

HEART NEWS FOR YOU

B is for Blood Pressure



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The classic “ABCs” of preventing cardiovascular disease or preventing recurrence or complication of cardiovascular disease are aspirin, blood pressure lowering and cholesterol lowering. In the first of this series of articles for “Heart News for You,” I expanded on “A” for aspirin by also commenting on other antiplatelet drugs and anticoagulation. (Visit www.heart.arizona.edu to see Issue 39.)

“B” is for blood pressure. High blood pressure (hypertension) has for decades been known as the silent killer. The reason is that in the majority of individuals, high blood pressure does not cause symptoms while it is silently damaging the arteries, making them thicker, stiffer and narrower. The result is more strain on the heart, as it must work harder, damage to the delicate lining of the arteries (the endothelium), making them more susceptible to atherosclerosis, and decreasing blood flow (perfusion) to the vital organs such as the brain, heart, kidneys and muscles. The end result of untreated or inadequately treated hypertension is end-organ damage or failure, e.g. strokes, dementia, heart attacks, sudden death, heart failure and kidney (renal) failure.

Some of you might be saying to yourselves, “But I thought you got headaches from hypertension.” It turns out that the prevalence of headache is the same in Americans with or without hypertension. There is a rare but rather specific hypertensive headache – a pain in the back of the head upon awakening. And of course if a blood vessel in your head breaks (ruptures) it causes a severe headache. There

are some individuals who can tell when their blood pressure is elevated by the way they feel, but this is unusual and unreliable. All in all, hypertension is a silent killer!

A l t h o u g h

symptomatically silent, there is an easy and practical way to diagnose hypertension: taking the arm blood pressure with a blood pressure cuff. If you are found to have high blood pressure, or have a family history of hypertension, I recommend that you buy a semi-automated blood pressure cuff to monitor your blood pressure. *Consumer Reports* recommends the Omron for measuring blood pressure at home. There are several other reliable units. It is important that one obtain the arm unit and not the wrist or finger BP units as these are much less reliable.

Home blood pressures are more predictable of complications than office blood pressures (*JAMA* 2004; 291:1342). In a study of office and home blood pressure recordings in nearly 5,000 patients, researchers found that 13 percent of patients have blood pressure readings higher in the office than at home (white-coat hypertension), and 9 percent of patients had higher BP at home than at the office (masked hypertension). The major reason that home blood pressures are more reliable is that they are taken much more often and at various times of the day, not just during “office hours.”

The pressure of the blood inside the arteries is not constant. It goes up with each heart beat, and then gradually decreases until is raised again by the blood pumped out of the left ventricle by the next heart beat. The peak blood pressure is called the “systolic” and the trough the “diastolic” pressure and is written 120/80. The unit of measurement is millimeters of mercury, abbreviated “mm Hg.”

The terms “normal blood pressure” and “high blood pressure” are arbitrary, as the damage to the arteries (and therefore the risk) increases with increased blood pressure, even in the so-called normal range. The blood pressure is a continuum – the higher the blood pressure the greater the risk and the lower the blood pressure, with normal tissue perfusion, the lower the risk.

A blood pressure of 90/70 mm Hg in a patient without symptoms (which would include being near-faint or light-headed upon standing), is probably optimal, even though it is below the so-called normal range. Patients with blood pressure in the high-normal range are at greater risk than those with blood pressure in the low-normal range.

The blood pressure is usually lowest while we are asleep. As part of the waking process, increased adrenalin is pro-

The ABCs of Preventing Heart and Vascular Disease

A is for Antiplatelet Therapy/Aspirin

B is for Blood Pressure

C is for Cholesterol

HEART NEWS FOR YOU

duced, and in many individuals the blood pressure is the highest first thing in the morning. It varies throughout the day, but decreases after the evening meal and drops even further during sleep. In many patients, the blood pressure increases with stress. With exercise the systolic pressure increases while the diastolic pressure remains unchanged or decreases slightly. In contrast, with “isometric” exercise, e.g. lifting weights, both the systolic and the diastolic blood pressure increases.

It has been shown that weight loss, a low-salt diet and exercise all lower the blood pressure. Unfortunately, all too often, even these are not enough to control the blood pressure.

The history of our understanding of hypertension is interesting.

It wasn't but a few decades ago that it was thought that elevation of the blood pressure was a normal aging process. It was thought that high blood pressure was “essential” to perfuse the brain and other organs as the arteries changed with age. It was thought that the normal systolic (top number) blood pressure was 100 plus your age. Thus at age 70, a blood pressure of 170/90 mm Hg was thought to be normal. Once studies showed that therapy of isolated systolic hypertension improved survival, this concept changed. The normal blood pressure for a 90-year-old is 120/80 mm Hg – the same as for a 30-year-old.

The diastolic blood pressure often increases more than the systolic blood pressure in younger people who develop hypertension. Thus, a younger person might have a blood pressure of 140/100 mm Hg. This led to the concept that diastolic BP was more important than systolic blood pressure. However, with age and increasing stiffness of the arteries, the systolic pressure increases and the diastolic pressure drops, so older individuals are more likely to have isolated systolic hypertension.

The goal of therapy for hypertension is generally to lower the systolic BP to below 140 and the diastolic BP to below 90 mm Hg. The goal is lower in patients at high risk, such as diabetics or patients with renal disease. However, the effort to lower the systolic blood pressure can get the diastolic blood pressure too low!

Because coronary blood flow to the heart muscle occurs during diastole, the relaxation phase of the heart cycle, it should not be too low. When the heart beats, the pressure in the main pumping chamber (left ventricle), the aorta and the coronary arteries is the same. When the heart relaxes, the aortic valve closes, and the pressure in the aorta is higher than that in the coronary arteries and the relaxing left ventricle, so almost

all of the coronary blood flow is during the diastolic or relaxing phase of the cardiac cycle. Recent studies have shown that the mortality of treated hypertension varies with the level of the diastolic blood pressure: In the INVEST study, recently reported at the National Cardiology Scientific Sessions but not yet published, the mortality was 13 percent in treated patients with a diastolic BP above 110 mm Hg; 6 percent with a diastolic BP between 90 and 110 mm Hg; 3 percent with a diastolic BP between 70 and 90 mm Hg; 6 percent with a diastolic BP between 60 and 70 mm Hg; and 14 percent if the diastolic BP was below 60 mm Hg. These risks for diastolic pressures between 70 to 110 mm Hg, are not too different from those reported from the HOT trial (*Lancet* 1998; 351: 1755), which also showed a “U”-shaped curve for mortality and diastolic blood pressures.

Franklin D. Roosevelt died of a stroke on April 12, 1945. One month before, his blood pressure was 240/180 mm Hg. He was not told that he had high blood pressure, as at that time there was no medical therapy. Over the next few decades, as medications to treat hypertension were developed, the incidence of stroke decreased dramatically. Now we can control

anyone's blood pressure – but it is not easy. It takes an average of three different antihypertensive medications to control hypertension. Since several different mechanisms contribute to hypertension, several different acting medications are required for blood pressure control.

The choice of the initial drug therapy depends upon associated conditions, but in general, if a diuretic is not the first drug, it should be the second. Control of blood pressure requires a significant amount of cooperation between the patient and the physician.

For mild hypertension, decreasing salt intake, weight and alcohol and increasing exercise may be all that is needed. These nonpharmacologic approaches should be followed, even when medication is necessary.

Every medical student knows the importance of hypertension to atherosclerosis. At the autopsy table we all witnessed patients with severe atherosclerosis of the aorta, but none in the pulmonary artery – same patients, same diet and exercise, same genes, same cholesterol, same everything except the pressure in the aorta is about four times higher than that in the pulmonary artery.

Each of the ABCs that I will cover in this series is important. However, it is most important that all the risk factors be addressed. It is only by aggressive global risk reduction that we will be able to prevent cardiovascular disease. ♥

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