The Need to Reduce Sodium in the U.S. Food Supply Now

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About 850,000 Americans die annually from cardiovascular diseases (CVDs), primarily coronary heart disease and stroke (2). These diseases are largely preventable. One of the major risk factors for these diseases is hypertension, which itself is largely preventable (28).

More than 27% of U.S. adults have hypertension, defined as a systolic blood pressure (SBP) ≥140 mm Hg, diastolic blood pressure (DBP) ≥90 mm Hg, and/or the use of antihypertensive medications (26). Another 31% have prehypertension (SBP 120–139 mm Hg and/or DBP 80–89 mm Hg) (26). The risk for developing CVD increases progressively the higher blood pressure rises above 115/75 mm Hg (16).

As indicated in a report adopted unanimously by the American Medical Association (AMA) House of Delegates in June 2006, the evidence tying excess sodium to increased rates of hypertension, death, and disability is overwhelming (5). Since that report was published, a World Health Organization (WHO) report has called the evidence “conclusive” (29).

The Role of Sodium in Increasing Blood Pressure

Animal, ecological, and migration studies as well as randomized clinical trials show a consistent pattern correlating sodium intake with blood pressure.

- Sodium reduction lowers blood pressure by about 5 mm Hg systolic and 2.5 mm Hg diastolic in hypertensive patients per teaspoon of salt and by 2 mm Hg systolic and 1 mm diastolic in normotensives.
- The taste for salt is acquired and not fixed.
- Currently the FDA is evaluating sodium’s GRAS status. The AMA has proposed three alternatives for the FDA to consider in designing new regulations for sodium in addition to removal of the GRAS status of salt.

American intake (27). Progressive addition of salt to the diet of chimpanzees leads to a large increase in blood pressure (33/10 mm Hg) that is reversible after withdrawing the high salt intake (8).

Most observational studies examining various nonindustrialized societies have correlated sodium intake with the incidence of hypertension or showed that when salt was introduced into the diet, the prevalence of hypertension increased (22). There are also direct correlations between sodium intake measured by daily urinary excretion rates and both blood pressure level and the incidence of stroke, especially at the extremes of intake (20). Furthermore, people living in primitive societies with habitually low salt intake are normotensive and do not exhibit increases in blood pressure with age, unless they migrate, adopt more modern lifestyles, and increase their sodium intake (14).

A large number of intervention trials further elucidated the relationship between salt intake and blood pressure. About 100 randomized controlled trials (RCTs) conducted from 1970 to 1995 examined the effects of reducing sodium intake on blood pressure in normotensive and/or hypertensive individuals. Meta-analyses of these RCTs demonstrated that sodium reduction lowers blood pressure by about 5 mm Hg systolic and 2.5 mm Hg diastolic in hypertensive patients per teaspoon of salt and by 2 mm Hg systolic and 1 mm diastolic in normotensives (6,7,10,12,15,19).

Subsequently, the Dietary Approaches to Stop Hypertension (DASH)–Sodium trial investigated combining reduced dietary sodium with the DASH diet, which emphasizes the consumption of fruits, vegetables, and low-fat dairy products, and contains less fat, saturated fat, and cholesterol, and more potassium, calcium, magnesium, dietary fiber, and protein than the typical U.S. diet (21). When the DASH diet was employed and sodium intake was maintained at 50, 100, or 150 mmol/day (per 2,100 kcal) for 30 consecutive days, the greatest effects occurred in persons with the lowest sodium intake. The largest reductions in SBP occurred in black hypertensive patients (–12.6 mm Hg).

The effect on SBP of lowering sodium intake from 100 to 50 mmol/day was nearly twice as great as that of lowering sodium intake from 150 to 100 mmol/day. Results of the DASH-Sodium and other studies confirm the benefit of dietary sodium reduction in lowering blood pressure and support establishing a low population target for daily sodium consumption.

However, fostering such behavioral changes in natural settings is difficult. Even in RCTs with consistent reinforcement, the ability to maintain a reduced sodium diet wanes over time in the absence of readily available foods with lower sodium content.

Results of RCTs can be affected by the relative salt sensitivity of subjects. The elderly, blacks, and persons with hypertension or diabetes are generally more sensi-
tive to the short-term blood pressure-elevating effects of salt. Meta-analysis of 11 RCTs, of which five included only patients ≥60 years of age and six included patients with a mean age close to 60 years, concluded that a chronic high sodium diet increased mean SBP and DBP by 5.6 mm Hg and 3.5 mm Hg (1).

The first meta-analysis of RCTs assessing the effect of reducing salt intake on blood pressure in children also showed reductions in average systolic and diastolic pressure (13). Effects on SBP (~2.47 mm Hg) were most pronounced in infants.

**Conclusions from the Evidence**

Excess sodium consumption is one of the principal causes for the rise in blood pressure with age in the United States. This progressive rise leads to a lifetime probability of developing hypertension of approximately 90% (25). As a result of this rise in blood pressure, we have estimated that at least 150,000 adults die prematurely each year in the United States due largely to heart attacks, congestive heart failure, strokes, and renal failure; many more become disabled from these conditions (11).

Based on recent long-term follow-up from randomized clinical trials assessing the health effects of reducing dietary sodium, 150,000 is almost certainly a significant underestimate of the number of premature deaths.

The deaths attributable to excess sodium intake represent a huge toll—the equivalent of a jumbo jet with more than 400 adults crashing every day of the year, day after day, year after year. From medical as well as public health perspectives, an optimal level for the public would be to consume no more than 1,500 mg/day. Average consumption in the United States is nearly triple that, putting the health of the public at unnecessary risk.

Most of this salt is consumed not because consumers requested it, but because food manufacturers and restaurants have placed it there. Intake of sodium in the United States greatly exceeds current recommendations from the leading scientific and health authorities in the United States and elsewhere in the world.

**Major Sources of Sodium Intake**

Average adult intake in the United States is estimated at 4,000 mg/day per 2,000 calories (23). Roughly 80% of daily intake of sodium comes from processed foods and restaurant foods in most of the Western world (18). Secular trends show a disturbing 55% increase in sodium intake in the United States from the early 1970s to 2000 (4). During this period, the age-adjusted prevalence rate of hypertension increased substantially. Many canned and processed foods contain 1,000 mg or more per 8 oz serving; typical U.S. restaurant meals contain between 1 and 2 teaspoons of salt (2,300–4,600 mg sodium) (17).

**Sodium in Cereals**

There is huge variability in the amount of sodium in cereals sold in the United States. A recent trip to the supermarket revealed that sodium levels in cold cereals ranged from zero to 450/mg per cup. A similar range of sodium levels was present in hot cereals. Serving size was incorrectly listed on most cold cereals as three-fourths of a cup, rather than one cup. This makes it much more difficult for consumers to realize how much sodium they are really consuming in one serving.

It should be noted that the same companies make the same cereals for other countries such as the United Kingdom and Finland with less sodium. It must also be noted that information on sodium levels of cereals is not available on at least one major cereal company website.

**The Taste for Sodium**

The taste for salt is acquired and not fixed. When offered a lower sodium product, typically the consumer does not add table salt to compensate for the lower salt content. In addition, after consuming lower sodium foods over a period of time, taste for salt tends to decrease. Other herbs and seasonings which have no effect on blood pressure can also satisfy an individual’s taste preferences.

**Recommendations from the American Medical Association**

Because of the huge health consequences attributable to the excess consumption of sodium in the United States, the AMA has recommended the following:

1. A stepwise, minimum 50% reduction in sodium in processed foods, fast food products, and restaurant meals to be achieved over the next decade;
2. That the Food and Drug Administration (FDA) revoke the GRAS (generally recognized as safe) status of salt, and develop regulatory measures to limit sodium in processed and restaurant foods;
3. That we work together to educate physicians and consumers about the benefits of long-term, moderate reductions in sodium intake; and
4. That the FDA seek to improve labeling to assist consumers in understanding the amount of sodium contained in processed food products and to develop label markings and warnings for foods high in sodium.

**Recommendations of Others**

The Worldwide Action on Salt and Health (WASH), comprised of sodium experts from 48 countries, recently distributed data revealing huge variations in sodium in food products made by the same manufacturer in different countries with no obvious rationale. By publicizing these data, WASH hopes to create additional incentives to lower sodium levels in food products. Such data also make clear that product reformulation represents less of a problem than often alleged by some from the food industry.

In the United States, sodium reduction has been a cornerstone of the National High Blood Pressure Education Program (NHBPEP) recommendations to prevent hypertension and is endorsed by the American Heart Association (AHA) and the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC 7) as a lifestyle modification to prevent and control hypertension. The NHBPEP and JNC 7 recommend limiting sodium intake to <2,400 mg/day, while the AHA recommends <2,300 mg/day; for those with hypertension, their recommendations are for <1,500 mg/day (4). *Healthy People 2010* set an objective to increase the proportion of persons aged 2 yr and older who consume <2,400 mg sodium daily to 65% from the current baseline of ~20%.

The Food and Nutrition Board of the National Academy of Sciences recently established a tolerable upper intake level (UL) for sodium of 2,300 mg/day based on its view that excessive sodium intake is associated with an increased risk of CVD (9). The board concluded that an adequate (daily) intake (AI) of sodium is 1,500 mg for healthy 19- to 50-year-olds, with lower values for older populations. Food and Drug Administration (FDA)—regulated food products use the percent daily value (DV) to declare nutrient content based on a 2,000 calorie reference point. For some nutrients, DVs represent the uppermost limit considered acceptable for healthy individuals; for sodium, this value is <2,300 mg (1 teaspoon of salt). This amount includes sodium used in cooking and at the table.

The *Dietary Guidelines for Americans* recommends that Americans consume <2,300 mg/day. For those age 50 and higher, blacks, and those with hypertension, the recommendation is to consume <1,500 mg/day; these groups comprise roughly 50% of the U.S. adult population (24).

**Sodium as a Food Additive**

Despite the scientific and governmental recommendations described above, manufacturers can add large amounts of sodium...
to processed foods based on the FDA designating it as a GRAS ingredient. The Center for Science in the Public Interest (CSPI) first urged the FDA to set sodium limits for food in 1978. Several years ago, the CSPI filed suit to force the FDA to either affirm sodium’s current GRAS status or to declare it a food additive (3).

Revoking the GRAS status would require industry to petition the FDA to approve the use of salt as a food additive at specified levels in various types of food, and would establish a process and procedures for establishing and regulating these amounts.

The Importance of Developing Better Food Labels

With regard to labeling and the question of the effectiveness of FDA regulations in reducing salt intake by the public, the AMA believes that they have been ineffective given that sodium intake rose by 55% from the early 1970s to 2000. The AMA and others believe that a real opportunity exists to better inform the public and for the industry to reduce the amount of salt added to the food supply via labeling initiatives. Consumers in the United States have little or no idea how much salt that they are ingesting each day. The current back-of-pack labeling system is inadequate to inform consumers whether or not to purchase an item in the grocery store based on its sodium content.

Other countries are far ahead of the U.S. in addressing this issue. For example, Finland began a major campaign aimed at the food industry and the public to reduce sodium consumption more than 30 years ago. Finland utilizes front-of-package warning labels for foods high in salt and a healthful symbol for foods low in salt. Sodium consumption decreased there by 40% during this period. Simultaneously, average blood pressure decreased by more than 8 mm Hg—a huge decrease for a population—and age-adjusted cardiovascular disease mortality rates declined by more than 80% (17).

The United Kingdom began a campaign aimed at the food industry and the public to reduce sodium intake approximately five years ago. A large number of companies in the United Kingdom have voluntarily adopted a front-of-package red-yellow-green traffic light system. In November, a press release in the United Kingdom announced that sodium in fresh and frozen prepackaged meals sold in supermarkets had decreased by 45% over the past four years as a result of product reformulation. There is no evidence that either the safety or the quality of the food supply in Finland and the United Kingdom have been adversely affected by lowering sodium content.

Unlike the situation in countries such as Finland and the United Kingdom, the food processing industry in the United States has been slow to respond to the medical and public health imperative to substantially reduce the sodium content of processed foods and restaurant foods. The voluntary approach to this problem has not worked in the United States.

The FDA and Sodium

Currently the FDA is evaluating the CSPI’s petition mentioned above. A hearing on this petition was held in late November. The AMA publicly supported removal of sodium from GRAS status at that hearing. The AMA also proposed three alternatives for the FDA to consider in designing new regulations for sodium in addition to removal of the GRAS status of salt. First, the FDA could follow the lead of the United Kingdom, which divided foods into 30 major categories and then recommended that companies’ products contain no more than the median levels then extant in such products. Another and complementary approach would be to designate any product containing more than 50 mg/oz as high in sodium and require a front-of-product warning label. A third approach would be to require a 5% per year reduction for all products designated as high. Each of these three approaches would lead to major reductions in sodium content by food manufacturers.

The AMA has indicated that it would be happy to work with the FDA and the food industry to develop appropriate recommendations to accomplish this. We urge the cereal manufacturers to join these efforts.

Whatever system the FDA chooses, there is a need for immediate action. Each day’s delay results in more preventable deaths and disability in the United States.

References


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