National Institutes of Health

Fact Sheet *Hypertension (High Blood Pressure)*

Yesterday

- The twentieth century ushered in an era of great interest in blood pressure with the development of a practical method to measure it. Accumulating data indicated a relationship between high blood pressure and premature death, and 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 ameliorate 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.

- On April 12, 1945, President Franklin D. Roosevelt collapsed and died from a stroke. Moments after his collapse, his blood pressure measured 300/190. The President's doctors had been unable to treat his ever-worsening hypertension since no effective therapy existed, and few of them understood what effect his habit of smoking 20 cigarettes per day had on his blood pressure and overall deteriorating health.

- In 1948, the NIH launched the Framingham Heart Study. Results over the years led to verification of the important roles of high blood pressure, 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 cardiovascular disease, 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 those with so-called mild hypertension and African American patients. 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: ACE inhibitors, and alpha- and beta-blockers.

- In 1972, the NIH launched the National High Blood Pressure Education Program to educate patients and physicians alike of the dangers of hypertension and the necessity of treating and controlling it. Since the program's inception, the rates of awareness, treatment, and control of hypertension have dramatically increased.

- 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 about every 4 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.

- 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 1994 NIH began the Antihypertensive and Lipid-Lowering Treatment to Prevent Heart Attack Trial (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

- We now understand that hypertension and its complications can be controlled through medicines and lifestyle changes, which include following a healthy eating plan, doing enough 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 (greater than 160 systolic or at least 100 diastolic).

- The JNC-7 also recommends using the Dietary Approaches to Stop Hypertension (DASH) diet, which is rich in fruits, vegetables, and low fat dairy products, and reducing sodium intake as effective methods to help lower blood pressure.

- A significant barrier to high blood pressure control remains patient compliance with treatment regimens. Too many people, for whatever reason, stop taking their medication or take it on an erratic basis.

- Several studies indicate racial/ethnic disparities in hypertension, e.g., non-Hispanic blacks have a higher prevalence and more severe disease than non-Hispanic whites.

- Many patients with hypertension monitor their 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 7,500 patients who will be followed for a total of 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. A similar research question is being addressed for diabetic patients in the Action to Control Cardiovascular Disease in Diabetes (ACCORD) trial.

- NIH-funded researchers have found that genetic variants play a role in determining CVD outcomes in patients with high blood pressure. Investigators in an ancillary study to ALLHAT looked at two variants in a gene called *NPPA*, which encodes for a precursor to a protein called ANP (atrial natriuretic polypeptide). ANP acts as a diuretic. Animal research has shown that too much ANP can cause hypotension, or low blood pressure, and too little ANP can cause hypertension. 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.

- 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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