressure inflicts on the brain's delicate blood vessels, increasing the risk of conditions like *vascular dementia*, a form of dementia caused by reduced blood flow to brain tissue.

## How Does High Blood Pressure Affect the Immune System?

Research is beginning to show that long-term high blood pressure may weaken the body's natural defenses and increase susceptibility to

certain illnesses because of a poor or defective immune response.

High blood pressure may contribute to chronic inflammation, which can affect immune function over time. This inflammatory state can damage the lining of blood vessels and accelerate atherosclerosis. Over time, this process not only increases the risk of cardiovascular disease but can also impair the body's ability to fight infections and repair tissue, as the immune system becomes overactive or misdirected.

## Can High Blood Pressure Cause Erectile Dysfunction?

High blood pressure can lead to erectile dysfunction (ED) by damaging the blood vessels that supply blood to the penis. This reduces blood flow and makes it harder to achieve or maintain an erection.



TIP

There are many different causes of erectile dysfunction, but anyone presenting to their doctor with this symptom should have their blood pressure measured and be tested for diabetes. ED is sometimes an early sign of more generalized cardiovascular diseases.

Some blood pressure medications may also cause or contribute to ED, although not all of these medications have this effect.

# How Does Blood Pressure Affect the Brain?

High blood pressure is linked to cognitive decline. Maintaining good cardiovascular health can help to protect the brain during aging. Having high blood pressure in midlife is linked to a decrease in *cognition*, which includes the ability to reason, think, and remember. Having high blood pressure can cause fuzzy thinking and memory loss over time. Those with high blood pressure in midlife tend to lose increasing amounts of cognitive function in their 70s, 80s, and 90s. Controlling high blood pressure can help to maintain better brain function and delay cognitive decline in older age.

# What Is the Relationship between High Blood Pressure and Alzheimer's Disease?

There is evidence that high blood pressure, particularly in midlife, increases the risk of Alzheimer's disease and other forms of dementia. It may contribute by damaging small blood vessels in the brain and reducing blood flow, which over time impairs brain health and function.

One key theory specifically related to Alzheimer's disease is that this vascular damage disrupts the brain's ability to clear harmful proteins that

accumulate and form the plaques that are a hallmark of Alzheimer's disease.

High blood pressure can also promote inflammation and *oxidative stress*, the imbalance between harmful *free radicals* (unstable molecules that damage cells) and protective *antioxidants* (molecules that neutralize free radicals) in the brain, leading to cellular damage and further accelerating the neurodegenerative processes linked to Alzheimer's disease.

## How Does High Blood Pressure Impact Skin Health?

High blood pressure can lead to atherosclerosis and peripheral artery disease (PAD), which significantly contributes to poor circulation and, in turn, can slow the healing of cuts and wounds and increase the risk of developing painful skin ulcers, particularly in the legs. The reduced blood flow through damaged blood vessels can make the skin more fragile and prone to injury, as vital nutrients and oxygen struggle to reach the outermost layers.

## Can High Blood Pressure Cause Vision Problems?

High blood pressure can lead to vision problems because it can damage the tiny, delicate blood vessels located in the eyes, resulting in

a condition called *hypertensive retinopathy*. In more severe cases, this damage can cause vision changes, blurring of vision, or even permanent vision loss if left untreated.



TIP

Sometimes changes seen by an *ophthalmologist* (eye doctor) at a routine eye test can be the first signs of a problem with high blood pressure.

Hypertensive damage to eye blood vessels can also increase the risk of other serious eye conditions, such as *glaucoma* (where increased pressure in the eye can damage the optic nerve) or *optic neuropathy* (which involves damage to the optic nerve from other causes like reduced blood flow).

## Can High Blood Pressure Cause Hearing Loss?

Having high blood pressure can cause damage to blood vessels in the inner ear and lead to hearing loss. Sensorineural hearing loss (SNHL) is a type of hearing loss that is most often caused by high blood pressure. SNHL is a result of damage or dysfunction of the inner ear or the nerves that transmit sound to the brain. It can lead to difficulty hearing sounds and understanding speech.

Not all types of hearing loss caused by high blood pressure are the same, and the severity of it depends upon how long you've had high blood pressure. Some people with high blood pressure may not experience hearing loss at all, while

others may experience mild hearing loss, and some may experience more severe losses.

Having high blood pressure can also accelerate age-related hearing loss due to blood vessel damage that can worsen over time. Damage to hair cells in the inner ear caused by high blood pressure is often irreversible.

## What Is the Relationship between High Blood Pressure and Thyroid Function?

Because the body's systems are connected, dysfunction in the endocrine system (such as thyroid disorders) can affect the cardiovascular system — specifically, high blood pressure. Both hyperthyroidism (overactive thyroid) and hypothyroidism (underactive thyroid) can lead to high blood pressure.

Diastolic hypertension (where the bottom number is high) can be caused by underactive thyroid. Having an overactive thyroid can lead to systolic hypertension (where the top number is high) by increasing heart rate and cardiac output.



TIP

If you've been diagnosed with high blood pressure, it's important for your doctor to check your thyroid function because treating thyroid dysfunction can help to regulate blood pressure.

# How Does High Blood Pressure Impact Bone Health?

High blood pressure can cause calcium loss in urine, which depletes the mineral essential for bone strength. It also causes systemic inflammation, which can disrupt bone remodeling and impair blood flow to bones, reducing the delivery of oxygen and nutrients integral to maintain healthy bone tissue and contributing to bone aging.

Specific bone-related issues caused by high blood pressure include reduced bone mineral density and increased risk of fractures and *osteoporosis* (weakened and brittle bones due to a loss of bone tissue and density, significantly increasing the risk of fractures), which is even more significant in women. Patients with high blood pressure should have their bone health monitored, especially if they're at greater risk for osteoporosis.

Those diagnosed with high blood pressure should have their calcium and vitamin D levels checked regularly. Calcium and vitamin D are crucial for bone health and blood pressure management.

# Can High Blood Pressure Cause Joint Pain?

Managing blood pressure can improve pain in general. High blood pressure and joint pain often coexist, especially with joint pain and

specifically conditions like arthritis. Inflammation and chronic pain can raise blood pressure, and blood pressure can also increase inflammation and chronic pain, which is especially difficult for joints.

There are several ways to manage both blood pressure and joint pain. Talk with your doctor about the best pain management and blood-pressure-lowering protocols. Pain relievers like ibuprofen and naproxen can increase blood pressure, so it's important to discuss alternatives with your doctor or pharmacist prior to self-medication.



Regular exercise, stress management, and an anti-inflammatory diet can reduce pain and help manage blood pressure.

## How Does High Blood Pressure Affect Sleep?

High blood pressure causes poor sleep by contributing to anxiety and stress, which makes sleep more difficult. Poor sleep can elevate stress hormones such as cortisol and adrenaline, increasing blood pressure as well. Getting less than six hours of sleep per night, or more than nine hours, is believed to cause a higher risk of high blood pressure.

It's important to maintain a healthy sleep schedule and lifestyle for improving blood pressure and overall cardiovascular health. If you have trouble sleeping, consult a sleep specialist

to find solutions. Talk with your doctor about treatment options for insomnia. You may want to ask whether melatonin, a hormone that helps regulate sleep and acts as a natural blood-pressure-lowering agent, would be an appropriate supplement to take.



TIP

For optimal blood pressure management and sleep, aim for seven to eight hours of sleep per night, manage stress and weight, and try to wake up and go to sleep at the same time each morning and evening.

## Can High Blood Pressure Cause Headaches?

Typical high blood pressure does not cause headaches. However, sudden, severe spikes in blood pressure *can* cause headaches because they cause the blood vessels in the head and neck to expand. When there are sudden and drastic spikes in blood pressure, shortness of breath, vision changes, confusion, weakness, and nosebleeds can accompany the headaches.

Blood-pressure-related headaches usually come on suddenly and have a severe intensity — people often describe them as the “worst headache ever.” A blood-pressure-related headache will often get worse in the morning.



TIP

Severe headaches are also a stroke symptom. Call 911 or go to an emergency room if you experience a severe headache.

# How Does High Blood Pressure Impact Athletic Performance?

If high blood pressure isn't controlled, it can affect an athlete's performance by potentially decreasing exercise capacity. The extent to which the athlete's exercise capacity may be decreased depends on their blood pressure, the type of exercise they're doing, and whether there are other health complications.

Uncontrolled high blood pressure poses a significant health risk for stroke during intense physical activity. Screening before participation and regular monitoring of blood pressure are crucial for all athletes.

# Can High Blood Pressure Cause Hair Loss?

High blood pressure itself doesn't cause hair loss, but some medications used to treat blood pressure *can* cause it.

Some beta blockers, used to treat high blood pressure, can cause a temporary condition called *telogen effluvium*, in which hair follicles prematurely enter the resting stage and are then shed. Statins and anticoagulants, other medicines used for regulating blood pressure, can also lead to temporary hair loss due to *telogen effluvium*.

High blood pressure is also often linked to stress, which can trigger hair loss by increasing stress hormones, which can disrupt the hair growth cycle.

High blood pressure and hair loss can both be associated with hormonal imbalances, which can disrupt the hair growth cycle. Uncontrolled high blood pressure may also reduce blood flow to the scalp. This weakens hair follicles and leads to thinning or shedding.



TIP

If you're diagnosed with high blood pressure and you experience hair loss, your doctor should check for hormonal imbalances and side effects of any medications you're taking in order to find the right protocol for you.

## DID YOU KNOW?

*More than 70 percent of people age 65 and older have high blood pressure, but targets in older adults may differ from younger people because of the risk of medication side effects and the fact that blood pressure when too low can sometimes be just as risky as when it's too high.*

# Chapter **10**

# Long-Term Outcomes

The long-term outcomes of high blood pressure drive home the importance of treating and monitoring the condition. This chapter explains what happens over the long term if high blood pressure goes untreated, whether high blood pressure affects life expectancy, and whether complications are inevitable.

# What Are the Long-Term Effects of High Blood Pressure?

If left untreated, high blood pressure can gradually damage body systems and organs in several ways. It increases the strain on the heart and arteries, which can accelerate the process of *atherosclerosis*, the buildup of plaque that narrows and stiffens arteries. This arterial damage increases the risk of major cardiovascular events such as heart attacks and strokes, because blood flow to vital organs becomes compromised. Sustained high blood pressure can also lead to heart failure, because the heart has to work harder against increased resistance. It can impair kidney function, potentially progressing to chronic kidney disease with a buildup of toxic waste products in the circulation. The delicate blood vessels in the eyes can also be harmed, leading to vision problems. Damage to blood vessels in the brain may contribute to cognitive decline.



TIP

The longer high blood pressure remains uncontrolled, the greater the likelihood of these serious health complications.

# How Does High Blood Pressure Impact Overall Life Expectancy?

High blood pressure, particularly when left uncontrolled, can significantly impact overall life expectancy by increasing the risk of numerous serious health complications, most of which are related to cardiovascular disease (including stroke and heart attack) and kidney disease. It's a leading cause of premature death worldwide, often referred to as a "silent killer" because it frequently presents without noticeable symptoms until severe damage has occurred.



TIP

Studies suggest that uncontrolled high blood pressure can reduce life expectancy by several years, but effective management through medication and lifestyle changes, as well as addressing other causes of atherosclerosis, can significantly reduce these risks.

# Does Everybody with High Blood Pressure Develop Complications?

Not everyone with high blood pressure will inevitably go on to develop complications, because high blood pressure is just one of several risk factors for atherosclerosis and cardiovascular disease. If you have multiple risk factors (such

as smoking, diabetes, and high cholesterol), you face a much higher likelihood of complications.

Studies suggest that the number needed to treat (NNT) to prevent one major cardiovascular event over five years in people with mild hypertension and no other risk factors can be as high as 100 or more. The NNT tells us how many people need to receive a treatment for one person to benefit. This means that 99 people out of 100 in this example would not have developed complications even without treatment, but that if all 100 are treated, one person is saved from a major cardiovascular event. However, since blood pressure medications are generally safe and well-tolerated, treating high blood pressure is still considered worthwhile for most people, as long as side effects are minimal and treatment is regularly reviewed.

## DID YOU KNOW?

*Researchers are developing “smart pills” that people will be able to swallow to measure blood pressure from inside the body, offering a new way to monitor health in real time.*

# Chapter **11**

# Research and Emerging Treatments

Scientists are always at work, learning more about medical conditions and coming up with new treatments. This chapter briefly describes some of the exciting new research being done and treatments that are on the horizon.

# Are There Any Innovations in Research in Blood Pressure?

Research is increasingly focused on personalized medicine for high blood pressure, exploring how genetic differences influence blood pressure and can influence individual responses to treatment.

Scientists are also examining the impact of socioeconomic and environmental factors on the development and management of high blood pressure.

A growing area of interest is the role of chronic low-grade inflammation and oxidative stress. Oxidative stress occurs when there is an imbalance between harmful *free radicals* (unstable molecules that damage cells) and protective *antioxidants* (molecules that neutralize free radicals). This condition damages blood vessels and may contribute to the onset and progression of high blood pressure.

Researchers are also identifying new *biomarkers* (measurable signs that tell a doctor what's happening in the body, such as whether someone has a disease or how well a treatment is working) that can better predict an individual's risk of developing high blood pressure or cardiovascular events, aiming to enable earlier and more targeted interventions.

# Are There Any Innovations in Treatment of Blood Pressure?

Recent innovations in blood pressure management are transforming both patient care and treatment options. Digital health technologies — such as accurate cuffless monitors, wearable continuous blood pressure tracking, mobile apps for self-monitoring, and expanded use of telemedicine — are empowering individuals to take a more active role in managing their health. These tools also help healthcare providers offer more personalized, data-driven care.

New classes of medications are emerging, too, including aldosterone synthase inhibitors like lorundrostat and baxdrostat, which show promise in treating *resistant hypertension* (blood pressure that remains high despite treatment with three or more different medications). Angiotensinogen-targeted therapies, such as zilebesiran, an injectable therapy that works at the level of the genes involved in hormone production, are given only a few times a year and are opening up new possibilities for long-term control.

Meanwhile, a deeper understanding of how lifestyle factors — such as diet, activity level, sleep, and stress — affect blood pressure is enabling more tailored and effective prevention strategies, helping reduce the risk of serious complications.



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## Dedication

**Simon Poole:** I dedicate my contributions to this book to Sophia Jankula, looking forward to a successful medical career ahead.

**Amy Riolo:** I dedicate my contributions to this book to my parents, Faith and Rick Riolo, for everything.

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