

# A Call for Quality Research on Salt Intake and Health: From the World Hypertension League and Supporting Organizations

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Extensive research supports the harmful effects of high dietary sodium.<sup>1–11</sup> In several animal species, including chimpanzees, diets with added sodium result in increased blood pressure (BP), and, in all settings, sodium-induced hypertension is harmful.<sup>12</sup> Further, in several animal models, increased dietary sodium directly causes inflammation and vascular, cardiac, and renal target organ damage independent of BP.<sup>1,13</sup> Increased dietary sodium is a procarcinogen for gastric cancer in animal studies and a probable procarcinogen in humans, as shown in epidemiological studies that have found close associations between sodium intake and gastric cancer.<sup>14,15</sup> Reducing dietary sodium decreases BP in adults and children,<sup>1</sup> with a linear relationship down to the lowest levels of sodium intake tested in randomized controlled trials (about 1200 mg/d of sodium). Increased dietary sodium is also associated with increased vascular events in healthy populations and was estimated to cause more than 3 million sodium-related deaths in 2010 (<http://viz.healthmetricsandevaluation.org/gbd-compare/>). Reducing dietary sodium is projected to be one of the most effective (and cost-effective) interventions to improve health.<sup>16</sup> Major health and scientific organizations around the world have recommended that dietary sodium levels be reduced.<sup>2–9,17–30</sup>

Nevertheless, there are several studies which report that reducing dietary sodium is not beneficial while others have produced results suggesting harm.<sup>22</sup> These studies have created substantive controversy and have drawn significant criticism from the scientific community for weaknesses in research design and methods, misinterpretation of study results, and potential conflicts of interest of the authors (Table I).<sup>31–36</sup> The Institute of Medicine commented that weak research design was a major factor in its inability to determine whether reduced sodium intake in the range of 1500 mg/d to 2300 mg/d was beneficial or harmful in reducing cardiovascular disease.<sup>22</sup> A systematic review of the

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**TABLE I.** Important Issues That Could Be Addressed in Setting Standards for Research on Sodium (Salt) Intake and Health

<p>The assessment of dietary sodium intake for populations or for individuals is precise and reliable.</p> <p>The method for assessing outcomes (eg, blood pressure and cardiovascular disease) is robust and there is minimum loss to follow-up.</p> <p>Intervention studies have a substantive and sustained impact on sodium intake, and in observational studies there is a substantive difference between low and high sodium intake.</p> <p>The study has a duration relevant to the health and disease outcomes under investigation.</p> <p>The study has adequate statistical power to address the reported outcomes.</p> <p>Relevant confounding factors are assessed, reasonably balanced, and accounted for in design and analysis.</p> <p>Blood pressure, which is on the causal pathway, is not adjusted for in analyses of effects on clinical outcomes.</p> <p>The right study designs are used to assess the question under evaluation. Specifically, it is not clear whether further retrospective studies of the relationship between sodium and either blood pressure or vascular events are warranted. Likewise, further cohort studies of the relationship between sodium and either blood pressure or vascular outcomes may not be helpful, particularly when the studies are performed in populations of patients with preexisting disease, in whom the risks of reverse causality are profound.</p> <p>Steps are taken to minimize the impact of reverse causality in cohort studies with patients who have existing disease. In such settings, reverse causality is always discussed as a major limitation precluding definitive conclusions.</p> <p>Drugs (especially diuretics) and other factors that interact with dietary sodium to reduce blood pressure and or intravascular volume are fully accounted for in the study design to avoid confounding the assessment of adverse events relating to hypotension or hypovolemia.</p> <p>The findings are reported and interpreted in the context of other published research on dietary sodium and health outcomes.</p> <p>Potential conflicts of interest are disclosed and acknowledged as a limitation in the discussion of results and are considered in funding and publication decisions.</p> <p>Discussion accounts for known published research on dietary sodium and similar relevant outcomes.</p> <p>Research data are maintained and are accessible for independent external review, if necessary.</p>
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epidemiological literature examining methodological issues in cohort studies that relate sodium intake to outcomes found that nearly all studies had major methodological issues that could impact the direction of the relationship between sodium intake and outcomes or bias towards the null hypothesis.<sup>34</sup> Rigorous research study design and conduct is needed to identify whether reducing dietary sodium is harmful or beneficial. The publication of further studies with weak designs and methods is likely to produce misleading and inconsistent results that will generate further controversy and confusion. Because controversy sells, such studies often attract unwarranted media attention, which undermines the public health message and casts doubt on solid evidence-based results.

For these reasons, the World Hypertension League and supporting organizations (Table II) make an urgent call for the setting of standards for research examining

sodium intake and health. Such standards need to be considered by researchers in designing studies, by funding bodies, and by journal editors and reviewers. To ensure consensus and the use of best available evidence in setting the standards, the standards setting process should be aided by systematic reviews of the evidence and overseen by respected international and national health and scientific organizations. To this end, the World Hypertension League is now actively creating a working group dedicated to establishing these standards and expects this effort to be under way before the end of 2014.

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**TABLE II.** Organizations Supporting the Call for Quality Research on Salt Intake and Health

<p>American Heart Association</p> <p>British Hypertension Society</p> <p>Canadian Stroke Network</p> <p>International Society of Nephrology</p> <p>Pan American Health Organization/World Health Organization</p> <p>United Kingdom, National Forum</p> <p>United Kingdom, Faculty of Public Health</p> <p>World Action on Salt and Health</p> <p>World Hypertension League</p> <p>World Stroke Organization</p>
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