

Published by

HEALTHY CHOICES FOR MIND AND BODY

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HOW MUCH SALT?

November 2010

Bottom Line at the Top: Americans as a group eat a lot of salt (sodium chloride). Sodium restriction lowers blood pressure in many, but not all, people. Since salt adversely impacts health, a modest salt reduction to recommended levels is reasonable. A switch to a vegetable and fruit-rich diet is even healthier and would obviate the need for cuts in salt.

A high salt diet can increase blood pressure in many people. Controversy flares when public health officials declare that *everyone* should limit dietary sodium.

The average daily sodium intake of U.S. adults is approximately 3900 mg, or 10 grams of salt. A teaspoon of salt equals 1000 mg sodium (2500 mg salt), so Americans, on average, shovel about 4 teaspoons of salt into their mouths each day. The Food and Drug Administration already has already recommended salt-restraint by establishing the daily reference value for sodium as 2400 mg, equal to 6 grams of sodium chloride.

Your blood pressure has a top number and bottom number. The systolic pressure is the top number and reflects the force and volume of the heart's contraction against resistance from a stiff aorta and arteries, and things that raise adrenaline, like anxiety, pain and anger. The bottom number, called diastolic, indicates artery wall inability to relax. We

measure blood pressure in millimeters of mercury, but I'll call them points, because that's what most patients call them.

Does sodium reduction lower blood pressure?

When you lump together the results of many experiments involving sodium reduction in people with high blood pressure (called hypertensive), the average systolic blood pressure falls by 3 to 5 points and diastolic pressure dips about 0.8 to 2 points.

People with normal blood pressure show little response. The average change in blood pressure is miniscule, but there are non-hypertensive people whose pressure does go down. Salt-responsiveness is not necessarily fixed for an individual over a life-span. Salt-sensitivity in obese, hypertensive teens may dissipate when they lose weight.

A low salt diet works best in those who eat a typical lousy American diet. People eating what is called a prudent diet, with vegetables, fruits, low-fat dairy, whole grains, fish and poultry, generally have much lower pressure even without salt reduction. After changing to a prudent diet the systolic pressure falls by an average of 6 points and the average diastolic pressure by 3 points. With a crappy diet, it takes an extreme salt restriction to match the improved blood pressure seen with a prudent diet. Add a modest salt reduction to the prudent diet and systolic pressure falls by another 1.3 points and diastolic by 0.6 points.

In the DASH (Dietary Approaches to Stop Hypertension) trial, a more extreme prudent diet slashed hypertensives' systolic pressure by 11 points and the diastolic pressure by 5 points. The effect in people with normal BP was significant but to a lesser degree. This particular prudent diet required eating 4 servings of fruit, 4 servings of vegetables and 3 servings of low-fat dairy products daily. Whereas sodium responsiveness depends on things like race and age, the prudent diet lowered blood pressure in all categories of people.

High potassium and dairy-rich diets tend to foster lower blood pressure. Sodium decreases potassium and calcium levels by increasing urinary losses. Could this be part of the reason that sodium raises blood pressure? Should we be focusing more on

increasing dietary potassium and calcium and less on reducing sodium? Possibly.

Most studies have been short-term and focused on salt's effect on blood pressure, not real life-and-death outcomes. The one exception is the National Health and Nutrition Examination Survey, in which a subgroup of overweight people who consumed double or more the recommended sodium intake had a 32% increased risk of stroke, a 61% increased risk of heart disease death and a 39% increased risk of death from all causes.

Salt hurts more than just blood pressure.

Chronic high-salt exposure directly contributes to thickened heart walls, one step away from heart failure. This happens whether or not you have high blood pressure. Societies consuming high salt diets have more stomach cancer. Excess salt increases the flow of calcium out through the kidneys, depleting bone calcium and contributing to osteoporosis. More calcium in the urine increases kidney stone formation.

Should everyone restrict salt? No. All of these numbers are averages. In large population studies, there are people who respond to low salt diets and those who don't. That's the nature of an average. In study after study those who benefit most are African-Americans, the elderly, those with hypertension and those eating typical American diets. Women are slightly more sensitive. For example, hypertensive African-American women older than 45 years of age responded to a low sodium diet with a 10 point systolic drop, while non-hypertensive, non-African-American men younger than 45 years of age responded by only 2.8 points.

Conclusions from blood pressure data may overstate the potential effect of sodium on health. Changing dietary salt affects systolic pressure much more than diastolic, but heart disease and stroke are much more strongly related to the diastolic.

Can salt restriction harm us? No convincing evidence exists that a **modest** salt reduction to recommended levels has any long-term, adverse health consequences. Pushing it to extreme lows is another issue, though. In one study, hypertensives

on very low salt diets tended to die more of heart attacks.

Certain people need extra salt to thrive. Athletes and physical laborers who sweat profusely need to replace their salt loss. Rare individuals with genetic abnormalities that make them lose salt through their kidneys would die without enough salt. Some people with low blood pressure need salt to keep from passing out.

We need sodium for most cells in the body to function. Muscles, including the heart, need it to contract. Our nerve and brain cells need it to function. Sodium is necessary to process the calories we eat into energy. With low sodium blood levels, usually achieved by inadequate sodium combined with excessive water drinking or diuretics, we experience muscle spasms, confusion, lethargy, and even seizures.

In addition to tasting good, salt has a practical purpose in food technology: It reduces spoilage in canned and packaged goods. It's why cucumbers may rot within a week, but pickles last forever.

Is the problem sodium or salt? Salt is sodium chloride. Food also contains other sodium compounds, like the preservative sodium benzoate, the buffer sodium citrate and the filler sodium carboxymethylcellulose. The Chinese season food with monosodium glutamate, which tastes salty and contains sodium, but is not 'salt'. All sodium compounds induce sodium retention and weight gain, but only sodium chloride induces significant urinary potassium and calcium loss. In animals, non-chloride sodium compounds, such as sodium glutamate, bicarbonate, ascorbate and phosphate, do not raise blood pressure. So is the problem sodium *chloride* or sodium?

Natural foods generally contain little salt. Beans cooked in unsalted water have almost none, but to preserve them in a can takes 400 mg salt. Meats contain very little until dried, marinated, seasoned or sauced. Cooking all your food from scratch and eschewing the salt shaker completely, both in cooking and at the table, would cut salt intake to about 1000 mg per day.

Most people don't think they eat much salt if they don't salt food at the table. But salting food at the table accounts for only 15-30% of dietary salt intake. Most salt-guzzling comes from preprocessed packaged meals (hamburger helper and Ramen noodles), cheeses and deli meats, packaged snacks like crackers and chips, and restaurant foods.

Fat, salt and spices add to and sometimes overwhelm food's natural flavor, but make food taste 'good'. When the low-fat food movement hit in the 1980's, food manufacturers replaced fat with salt to meet American's taste expectations for packaged food. That's why Lean Cuisine added close to 700 mg sodium to their meals to offset the taste deficit created by removing fat. They should use potentially healthy spices like garlic, ginger, curry powder, dill and pepper for flavor instead.

Some food manufacturers have cut the salt content of soups, cereals and breads, while others have added more to poultry, meats and fish. Many companies now use sea salt, made by evaporating seawater, because its salt content is lower than table salt. It contains a variety of minerals in addition to sodium chloride. Unlike iodized table salt, it contains no iodine.

We've acquired a collective taste for salt, but even people who love salt can break their addiction with a few months of consistent restriction. At that point, salty foods may taste unpleasant.

Can we predict who should restrict salt? No simple, biochemical or genetic marker identifies salt-sensitive individuals. Measuring 24 hour urine sodium excretion tells us something about a person's salt intake, but doesn't predict salt-sensitivity. Renin, a hormone made in the kidney that regulates blood pressure and salt retention, is a better predictor of whether or not someone will be diet-, medication- and salt-sensitive. But the test is expensive and only meaningful when consuming a low sodium diet.

For doctors: People with high renin respond to beta-blocker medication, weight loss, and a low sodium, high potassium diet. Low renin people respond better to diuretic medication.

Suggestion: Eat a diet of 4-5 half-cup servings of vegetables including beans, 2-3 fruits, 2-3 low fat dairy servings, whole grains, fish, lean meats and poultry and monounsaturated fat. Limit salty restaurant and preprocessed foods, but if you eat a prudent, vegetable-rich diet you don't need to severely restrict salt intake. Don't restrict salt if you sweat a lot.