

# Hypertension (High Blood Pressure)



## Yesterday

- Hypertension is a silent killer because it has no early significant symptoms, but creates an extra load on the heart and blood vessels.
- The twentieth century ushered in an era of great interest in blood pressure with the development of a practical method to measure it. Physicians began to note associations between hypertension and risk of heart failure, stroke, and kidney failure.
- Although scientists had yet to prove that lowering blood pressure could reduce health risks, some approaches were attempted during the 1930s and 40s, including a surgical procedure that involved cutting nerves to blood vessels, induction of a high fever, and strict low-sodium diets. Case studies suggested that each of the treatments was effective in lowering blood pressure and improving outcomes, but the drawbacks were substantial.
- In 1948, the NIH launched the Framingham Heart Study (<http://www.framinghamheartstudy.org/index.html>). Results over the years led to verification of the important role of high blood pressure—especially in concert with high cholesterol, smoking, diabetes, and obesity—in cardiovascular disease (CVD).
- In 1958, a diuretic called chlorothiazide became available as the first safe and effective orally administered therapy for hypertension. Diuretics stimulate the kidneys to excrete more salt and water, which initially reduces the volume of blood in the circulatory system and causes blood pressure to go down.
- Throughout the 1960s and 1970s, the results of observational studies further strengthened the causal relationship between high blood pressure and CVD, and clinical trials provided unequivocal evidence for the benefits of lowering blood pressure. Among NIH-initiated trials, the Hypertension Detection and Follow-up Program established that diuretic-based antihypertensive drug treatment improves survival of people with hypertension, including so-called mild hypertension. As the public health significance of hypertension gained attention, renewed emphasis was focused on finding new, more effective treatments.

- During the 1960s and into the mid 1970s, additional classes of drugs made their debut as treatment options for hypertension: angiotensin-converting enzyme (ACE) inhibitors and alpha- and beta-blockers.
- In 1972, the NIH launched the National High Blood Pressure Education Program to educate patients and physicians of the dangers of hypertension and the necessity of controlling it (<http://www.nhlbi.nih.gov/about/nhbpep/index.htm>).
- In 1977 the first report of the Joint National Committee (JNC) on Detection, Evaluation, and Treatment of High Blood Pressure was published. Since then, reports have been issued every few years to provide physicians with up-to-date information to use in treating patients, and in the more recent reports, to make recommendations for preventing high blood pressure from developing.
- During the 1980s another class of drugs, calcium channel blockers (CCBs), was first used clinically to treat hypertension. The newer drugs became so popular with physicians and patients that diuretic use fell from 56 percent of antihypertensive prescriptions in 1982 to 27 percent in 1992.
- In 1993 NIH began the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (ALLHAT) (<http://www.nhlbi.nih.gov/health/allhat/>). The trial's hypertension component addressed the question of whether the newer, more expensive blood pressure-lowering drugs (ACE inhibitors, CCBs, and alpha blockers) were superior to the older, cheaper diuretics.

## Today

- About 1 in 3 adults in the United States has high blood pressure.
- Rates of awareness, treatment, and control of hypertension have dramatically increased over the past several decades. In 2003–2006, 78 percent of hypertensive Americans were aware of their condition; 67 percent were on treatment for it; and 45 percent had it controlled—a substantial improvement over the comparable figures (51 percent, 31 percent, and 10 percent, respectively) for 1976–1980.

- We now understand that hypertension and its complications can be controlled through medicines and lifestyle changes, which include following a healthy eating plan, engaging in physical activity, maintaining a healthy weight, and quitting smoking. Controlling hypertension prevents strokes, heart attacks, and premature mortality.
- ALLHAT results indicate that, for most people, diuretics work as well as or better than other drugs in preventing CVD events. Based on ALLHAT results, the latest JNC report (JNC-7) recommends that diuretics should be the initial therapy for patients with hypertension.
- JNC-7 adds a new category, called *prehypertension*, and identifies four blood pressure categories: normal (less than 120 systolic and less than 80 diastolic), prehypertension (120–139 systolic and/or 80–89 diastolic), stage 1 hypertension (140–159 systolic and/or 90–99 diastolic), and stage 2 hypertension (at least 160 systolic and/or at least 100 diastolic).
- The JNC-7 also recommends using the Dietary Approaches to Stop Hypertension (DASH) diet ([http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new\\_dash.pdf](http://www.nhlbi.nih.gov/health/public/heart/hbp/dash/new_dash.pdf)), which is rich in fruits, vegetables, and low fat dairy products, and reducing sodium intake as effective methods to help lower blood pressure.
- In patients with type 2 diabetes, who are at especially high risk for CVD, the NIH-supported Action to Control Cardiovascular Disease in Diabetes (ACCORD) trial found no conclusive evidence that more intensive blood pressure-lowering than is currently recommended reduces the risk of heart disease (<http://www.nhlbi.nih.gov/health/prof/heart/other/accord/index.htm>).
- A significant barrier to high blood pressure control remains patient adherence to treatment regimens. Many people stop taking their medication or take it on an erratic basis.
- Many patients with hypertension find it easier to adhere to medications when they monitor their own blood pressure using made-for-home devices. NIH-funded research shows that better blood pressure control can be achieved by using these devices in conjunction with Internet communications and pharmacist care.

## Tomorrow

- The Systolic Blood Pressure Intervention Trial (SPRINT) is a randomized, multi-center clinical trial that will test the

effects of intensive lowering of systolic blood pressure on preventing CVD. It will enroll about 9,250 patients who will be followed for four to six years. The results from SPRINT will provide much-needed new information on how to prevent and treat hypertension, particularly in patients with clinical CVD, those with chronic kidney disease, and those who have additional known risk factors for CVD. SPRINT will also provide information on whether intensive treatment of hypertension will reduce the rate of memory loss and dementia seen as people age and their blood pressures rise.

- NIH-funded researchers have found that genetic variants play a role in determining CVD outcomes in patients with high blood pressure. Investigators looked at two variants in a gene called NPPA, which encodes for a precursor to a protein called ANP (atrial natriuretic polypeptide). Results of this study may lead to methods to regulate ANP and thereby prevent or control hypertension.
- The ability to determine a patient's genotype and to design antihypertensive therapy that is specific for that person will be an important key to improving prevention, treatment, and control of hypertension. Analyzing data from over 29,000 study participants, an international team of investigators, funded in part by the NIH, identified a number of genetic variants associated with higher blood pressure. Such findings will improve our understanding about hypertension and suggest potential new targets for treatment.
- Ongoing research that examines the interaction of race/ethnicity with socioeconomic status, access to care, and variables of health care delivery continues to shed light on the etiology of health disparities in hypertension. Future studies will be directed at the application of evidence-based medicine in all communities and the implementation of research to eliminate disparities in health due to hypertension.
- The NIH is working with scientific and medical communities to update hypertension management guidelines (JNC-8), including integrating them with updated guidelines on management of cholesterol and obesity.

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