Lower Levels of Sodium Intake and Reduced Cardiovascular Risk:
The Challenge to Achieve Lower Sodium Recommendations

Running title: Steffen; Can We Achieve Lower Sodium Recommendations?

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It is well known that sodium intake is directly related to the development of high blood pressure. In two recent meta-analyses, higher sodium intake was also related to greater risk of incident stroke and CVD;\(^1,2\) however, whether lower sodium intake reduces risk of CVD is not clear.\(^3\) One meta-analysis of 7 clinical trials originally designed to test the effectiveness of sodium reduction on blood pressure found non-significant associations of sodium reduction with lower CVD risk and total mortality over 6 or more months of follow-up.\(^4\) In observational studies of diverse populations, a J-shaped relation between sodium intake (or urinary sodium excretion) and risk of CVD has been reported.\(^5,6\) In contrast, study participants assigned to a sodium reduction intervention had a lower risk of CVD over several years of followup.\(^6\) In this issue of Circulation, Cook and colleagues reported a lower risk of CVD or CVD mortality among study participants with lower urinary sodium (<2300 mg/24 hours) compared to higher levels (3600 to <4800 mg/24 hours).\(^7\) Although the current study was not originally designed to test the effectiveness of lower sodium intake on CVD risk, multiple 24-hour urine samples, the ‘gold standard’ measure of sodium intake, were used to characterize usual sodium intake.\(^8\) In most observational studies, sodium intake has commonly been represented by a ‘spot urine’ or overnight urine collection which is not an accurate estimate of usual sodium intake and thus, previously published study results may be biased.\(^5,9,10\)

Based on study findings by Cook et al., the ideal level of sodium intake to achieve lower CVD risk was less than 2300 mg of sodium per day (the equivalent of less than 1 teaspoon of salt per day).\(^7\) The 2010 Dietary Guidelines for Americans (2010 DGA) recommend: ‘Reduce daily sodium intake to less than 2,300 mg and further reduce intake to 1,500 mg among persons who are 51 and older and those of any age who are African American or have hypertension, diabetes, or chronic kidney disease. The 1,500 mg recommendation applies to about half of the U.S.
population, including children, and the majority of adults;\textsuperscript{11} while, the American Heart Association (AHA) recommends that all Americans should consume less than 1500 mg sodium per day (the equivalent of less than ½ teaspoon of salt per day). Despite public health efforts to encourage lower sodium consumption in the U.S., Americans consume over an average 3400 mg of sodium daily (the equivalent of 1½ teaspoons of salt per day).\textsuperscript{12} Results from a study conducted in 1991 showed an estimated 12% of sodium occurs naturally in foods, 11% is added to food during preparation or at the table, and 77% of sodium is from processed/packaged foods and restaurant foods.\textsuperscript{13} According to the 2007-08 National Health and Nutrition Examination Survey (NHANES), the top food sources contributing to sodium intake were breads and rolls, cold cuts and cured meats, pizza, poultry, soups, sandwiches, cheese, pasta dishes, meat dishes, and snacks.\textsuperscript{14}

Consuming a lower sodium diet to meet the 2010 DGA or AHA sodium goal is a challenge given the current food supply of few lower sodium food choices. In order to achieve lower sodium intake, individuals should be aware of the amount of sodium in foods purchased at grocery stores and restaurants. There is a wide range of sodium among different brands of the same food. For example, the amount of sodium in pasta sauce ranges from 230 to 980 mg for 1 cup of sauce, not including the very few available lower sodium choices labeled ‘low sodium’ or ‘no salt added’ pasta sauce. The Nutrition Facts panel on package labels is an excellent tool that informs the consumer of sodium content. On the Nutrition Facts panel, the consumer may check for the % Daily Value (DV) of sodium per serving; 5% DV is equivalent to lower sodium, while 20% DV is high sodium content. In addition to obtaining sodium information from food labels, other strategies to purchase lower sodium foods include buying fresh produce and meat instead of canned or processed. However, lower sodium canned products, packaged foods, and
processed meat may be available that are labeled “low sodium,” “reduced sodium,” “no salt added,” or “unsalted”. Choosing alternative lower sodium foods instead of processed foods high in sodium is another strategy. For example, choose an alternative food such as fresh fruit instead of a salty snack – potato chips. Another behavioral strategy to reduce sodium intake is to replace the added salt, salt-containing seasonings or condiments during food preparation and at the table with herbs and spices or salt substitutes to enhance the flavor of foods.

Restaurant foods, especially fast foods, are typically high in sodium. Eating lower sodium foods in restaurants is difficult since it is unknown if the food was fresh or processed prior to preparation and if salt, salt-containing seasonings or condiments were added to the food during preparation. In addition, few restaurants identify the sodium content of foods on their menu. According to the AHA, some states and cities have already developed menu labeling requirements for sodium and other nutrients, including California and Philadelphia, PA.

To achieve the 2010 DGA and AHA lower sodium recommendations, reductions in sodium for both processed and restaurant food are necessary. To facilitate sodium reduction in Americans, two organizations, in particular, have been working with food manufacturers and restaurants to voluntarily reduce the amount of sodium in their foods. In 2008, the New York City Health Department coordinated a partnership of over 90 state and local health authorities and national health organizations called the National Salt Reduction Initiative (NSRI). Their goal is ‘to reduce American’s sodium intake by 20% by 2014 through voluntary corporate commitments to lower sodium in packaged and restaurant food’.15 The American Heart Association’s Heart Check Food Certification program, which began in 1995, is designed to assist consumers in selecting heart healthy foods at grocery stores and restaurants.16 The Heart Check mark is a symbol shown on the food package or restaurant menu indicating the AHA’s
certification of a heart healthy food. Foods meeting specific nutrient criteria, including lower sodium content, qualify for the Heart Check mark.

Cooperation from the food and restaurant industries to lower sodium in manufactured and restaurant foods would assist Americans in meeting the lower sodium recommendations. Even though sodium plays an important role in the flavor, function, and preservation of processed foods, several food manufacturers have been successful in reducing the sodium content in their processed food products by 10-60%. To achieve the lower sodium recommendations, however, further reductions are needed. Finally, public health nutrition strategies are needed to assist children, adolescents, and adults in selecting lower sodium foods to promote their cardiovascular health.

Conflict of Interest Disclosures: Dr. Steffen is the PI of a research study ‘Assessment of Food Sources of Sodium’ funded by the Centers for Disease Control and Prevention.

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