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What is Your Hypertension IQ?
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Question: If you are 55 years of age and if you do not have high blood pressure -- hypertension -- what is your risk of developing blood pressure in your life time?

Question: If your blood pressure is 135/85, what is your risk of cardiovascular disease as compared to a person whose blood pressure is 115/75?

Question: In societies where there is no dietary sodium chloride -- table salt -- what is the incidence of hypertension?

If you answered zero, or very low, to the first question, you are wrong. The probability of a person developing hypertension after age 55 is slightly over 90%. That's not the obvious answer, is it? It would seem that if you don't have high blood pressure by age 55, then you would be unlikely to develop it. The reality is that high blood pressure is so related to conditions which are rampant in America, that almost everyone will develop it, unless you take positive steps to avoid it.

If you answered 100% increase -- i.e., the person whose blood pressure is 135/85 has twice the risk of developing heart disease as the person whose blood pressure is 115/75 -- then you are right. Increasingly, we are finding that whether it is in blood sugar with diabetes, cholesterol levels or blood pressure, maintaining your health requires much stricter control than is commonly thought.

And, now we turn our attention to the ultimate culprit, salt. Do you add salt to your food without tasting it? Do you eat large amounts of Chinese foods with monosodium glutamate preservative? Do you heavily salt your corn-on-the-cob, pop-corn, French fries, etc. etc? They you would answer the above question incorrectly, or you might say, "I don't care about the answer." The fact is that in societies where there is not salt added to the food and where there is no naturally occurring salt, there is NO hypertension.

NEW GUIDELINES ON THE TREATMENT OF HIGH BLOOD PRESSURE

The Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) established the following guidelines for hypertension.

1. In persons older than 50, systolic blood pressure (BP) of more than 140 mm Hg is a much more important cardiovascular disease (CVD) risk factor than diastolic BP.
2. The risk of CVD, beginning at 115/75 mm Hg, doubles with each increment of 20/10 mm Hg.
3. Individuals with a systolic BP of 120 to 139 mm Hg or a diastolic BP of 80 to 89 mm Hg should be considered as prehypertensive and encouraged to adopt health-promoting lifestyle modifications such as weight reduction, dietary sodium reduction, and regular physical

activity.
4. Thiazide–type diuretics should be prescribed for most patients with uncomplicated hypertension, either alone or combined with drugs from other classes.
5. Most patients with hypertension require 2 or more antihypertensive medications to achieve BP (140/90 mm Hg, or < 130/80 mm Hg for patients with diabetes or chronic kidney disease.
6. If BP is more than 20/10 mm Hg above goal BP, consideration should be given to initiating therapy with 2 agents, 1 of which usually should be thiazide-type diuretic.

Don't dismiss this information too quickly; it may save your life. In the Framingham Cardiovascular and Stroke Risk assessment, hypertension is a major component of assessing your risk of developing heart disease and of your having a stroke. While some people have an aversion to taking medication for "minor" conditions, controlling of the blood pressure is so important many more people ought to be taking medication than are presently.

What are the practical implications for you of the new guidelines?

1. Systolic Blood Pressure -- the top number -- is the driving force behind the total, daily blood pressure load. It is this load which puts you at risk for heart disease and stroke. Lowering this total pressure load through life-style changes (see below) and/or through medication will improve your health and decrease your risk of devastating health problems.
2. Cardiovascular disease risk starts at a very much lower blood pressure than previously recognized. If your blood pressure is 120/80, which we would have considered normal previously, you already have a higher risk of heart disease and stroke. What can and what should you do? Read on.
3. Prehypertension is real. If you carefully read number three above, you will recognize that prehypertension is diagnosed on the basis of either a systolic blood pressure between 120 and 139 **OR** a diastolic blood pressure between 80 and 89. It doesn't take both, only one. This means that if your blood pressure is 138/70, you are prehypertensive and you should take steps to lower your blood pressure. It also means that if your blood pressure is 110/85, you are prehypertensive and should take steps to lower your blood pressure.

What Factors Affect Blood Pressure?

Blood pumped through blood vessels is always under pressure, much like water that is pumped through a garden hose. This pressure is highest in the arteries closest to the heart and gradually decreases as the blood travels around the body. Blood keeps moving around the body because there are differences in pressure in the blood vessels. Blood flows from higher-pressure areas to lower-pressure areas until it eventually returns to the heart.

Blood pressure is controlled by three things:

- **How fast the heart beats (heart rate).** The pace at which the heart beats, or heart rate, is counted in heartbeats per minute. Generally, when heart rate increases, blood pressure rises. When heart rate decreases, blood pressure drops. A number of things affect heart rate, including the body's nervous system; chemical messengers called hormones, body temperature, medications, and diseases.

- **How much blood the heart pumps with each beat (stroke volume).** The amount of blood pumped out of a ventricle with each heartbeat is called stroke volume. When you're resting, stroke volume is about the same as the amount of blood that veins carry back to the heart. But under stressful conditions, the nervous system can increase stroke volume by making the heart pump harder. Stroke volume can also be affected by certain hormones, drugs, and diseases, as well as increases or decreases in the amount of blood in the body, called blood volume. You might also hear the term "cardiac output" used to describe the amount of blood that's pumped through the body. Cardiac output is simply the amount of blood pumped out of a ventricle in one minute: Cardiac output = Heart rate x Stroke volume (amount of blood pumped with each beat) As cardiac output increases, so does blood pressure. This is why heart rate and stroke volume are important ways for the body to control blood pressure.
- **How difficult it is for blood to travel around the body (peripheral resistance).** The third major component that affects the blood pressure is the caliber or width of the arteries. Blood traveling in narrower vessels encounters more resistance than blood traveling through a wider vessel (it’s harder for water to pass through a narrow pipe than a wide pipe).

Depending on what a person is doing, the amount of blood the heart pumps varies enormously. Yet the blood pressure normally remains pretty stable. That's mainly because the body adjusts the resistance of the arteries, either widening or narrowing them as appropriate, to prevent the blood pressure from swinging wildly. This ability to regulate the width of the blood vessels is called the peripheral resistance. Most of the resistance to blood flow in the circulation occurs in the small-diameter arteries called arterioles. These arterioles are especially important in the immediate regulation of blood pressure. That's because they contain specialized smooth muscle in their walls that can relax or contract, allowing the blood vessel to get wider or narrower.

These changes are caused by:

- Nervous system stimulation (for example, stress, caffeine, or tobacco)
- Hormones
- Proteins
- Substances derived from the inner lining, or endothelium of blood vessels
- Substances released during the body's inflammatory response, called inflammatory chemicals
- Certain medications
- Various diseases

A group of hormones called the renin-angiotensin-aldosterone system (RAAS) is another critical player in blood pressure control. They regulate the amount of fluid in the blood, the width of the blood vessel, and the sodium and water balance by their action on the kidneys and blood vessels. The kidneys play a vital role in long-term changes in blood pressure. The hormones act on the kidneys to control the amount of sodium and water they excrete. If too much sodium or water stays, the amount of fluid in the blood, called the blood volume, goes up. This increase in blood volume means that the heart has to pump harder to circulate more

fluid, and blood pressure goes up.

Keeping the Blood Pressure Normal

Generally, a change in any factor that may cause the blood pressure to rise is balanced by a change in another factor. This is how the body keeps blood pressure in a normal range. For example, when you begin to exercise, your heart rate increases, as does the amount of blood pumped out of the heart with each beat (the stroke volume). This would normally increase the blood pressure. But the blood pressure remains normal because the blood vessels widen in order to increase the capacity for the extra blood being pumped while exercising. This helps offset the increase in blood pressure associated with the increase in heart rate and stroke volume associated with exercise.

On the other hand, if blood pressure suddenly drops, a series of changes restores normal blood pressure. These include short-term increases in heart rate, the strength of the heart's contractions, and peripheral resistance. Over a longer time period, blood volume also increases due to the actions of hormones on the kidneys.

Pulse Pressure

There is another dynamic component of blood pressure called pulse pressure. Pulse pressure is the difference in pressure between when the ventricles of the heart contract and when they relax. It can be felt as a throbbing beat in an artery, called a pulse. When the ventricles contract, blood is pumped out of the left ventricle into the main artery leading away from the heart to the body, called the aorta. This creates the highest pressure that occurs in the aorta, called the **systolic blood pressure**.

The increased pressure and increased blood volume cause the aorta to stretch. Because the blood pressure in the aorta is higher than the pressure in more distant vessels, blood moves forward toward the body's tissues. When the ventricles relax, blood stops flowing into the aorta and the pressure drops to its lowest level. This is called the **diastolic blood pressure**.

But blood continues to move forward in the circulation even when the ventricles are relaxed. Because the walls of the aorta and other elastic arteries bounce back, they maintain pressure on the blood moving through them. Recent study results suggest that individuals with large pulse pressures are at the greater risk for complications of high blood pressure, such as stroke or heart attack. Most drugs that decrease blood pressure cause blood vessels to widen, making it easier for blood to pass through them, or cause the heart to beat less forcefully. But there's growing interest in factors that determine the pulse pressure, such as the arteries' ability to stretch or to store the blood ejected with each heartbeat.

Next week, we'll discuss what you can do personally to decrease your blood pressure, your risk of developing hypertension or your risk of heart disease or stroke if you already have high blood pressure.