

VIEWPOINT

Sodium Reduction—Saving Lives by Putting Choice Into Consumers' Hands

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Although sodium reduction has been proposed as a public health strategy in the United States for more than 4 decades, there has been no progress reducing consumption. One reason for this lack of progress is the continued ubiquity of dietary sodium in the US food supply. The Food and Drug Administration (FDA) has released draft proposed voluntary guidelines¹ to encourage companies to steadily reduce sodium in processed and restaurant foods, a change that would increase consumers' control over their sodium intake. The proposed guidelines set targets for the gradual reduction in sodium across a range of food categories for both manufactured and restaurant products and would lead to a sustained reduction in the amount of sodium added to the food supply before foods reach consumers' hands. This Viewpoint provides answers, based on the best available science, to important questions about why this action is needed.

How Important a Problem Is High Blood Pressure?

High blood pressure is the leading cause of death from heart disease and stroke in the United States, contributing to more than 1000 deaths per day. One in 3 US

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adults—more than 70 million people—have hypertension, and only half have it controlled. Another 1 in 3 adults have prehypertension, and each 20-point increase in systolic blood pressure above 115 mm Hg doubles the risk of death from heart disease and stroke; risk increases at levels below which blood pressure is treated with medication currently. However, there is strong evidence, including a recent analysis of more than 100 randomized clinical trials, that sodium reduction reduces blood pressure in adults.²

How Much Difference Would Sodium Reduction Make?

Nine of 10 US adults and children consume too much sodium, and even modest reductions in sodium intake are associated with substantial health benefits. Average sodium intake (≈ 3400 mg/d) is well in excess of the 2300 mg/d recommended by the 2015-2020 *Dietary Guidelines for Americans*. It is estimated that a decrease in sodium intake by as little as 400 mg/d could prevent 32 000 myocardial infarctions and 20 000 strokes annually.³ Reducing so-

dium intake by 1200 mg/d may reduce the number of people with hypertension by nearly 11 million. Over a decade, this reduction could prevent up to an estimated 500 000 deaths and may save an estimated \$100 billion in health care costs.^{3,4} In addition to, and working synergistically with, improved treatment of hypertension, sodium reduction is the most scalable intervention to reduce blood pressure; no other intervention would have as large a population reach and effect.

Could Sodium Reduction Harm Some People?

Some researchers claim that sodium reduction could harm a segment of the general population. Although there are short-term physiologic responses to marked short-term sodium reduction, interventions lasting 4 weeks or longer do not adversely affect blood lipids, catecholamine levels, insulin metabolism, or renal function. In contrast, excess dietary sodium intake, even in the absence of elevated blood pressure, may adversely affect the heart, kidneys, brain, and blood vessels.

Reducing sodium in the food supply will not cause insufficient sodium consumption. Recommended sodium intake is far higher than physiologic need; the estimated average requirement of 1500 mg/d accommodates groups with extreme physiologic sodium excretion (eg, professional athletes). If proposed targets are met, there will be minimal change in the proportion of the population consuming less than 1500 mg/d of sodium, currently 1%. In sum, there are definite harms associated with excess sodium, clear ben-

efits from reducing sodium intake to levels recommended in the *Dietary Guidelines for Americans*, and minimal risk of harm from inadequate sodium intake.

Is Evidence Strong Enough to Take Public Health Action?

A robust body of evidence supports the health benefits of sodium reduction. There is incontrovertible evidence of a direct, dose-response relationship between sodium and blood pressure. There is also evidence that sodium reduction prevents cardiovascular disease based on trends in cardiovascular events related to sodium reduction at the population level,⁵ meta-analysis of trials to reduce sodium intake,⁶ and well-designed long-term cohort studies showing that lower sodium intake is associated with reduced cardiovascular events (despite the small number of events resulting in limited statistical power).⁷

The debate about dietary sodium reduction stems in part from a few studies with inconsistent findings at lower levels of estimated sodium intake. These reports have created a "false aura of scientific controversy around dietary

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salt.⁸ Studies that have reported a J- or U-shaped relationship between sodium intake and cardiovascular outcomes have fundamental flaws, including inaccurate measurement of usual sodium intake; potential for reverse causality due to short follow-up and inclusion of those with preexisting disease; and residual confounding.⁹

Large sample size cannot overcome these design flaws. Among other limitations, several of these studies used a single spot urine sample to assess usual sodium intake; this is an inaccurate measure of sodium intake because it ignores day-to-day variability in sodium intake, diurnal variation in sodium excretion, and the effects of medications. A single spot or one 24-hour urine collection does not represent a person's current, much less their long-term, sodium intake; intraindividual variation in 24-hour urine sodium excretion is generally as great as or greater than that between individuals. Multiple 24-hour urine collections are needed to characterize usual individual intake accurately. Studies that do not accurately assess long-term sodium intake will mischaracterize the associations between sodium intake and cardiovascular disease outcomes. The most accurate studies use either multiple 24-hour urine collections or accept that population-level comparisons are, in this case, more valid than individual comparisons because larger numbers of observations reduce error due to individual variation in sodium excretion. There is no evidence that lower sodium intake will increase cardiovascular disease or all-cause mortality. The most rigorous studies find a consistent relationship between sodium intake and blood pressure and between blood pressure and cardiovascular disease. Flawed research should not stall public health interventions to increase consumer choice over sodium intake and save lives.

Do These Guidelines Tell People What to Do Rather Than Make Their Own Choices?

The draft guidelines would achieve exactly the opposite. Currently, consumers cannot choose how much sodium to consume because more than 70% of the sodium consumed is in food before it reaches the table. Half of adults report attempting to reduce their sodium intake, yet 90% consume excess sodium. Past educational efforts have placed the burden on the consumer, with the result that sodium intake has not changed. Changes in the food supply, made gradually over time, will enable individuals to reduce sodium intake.¹⁰ This will put choice back into consumers' hands, letting them decide how much sodium to consume.

Will Voluntary Targets Work?

Reducing sodium is feasible. Different brands of the same foods vary widely in sodium content; sodium levels differ for the same brand sold in different countries, showing that manufacturers can produce foods with less sodium. Voluntary targets give industry a benchmark to guide planned reformulation of foods in advance of the menu labeling deadline to comply of May 2017.

Some argue that sodium intake is physiologically set, and if sodium is reduced in foods, people will compensate to maintain the same level of sodium intake. However, studies show that when sodium is reduced in foods, consumers replace only a small proportion of it. For instance, in the United Kingdom, where sodium in the food supply has been reduced, average sodium intake has decreased. In the United States, current average sodium intake is high because of the levels found in the food supply and not because of biological need or individual choice. Preference for salty taste may be initially set during childhood; even toddlers in the United States are exposed to high levels of sodium. Individuals who reduce sodium intake change their taste preferences, and tastes can change at the population level through widespread reductions in sodium in foods as well.

Thirty-nine countries have established sodium targets for foods and meals, with 36 of those adopting voluntary approaches. Setting targets helps create a level playing field for the food industry, supporting reductions already begun by companies such as Walmart, Darden, Unilever, PepsiCo, General Mills, Mars, Nestlé, and others. The United Kingdom set voluntary sodium reduction targets in 2003; from 2003 to 2011 sodium intake decreased 15%. During this same period, average blood pressure decreased, and, following no change in prior years, deaths from ischemic heart disease and stroke decreased by approximately 40%.⁵

Conclusions

The decline in heart disease and stroke deaths in the United States has slowed in recent years. Sodium reduction through voluntary reductions by industry and facilitated by FDA guidelines will put choice into the hands of consumers, will save lives and money, and is an achievable and effective public health strategy that should be implemented without delay.

ARTICLE INFORMATION

Published Online: June 1, 2016.
doi:10.1001/jama.2016.7992.

Conflict of Interest Disclosures: The author has completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

Additional Contributions: I thank Kathryn Foti, MPH, for assistance with manuscript preparation and Barbara A. Bowman, PhD, Mary E. Cogswell, DrPH, and Kristy Mugavero, MSN, MPH, for critical review.

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