By Raphael Sirtoli

How much salt is optimal for good health? According to a report last month by the National Academies of Sciences, Engineering and Medicine (NASEM), lower is indeed better. This conclusion contradicts the organization’s own 2013 investigation, however, and also ignores a large and growing body of research showing a moderate amount of salt to be ideal for heart health. Thus, it is something of a mystery as to why this latest NASEM report reverted to the previous orthodoxy on salt.

NASEM’s current report sets the adequate intake (AI) of sodium to 1,500 mg/day for anyone over age 19, far lower than the 2,300 mg/day previously set by the organization.

Sodium vs. Salt

Salt is made up of about 40% sodium and 60% chloride, so the 1,500 mg and 2,300 mg/day AI values are equivalent to 3,750 and 5,750 mg of salt, respectively. In effect, the new report lowers the sodium recommendations, and thus, salt, by 35% across the board.
Evidence to the Contrary

This latest NASEM report contradicts the majority of the existing scientific literature on salt, which suggests that heart-disease deaths are elevated in populations that consume too little salt. These studies conclude that a “moderate” amount of salt, between about 3 and 5 grams, is optimal for health. The exception is in hypertensive populations on high-salt diets for whom studies show benefit from salt reduction. However, researchers emphasize that this benefit is limited to people with hypertension and is not generalizable to populations at large.

In 2013, NASEM itself concluded that the “evidence from studies on direct health outcomes is inconsistent and insufficient to conclude that lowering sodium intakes below 2,300 mg, or 5.7 g of salt, per day “either increases or decreases risk of CVD [cardiovascular disease] outcomes, including stroke and CVD mortality, or all-cause mortality in the general U.S. population.” The Academies report adverse outcomes associated with low sodium intakes, particularly in populations with diseases like diabetes or heart disease.

In fact, a majority of studies support NASEM’s 2013 conclusions. A 2014 report in the Journal of Hypertension, for instance, found that high and low sodium diets were associated with increases in mortality rates, whereas maintaining “usual” salt intake levels between 2,645 - 4,945 mg/day were not associated with increased mortality.¹

The world’s largest study, called Prospective Urban Rural Epidemiology (PURE), found in 2014 that high salt intake is not associated with increased risk of cardiovascular disease or other negative outcomes when compared to lower salt intakes. PURE and many other studies have shown that decreased salt consumption, as measured by urinary sodium excretion, has been linked to higher risk of heart-disease mortality.²

This most recent NASEM report deals with this contradictory data on salt either by dismissing contrary studies for “excessive bias,” without further explanation, or by claiming inadequacy of study methods. For instance, NASEM authors correctly highlight important limitations in the method of measuring sodium excretion in urine over 24-hours as an
accurate reflection of dietary sodium intake,\textsuperscript{3} however, the authors fail to note that this method is still considered the gold standard, compared to any other commonly used method. Indeed, NASEM itself relied on this same method, in addition to spot urine checks, in its own report.

Furthermore, NASEM all but dismisses a large, landmark study with contrary results, called Trials of Hypertension Prevention (TOHP), choosing instead to emphasize a contradictory re-analyses of the TOHP data, by a NASEM committee member.\textsuperscript{4,5}

A One-Sided Committee

It is unfortunate that the 2019 NASEM committee did not include any members who might have been likely to challenge the “lower is better” conventional wisdom on salt. In fact, many committee members were longtime authors and defenders of this orthodoxy and could not reasonably be expected to challenge it. These members include: Alicia Carriquiry, Alice Lichtenstein, Jian He and Nancy Cook, whose publication records indicate an affiliation with a “lower is better” approach, without reservations.\textsuperscript{6,7,8,9} The lack of balance on the committee likely meant that its outcome was a foregone conclusion.

Origin of ‘Lower is Better’ Salt Hypothesis

The dietary salt guidelines go back to a 1976 study by Meneely and Batterbee,\textsuperscript{10} which observed the occurrence of hypertension in genetically susceptible rats after excessive salt consumption. Even though this phenomenon could not be confirmed in dogs (unless renal function was impaired), the authors extrapolated that humans must respond similarly to rats. The report acknowledged that high consumption of salt increases blood pressure only in a subset of people. Nevertheless, the report concluded that salt for all people should be restricted to 3,000 mg/day or less. Surprisingly, this advice has done little to change salt intake in Americans; consumption has remained constant in recent decades, despite changes in official recommendations.\textsuperscript{11}

Future of NASEM Recommendations

Is the new NASEM recommendation on salt even feasible? According to linear programming models which test food combinations of 39 food groups,\textsuperscript{12} consumption of so little sodium is almost impossible while also maintaining adequate levels of potassium. Sodium (salt) and potassium work in tandem to accomplish essential biochemical tasks, which is why appropriate salt-to-potassium ratios are important. Consequently, it’s imperative for dietary guidelines to recommend a manner of eating that allows for the sufficient intake of both minerals. The latest NASEM recommendations appear to make this impossible.
The 2013 NASEM report was widely considered to be a breakthrough in challenging the long-standing orthodoxy on salt. Now, in 2019, these recommendations seem to have erased the latest science and reverted our understanding back to an earlier time.

About the Author:

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NASEM Committee Members: Publication Record on Salt/Sodium

- **Virginia A. Stallings**
  0 papers studying “sodium” or “salt” (except for the 2019 NASEM report)

- **Cheryl A. M. Anderson**
  2 papers studying “sodium” or “salt”
  1. **Neutral** “nearly half of all participants did not exhibit a slope consistent with salt sensitivity” [Study](#)
  2. **Lower is better** “[...] strategies to reduce sodium intake should focus at the population level first and should include the industries that supply processed foods, beverages, and menu items” [Study](#)

- **Patsy M. Brannon**
  0 papers studying “sodium” or “salt” (including the 2019 NASEM report)

- **Alicia Carriquiry**
  6 papers studying “sodium” or “salt”
  1. **Lower is better** “Regardless of recommendations or sociodemographic or health characteristics, the vast majority of US adults consume too much sodium and too little potassium” [Study](#)
  2. **Lower is better** “Monitoring sodium intake in the U.S. population is imperative to track current and future national sodium reduction efforts”...no mention of low salt intakes being risky... [Study](#)
  3. **Lower is better** “Excess sodium intake is projected to cause an estimated 50,000 heart attacks and 30,000 strokes in the United States every year (1). Accurate monitoring of intake is essential to support public health efforts to reduce excess intakes”...no mention of low salt intakes being risky... [Study](#)
  4. **Lower is better**...no mention of low salt intakes being risky... [Study](#)
  5. **Lower is better** “Reducing average daily US population sodium consumption by approximately one-third is projected to avert up to 92,000 deaths and save up to 24 billion health care dollars annually” [Study](#)
  6. **Lower is better** “These results support those from randomized controlled trials showing reduced sodium consumption and increased potassium consumption can help prevent hypertension, and hence, cardiovascular disease”...no space given to risks of low salt intakes... [Study](#)

- **Weihsueh Chiu**
  0 papers studying “sodium” or “salt” (including the 2019 NASEM report)

- **Nancy R. Cook**
  **Lower is better** (already reviewed and in article)

- **Eric A. Decker**
4 papers studying “sodium” or “salt”

1. **Neutral** “nearly half of all participants did not exhibit a slope consistent with salt sensitivity” study
2. **Lower is better** Reducing salt in tacos using mushrooms [Study](#)
3. **Lower is better** “salts are able to promote lipid oxidation in emulsions” [Study](#)
4. **Neutral** sodium-fat food science [Study](#)
5. **Lower is better** “The ability of NaCl to reduce the activity of the antioxidant enzymes could be partially responsible for the lower oxidative stability of salted muscle foods” [Study](#)

- **Jiang He**
  MANY papers studying “sodium” or “salt”...(his name is too short to properly filter studies where he's an author)

  1. **Neutral/unclear** (serum sodium, not sodium intake) [Study](#)
  2. **Lower is better** National Heart, Lung blabla position statement [Study](#)

- **Joachim H. Ix**
  6 papers studying “sodium” or “salt”

  1. **Lower is better** “[...] strategies to reduce sodium intake should focus at the population level first and should include the industries that supply processed foods, beverages, and menu items” [Study](#) (co-author with Anderson)
  2. **Neutral** “nearly half of all participants did not exhibit a slope consistent with salt sensitivity” [Study](#) (co-author with Anderson)
  3. **Pro-sodium** “In community-dwelling older men, serum sodium between 126–140, and 126–140 or 143–153 mmol/L, are independently associated with prevalent cognitive impairment and cognitive decline, respectively” [Study](#)
  4. **Neutral** “studies wherein extremes of sodium intake drive associations with outcomes particularly may be prone to bias” [Study](#)
  5. **Neutral** “Until we have such studies, we are left uncertain of whether dietary sodium reduction in CKD may be suggestively hazardous or intuitively advantageous” [Study](#)
  6. **Lower is better** “Further discussion is necessary to inform the public and the healthcare community and to inform public health strategies for sodium reduction” [Study](#)

- **Alice H. Lichtenstein**
  4 papers studying “sodium” or “salt”

  1. **Lower is better** “These data support the dietary recommendation to the reduction of salt intake” [Study](#)
  2. **Lower is better** Lower is better “In summary, available data are sufficiently strong to recommend a lower sodium intake beginning in early in life as an effective and well-tolerated approach to reducing BP in children” [Study](#)
  3. **Lower is better** “Findings suggest that efforts to promote reductions in energy, sodium, saturated fat, and trans fat intakes need to be shifted from emphasizing portion-size labels to additional factors [...]” [Study](#)
  4. **Lower is better** “High intakes of sodium and of saturated and trans fats are associated with increased risk of developing hypertension and cardiometabolic syndrome, respectively”...no mention of low sodium risks... [Study](#)

- **Joseph V. Roderick**
  0 papers studying “sodium” or “salt”

- **Janet A. Tooze**
1 paper studying "sodium" or "salt"

1. **Lower is better** “Stating Na recommendations on a per calorie basis […] would not change the overall message to consumers to reduce Na intake and […] the Na content of foods” TOHP Study

- **Georgia A. Wells**
  1 paper studying “sodium” or “salt”
  1. **Neutral/irrelevant** abstract only

- **Elizabeth A. Yeatley**
  1 paper studying “sodium” or “salt”
  1. **Neutral** “Considering the totality of the evidence, these committees consistently showed that the evidence revealed a relation between sodium intake and CVD risk that was consistent with the known effects of sodium intake on BP” Study.