Sodium, salt, and you
Should everyone cut back on salt? There’s still no consensus.

This month, an Institute of Medicine (IOM) committee will hold its final information-gathering session on ways to reduce sodium consumption in the United States. The panel will issue its findings in a report due out in February 2010. The IOM’s mission is to bring our sodium intake down to the levels recommended by the Dietary Guidelines for Americans (www.health.gov/DietaryGuidelines)—namely, for the average adult, no more than 2,300 milligrams (mg) per day, the amount in about a teaspoon of ordinary iodized table salt. Lower consumption—no more than 1,500 mg per day, about two-thirds of a teaspoon of salt—is recommended for middle-aged and older adults, African Americans, and people with high blood pressure.

Most of the sodium in our diet comes from salt, or sodium chloride. Salt is about 40% sodium by weight. Sodium has many important biological functions—transmitting nerve impulses, contracting and relaxing muscle fibers, and maintaining proper fluid balance. But Americans get much more than they need—3,400 mg of sodium per day, on average. The kidneys regulate the body’s sodium level by getting rid of any excess. But if there’s too much sodium in the bloodstream, the kidneys can’t keep up. Excess sodium in the blood pulls out water from the cells; as this fluid increases, so does blood volume. That means more work for the heart, increased pressure in the blood vessels, and often, eventually, stiffened vessel walls, chronic high blood pressure, and an increased risk of heart attack or stroke.

Some people are especially sensitive to sodium—their blood pressure rises and falls directly with their sodium intake. That puts them at increased risk for cardiovascular disease, even if they don’t have high blood pressure, and it means they particularly benefit from restricting sodium intake. Those most prone to salt sensitivity include the elderly, African Americans, and people with hypertension, diabetes, or chronic kidney disease.

Sodium and the public’s health
As many as one in three adults in the United States has high blood pressure—also called hypertension, which is defined as a reading of 140/90 millimeters of mercury (mm Hg) or higher. Many more have “prehypertension” (a systolic blood pressure reading of 120 to 139 mm Hg or a diastolic reading of 80 to 89 mm Hg), which means that while they don’t have high blood pressure, they’re likely to develop it. Many studies have shown that blood pressure is directly related to dietary sodium, so it makes sense for at-risk individuals to cut back. But what about the rest of us?

The Centers for Disease Control and Prevention (CDC) says that limiting sodium intake should be just about everyone’s concern. In a 2009 study using data from the National Health and Nutrition Examination Surveys and referring to the Dietary Guidelines for Americans, CDC researchers concluded that 70% of American adults—about 145 million people, including everyone over age 40, all African Americans, and people with hypertension—should aim for a sodium intake of no more than 1,500 mg per day.

Some public health experts believe the 1,500-mg-per-day cap should be extended to everyone. Others say that proposal ignores other factors influencing blood pressure—and could have unintended consequences.
Sodium continued

(like the campaign to reduce fat consumption by substituting carbohydrates, which has been associated with increased obesity). Almost everyone agrees that we couldn’t reach the 1,500-mg limit without reducing the amount of salt in processed and prepared foods—the main source of dietary sodium.

Applying these findings to our own diet, the process becomes much more complex. A recent study of the DASH diet (Dietary Approaches to Stop Hypertension) showed that a diet rich in fruits, vegetables, low-fat dairy products, whole grains, beans, nuts, fish, lean meats, and poultry lowered blood pressure in people who were able to reduce their salt intake by 30%.

Reduction or restriction?

Many studies have investigated links between sodium intake, blood pressure, and cardiovascular disease. Some of the most compelling evidence has come from the Dietary Approaches to Stop Hypertension (DASH) trials.

The first DASH trial showed that a diet rich in fruits, vegetables, low-fat dairy products, whole grains, beans, nuts, fish, lean meats, and poultry lowered blood pressure in a follow-up trial, this diet was compared with one closely resembling the average American diet, and both diets were further divided into three sodium levels: high (3,500 mg/day), moderate (2,400 mg/day), and low (1,500 mg/day). More than 400 volunteers followed their assigned diets for 12 weeks, changing their sodium intake every four weeks.

Across the board, less sodium intake led to lower blood pressure. The DASH diet with sodium restricted to just 1,500 mg per day worked best for all participants, and for people with hypertension, it was almost as effective as medication.

The researchers concluded that we could all benefit from reducing our sodium intake. But the study did little to quell controversy over the issue. Critics charged that it was too brief to justify a general recommendation, and they warned of health risks from insufficient sodium in the diet. Proponents say that’s unlikely, because most human beings don’t even need as much as 1,500 mg a day for good health. Of course, this 12-week study couldn’t predict the impact of reduced sodium intake on the risk of cardiovascular disease down the road.

A 2007 follow-up study of the Trials of Hypertension Prevention (TOHP) provided a longer-term perspective. The original TOHP study involved two randomized trials of lifestyle interventions conducted in the late 1980s and early 1990s. A team led by Harvard researchers tracked down the original TOHP participants and found that those who had permanently lowered their sodium intake to between 2,000 and 2,600 mg per day and continued to watch their salt intake had almost 30% fewer cardiovascular events, including death, in the following 10 to 15 years. The TOHP trials didn’t require drastic dietary changes. Instead, the volunteers learned how to look out for hidden salt and avoid it; those who were able to reduce their sodium intake by

<table>
<thead>
<tr>
<th>Group</th>
<th>Adequate Intake (AI) of sodium**</th>
<th>Salt equivalent</th>
<th>Upper limit (UL) of sodium**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ages 19–50</td>
<td>1.5 g/1,500 mg</td>
<td>3,800 mg, or ½ tsp</td>
<td>2.3 g/2,300 mg (equivalent to 5.8 g/5,800 mg, or 1 tsp, salt)</td>
</tr>
<tr>
<td>Ages 51–70</td>
<td>1.3 g/1,300 mg</td>
<td>3,200 mg, or ~½ tsp</td>
<td>Less than 2.3 g, but a precise amount has not been determined</td>
</tr>
<tr>
<td>Ages 71 and over</td>
<td>1.2 g/1,200 mg</td>
<td>2,900 mg, or ½ tsp</td>
<td></td>
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</tbody>
</table>

* The average amount needed to replace sodium lost daily through sweat while providing enough other essential nutrients.
** UL may be higher for people who lose large amounts of sodium in sweat, such as athletes and workers exposed to extreme heat.

one-third to one-half teaspoon per day reaped the cardiovascular benefits.

So it’s unclear whether these results mean we should reduce sodium intake to no more than 1,500 mg per day or ask food processors and purveyors to cut added salt by half.

The controversy about universal salt restriction will probably continue. As in most health matters, one size doesn’t fit all. How salt affects your blood pressure and health depends on many things, including your genes, age, race, and medical conditions. Nevertheless, policy makers are likely to sit up and take notice of a recent analysis from the RAND Corporation, a nonprofit research organization. According to the study, published in the American Journal of Health Promotion (September/October 2009), lowering Americans’ sodium consumption to less than 2,300 mg per day could result in 11 million fewer cases of high blood pressure. The savings could amount to as much as $18 billion annually in health care costs—and further reductions might yield even greater savings.

**What to do**

If you’re under age 50, your blood pressure is in the healthy range (under 120/80 mm Hg), and your health is good, you have little reason to worry about your dietary sodium intake, at least for now. Still, try to limit it to no more than 2,300 mg per day. The risk for high blood pressure rises with age, so you’ll do yourself a favor if you wear your taste buds from a yen for salt. Research has shown that people who slowly reduce their intake find that they eventually prefer less salt.

Many older, obese, or diabetic people and African Americans are salt-sensitive, and most experts agree that they should cut back. For them, as well as for people with hypertension, prehypertension, kidney disease, or heart failure, sodium intake should be less than 1,500 mg a day.

If you’re hypertensive or prehypertensive or just want a healthy eating plan, consider following one of the three diets that were tested in the OmniHeart trial: the DASH-like diet (www.health.harvard.edu/148) and two others, one high in unsaturated fats and the other high in protein (www.omniheart.org). Results published in The Journal of the American Medical Association (Nov. 16, 2005) showed that all three diets lowered blood pressure, improved cholesterol levels, and reduced the risk of heart disease. (The high-unsaturated-fat and high-protein diets improved cholesterol levels and blood pressure even more than the DASH diet, which was higher in carbohydrates.)

The health benefits of these eating plans can’t be attributed to any single ingredient—the magic is probably in the mix—but one reason they work is that they’re rich in potassium. So whatever diet you follow, make sure it includes plenty of fruits and vegetables, which contain little or no sodium and are an important source of potassium. Potassium-rich choices include bananas, orange juice, cantaloupe, spinach, avocado, and sweet potato.

**What about iodine?**

Iodine is essential to human life. Too little can result in serious health problems, including thyroid enlargement (goiter) and neurological difficulties. Most of the iodine we need comes from iodized salt. Five grams of iodized salt (close to a teaspoon) meets the Institute of Medicine’s 150-microgram (mcg) recommended daily intake of iodine for nonpregnant adults.

Would long-term salt restriction—or the use of non-iodized gourmet salts and kosher salt—result in insufficient iodine intake? So far, this hasn’t been the object of concerted scientific study. The National Health and Nutrition Examination Surveys did report a sharp decline in average iodine intake between the early 1970s and the 1990s, but it never fell below the level needed for good health and is now on the increase again.

People cutting back on iodized salt can find other food sources of iodine. One of the best is seaweed (kelp, wakame, nori). Another is seafood (clams, oysters, lobster, shrimp, sardines, and ocean fish). Wherever iodine is added to animal feed, dairy products are a good source. Some breads also contain significant amounts of iodine. Unfortunately, iodine content isn’t listed in the Nutrition Facts label. Fruits and vegetables contain iodine, but they’re typically not a concentrated source, and the amount depends in part on the soil they’re grown in and the fertilizers applied to them. Apart from iodized salt, the most reliable source of iodine is probably an iodine-containing multivitamin.

Here are some ways to reduce your sodium intake:

**Eat mostly fresh foods.** Most of the sodium we eat comes from restaurant meals and processed foods, including canned vegetables and soups, pasta sauces, frozen entrees, luncheon meats, and snack foods. If you start with unsalted, fresh foods and prepare them yourself, you can exercise better control over your sodium intake.

**Take care with condiments.** Sodium is found in many condiments besides ordinary table salt—including soy sauce, Worcestershire sauce, salad dressings, ketchup, seasoned salts, pickles, and olives. Baking soda, baking powder, and monosodium glutamate (MSG) also contain sodium.

**Read labels.** The Nutrition Facts label on packaged food lists milligrams of sodium per serving, so note how many servings the container holds. The percent daily value (“% Daily Value” or “% DV”) is based on 2,400 mg, so if your own daily sodium limit is lower, the amount of sodium in a serving is actually a higher percentage than the label indicates. Read the labels on over-the-counter drugs, too; some of them contain sodium.

**Speak up.** When dining out, ask to have your food prepared with less salt. You can also ask for a lemon or lime wedge to add more flavor to your food.

**Spice it up.** Cut back on salt by making your own blends of spices and herbs and using them along with lemon or lime juice or flavored vinegars. (Ready-made blends are also available in grocery stores.) Some kosher and gourmet salts contain less sodium than standard iodized table salt; check the Nutrition Facts label to make sure.
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