

Salt consumption has a sweet spot: Too little and too much are both harmful

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Results from the largest study of its kind ever conducted—involving 18 countries and more than 100,000 people—indicate that the current recommended maximum sodium intake for the population is actually too low and may even be unsafe. However, high sodium is also harmful, so an "optimal" range is the best target.

Two reports from a global collaborative study involving hundreds of [investigators](#) from 18 [countries](#) published today in the *New England Journal of Medicine* are shaking up [conventional wisdom](#) around salt consumption.

The Prospective Urban & Rural Epidemiological (PURE) study, led by investigators from the Population Health Research Institute, McMaster University and Hamilton Health Sciences, followed more than 100,000 people for nearly four years. The study assessed sodium and potassium intake and related them to [blood pressure](#) as well as to deaths, heart disease and strokes.

Current intake of sodium in Canada is typically between 3.5 and 4 grams per day and some guidelines have recommended that the entire [population](#) lower its [sodium intake](#) to below 2.3 grams per day, a level that fewer than 5 per cent of Canadians (and people around the world) now consume.

Researchers have shown that the effects of increasing sodium intake on raising blood pressure – a risk factor for heart attack, heart failure,

stroke and other problems – become dramatically worse as intake rises above 5 grams per day, especially among people who already have high blood pressure, or who are older than 55, or both.

But the blood-pressure effects are more modest at average levels of sodium consumption (3 to 5 grams per day) and not evident at low levels of intake below 3 grams of sodium per day (a level that is higher than the maximum currently recommended by many guidelines), said Andrew Mente, the lead author of one report, and an assistant professor of clinical epidemiology and biostatistics.

"While there has been much focus on reducing salt in the diet, an important and ignored approach to lowering blood pressure is increasing the amount of potassium consumed. A balanced approach is what is likely to have the greatest benefit in lowering blood pressure," said Mente. "This can be achieved by moderation in salt intake, combined with eating lots of fruits and vegetables."

While too much salt has long been recognized as a serious health risk, the researchers have also found that may be a risk from eating too little.

In fact, the lead author of the second report, Martin O'Donnell, suggests that what is now generally recommended as a healthy daily ceiling for [salt consumption](#) appears to be set too low.

"Low sodium intake does reduce blood pressure modestly, compared to moderate (or average) intake, but low sodium intake also has other effects, including adverse elevations of certain hormones that are associated with an increase in risk of death and cardiovascular diseases. The key question is whether these competing physiologic effects result in net clinical benefit or not," said O'Donnell, an associate clinical professor at McMaster and the National University of Ireland Galway.

"In the PURE study, we found the lowest risk of death and cardiovascular events in those who consumed moderate amounts of sodium intake (3 to 6 grams per day), with an increased risk above and below that range. While this finding has been reported in previous smaller studies, PURE is the largest international study to study sodium intake and health outcomes, and adds considerable strength to the contention that moderate sodium intake is optimal."

The studies were funded from more than 50 sources, including the PHRI, the Heart and Stroke Foundation of Ontario and Canada and the Canadian Institutes of Health Research.

"The findings of both studies are robust, globally applicable and collectively question established dogma and recommended policies. This also means that salt reduction should be primarily targeted at those who have high BP and those who consume a lot of salt," said Salim Yusuf, the Principal Investigator of the global PURE study, senior author of both reports, and director of the Population Health Research Institute, which designed and coordinated the study.

Taken together, the papers show there is a "sweet spot" for sodium consumption, where too much or too little can be damaging, while a moderate amount between 3 and 6 grams is optimal. The good news is that most people in the world already consume an amount in that range, the researchers found.

In an accompanying editorial in the NEJM, Prof Suzanne Oparil from the University of Birmingham, Alabama, urged reconsideration of current guidelines and recommended randomized trials comparing outcomes in people who consume usual salt intake to very low intake to assess if further reductions in sodium reduces clinical events.

"These provocative findings beg for a randomized, controlled outcome

trial to compare reduced sodium intake with usual diet," writes Prof Oparil. "In the absence of such a trial, the results argue against reduction of dietary sodium as an isolated public health recommendation."

Provided by McMaster University

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