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Do New Studies Refute the Benefits of Reducing Salt?

Certainly anyone reading the *Wall Street Journal* (WSJ) article "Low-Salt Diets May Pose Health Risks, Study Finds" by Ron Winslow, or who is perusing the article "Studies Question Need to Watch Salt" on WebMD Health News by Brenda Goodman, or who is even watching other media reports discuss these new studies that were all published in the August 13, 2014 edition of the *New England Journal of Medicine* (NEJM) would be led to believe that this new data seriously undermines current recommendations to reduce salt/sodium intake. Even an accompanying editorial in the NEJM by Dr. Suzanne Oparil suggested that this data somehow seriously undermines current recommendations to reduce salt/sodium intake.

Mr. Winslow's WSJ article's first sentence states "A long-running debate over the merits of eating less salt escalated Wednesday when one of the most comprehensive studies yet suggested cutting back on sodium too much actually poses health hazards." Ms. Goodman's article quotes Dr. Martin O'Donnell (who authored two of the three NEJM articles) as saying, "We're not challenging the blood pressure contention here. We're seeing it, too. We're seeing a clear association between sodium intake and blood pressure, but at moderate levels, less than 6,000 milligrams a day, the effect of salt on blood pressure appears to be small. Eating less, he says, doesn't seem to prevent heart attacks, strokes, or deaths."

So all three new studies show that increased salt intake does increase blood pressure (BP) but, mysteriously, this increased BP did not translate into more deaths from heart disease and stroke. Does this not seem odd?

PURE Nonsense?

The two studies Dr. O'Donnell was involved in used data from the ongoing Prospective Urban Rural Epidemiology (PURE) study. These two studies estimated sodium (and potassium) intake based on a single morning urine collection. One of O'Donnell's studies then followed over a hundred thousand people (35 to 70 years old) in 17 countries for an average of only 3.7 years and observed more deaths and deaths from cardiovascular dis-

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ease (CVD) in those estimated to be consuming more than 5,999 milligrams (mg) of sodium per day, but more deaths in those consuming less than 4,000 mg of sodium per day. Dr. O'Donnell et. al. concluded: "an estimated sodium intake between 3g and 6g per day was associated with a decreased risk of death and cardiovascular events than was either a higher or lower estimated level of intake." This would be great news if it were true, because most American adults are already consuming between 3 and 6 grams (g) of sodium daily. However, it is well known that many people who are sicker, and particularly those with failing hearts, are likely to be eating less food and many will also be cutting back on salty foods because excessive dietary salt can cause fluid retention, which can make breathing difficult by causing lung congestion. Most people with congestive heart failure (CHF) are expected to die over the next 5 years, largely from CVD.

The second study (1) also observed that those whose urine had a low potassium content were significantly more likely to die. Of course, the most obvious explanation for both a lower intake of both sodium and potassium is that sicker people are simply eating less food. Now this seems likely to this reviewer, but such an explanation for their data seems to have largely escaped Dr. O'Donnell and the rest of the PURE research team.

The second study by the same PURE research group observed that people who consumed less potassium and more sodium had higher BP on average, and this was particularly true in those who were older and had elevated BP to begin with (2). They also noted that this trend continued as sodium intake dropped but became statistically insignificant as sodium intake levels fell below an estimated 3,000 mg per day. Again, one explanation for this data is that many of those subjects who were consuming the least sodium and potassium were likely eating less food because they were already sicker and had poor appetites. So these two new studies, despite their limitations of using a single morning urinary sample to estimate how much sodium and potassium their subjects were consuming, still both observed that more salt (and less potassium) intake was significantly associated with higher BP. Isn't higher BP over the long term the single greatest CVD risk factor and predictor of earlier mortality?

Dr. Oparil's NEJM editorial begins by stating that more than a billion adults worldwide have hypertension (HTN) "…and that hypertension accounts for more than 9 million deaths annually." However, Dr. Oparil then goes on to say "…this large study does provide evidence that… low levels of sodium excretion may be associated with an increased risk of death and cardiovascular-disease outcomes..." This neglects the point that the low sodium (and potassium) intake can be caused by illness (especially CHF) that greatly increases the risk of CVD? Dr. Oparil says that without a long-term clinical trial to show the safety and efficacy of salt reduction "…the results argue against reduction of dietary sodium as an isolated public health recommendation." Mr. Winslow's WSJ article quotes Dr. Oparil as saying this study "adds a pretty big weight on the side of low-salt intake is associated with harm" and that the current low-sodium targets are "questionable health policy." This begs the question of whether this is true even though these two new studies showed unequivocally that higher sodium intake was significantly associated with higher BP.

Third NEJM Study

According to a new meta-analysis of 107 randomized intervention trials that evaluated the potential impact of dietary sodium intake to the World Health Organization's (WHO) recommendation of limiting sodium to 2,000 mg/day, sodium reduction would prevent approximately 1.65 million CVD deaths per year, if such a reduction were achieved globally. This new analysis evaluated data from 187 different countries and was published in the August 14 issue of the NEJM (3). "High sodium intake is known to increase blood pres-

sure, a major risk factor for cardiovascular diseases including heart disease and stroke," according to Dr. Mozaffarian, M.D., Dr.P.H., the dean of the Friedman School of Nutrition Science and Policy at Tufts University, who led the research team while still at the Harvard School of Public Health. The result of this new meta-analysis shows that the customary amounts of salt being added to foods worldwide are likely a major cause of HTN and CVD mortality.

For this study, Dr. Mozaffarian and colleagues collected and analyzed existing data from 205 surveys of sodium intake in many countries, representing nearly three-quarters of the world's adult population. This data was combined with other global data on food intake to estimate sodium intakes worldwide by country and by men and women of various ages in those countries. The effects of sodium consumption on BP and of BP on CVD were then determined separately in new pooled meta-analyses that included differences by both age and race. These findings were then combined with current rates of CVD around the world to estimate the numbers of CVD-related deaths likely attributable to sodium intake in excess of 2,000 mg per day. The researchers found that the average intake of sodium worldwide in 2010 was 3,950 mg per day, or nearly double the 2,000 mg per day recommended by the WHO and nearly triple the 1,500 mg of sodium now recommended by the American Heart Association (AHA). This data showed that every region of the world was well above these recommended sodium intake levels. Regional average sodium intake ranged from 2,180 mg per day in sub-Saharan Africa to 5,510 mg per day in Central Asia. In their meta-analysis of controlled intervention studies, the researchers also found that reducing dietary sodium intake lowered BP in all adults, with the largest effects seen in older people, African-Americans, and those with pre-existing HTN.

"These 1.65 million deaths represent nearly one in 10 of all deaths from cardiovascular causes worldwide. No world region and few countries were spared," added Dr. Mozaffarian, who chairs the Global Burden of Diseases, Nutrition, and Chronic Disease Expert Group, an international team of more than 100 scientists studying the effects of nutrition on health. These new findings provide yet more compelling evidence for greater efforts to reduce dietary sodium intake. The DASH Sodium trial demonstrated that reducing salt intake from 2,300 mg down to 1,500 mg daily lowered BP even more than reducing it from 3,100 mg/day down to 2,300 mg per day (4).

Dr. Mozaffarian acknowledged that his results estimated sodium consumption based on urine samples, which are known to modestly underestimate true sodium intakes. Additionally, he noted some countries lacked data on sodium consumption, which had to be estimated based on other nutritional information. He further noted that because their study focused on CVD deaths, it may underestimate the full health impact of excessive sodium intake, which is also linked to a much higher risk of nonfatal CVD, kidney disease, and stomach cancer (the second most-deadly cancer worldwide).

Bottom Line: The claims being made by the authors of the two PURE articles are troubling because the preponderance of credible scientific data continues to show that elevated BP is the single greatest CVD risk factor in most populations. Data from controlled clinical trials show that dietary salt in excess of 1,500 mg/day is the #1 dietary cause of elevated BP. Indeed, in all human populations studied by medical anthropologists, it is known that less than 1,500 mg of sodium per day results in very little or no increase in BP even into old age. By contrast, BP rises significantly over many years in all human populations in which salt is added to food in significant quantities, resulting in most people in all those salt-added societies sooner or later ending up with HTN (5).

For references, visit http://www.communicatingfoodforhealth.com/studies-reducing-salt/

By James J. Kenney, PhD, FACN

Model Cholesterol Damage in Your Hallway

Sometimes the best way to help your clients internalize key health lessons is to have them act them out. For this activity, you will need a free doorway in a low-traffic area, with available space on either side of the door. The door to your office or conference room may be perfect. You will also need some balloons, tape, and 4 different colors of bandanas (or another tool that you can use to mark participants into different teams).

Begin by bringing your participants into the hallway and explaining that the group is going to model the flow of blood through an artery. Then divide everyone into four groups.

One group will represent LDL cholesterol. They will carry balloons that they will attach to the edges of the door as they go past. These balloons will represent growing LDL deposits.

A second group will represent HDL cholesterol, which will remove LDL balloons as they go past and help to clear the arteries.

A third group (the largest) will be blood, trying to move through the door.

A fourth group will link arms to represent blood clots and try to move through the doorway in groups,

Begin by having the LDL and blood groups move through the door in waves. Point out the delay prompted by LDL people taking time to stick their balloons to the door and how this action impacts blood flow.

Have a second round of blood, LDL, and HDL move through the doorway, carrying out their tasks, then discuss how the blood flowed this time.

Then, once the door is pretty covered in balloons, discuss the parallels of the door to an artery in a person with high blood cholesterol. Add a few blood clots to the group and have the teams move through the door again. What happens when a blood clot clogs the artery? What would happen to a person if this occurred in his or her body?

Have everyone take down their balloons and return to the classroom for a full activity debrief, answering any questions that they may ask and highlighting the roles of HDL and LDL cholesterol on the flow of blood through the arteries.

This lesson is excerpted from the 12 Lessons of Diabetes program, which is available in its entirety in the Nutrition Education Store.

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