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## New Study Finds No Connection between Salt and Heart Disease

Link between salt consumption and heart disease challenged.

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By Ewen Callaway of Nature magazine

A controversial new study is questioning the oft-repeated connection between the consumption of too much salt and the development of cardiovascular disease. The meta-analysis, published online today in the American Journal of Hypertension<sup>1</sup>, examined the results of seven clinical studies and found no solid proof that reducing salt consumption prevents heart conditions.

The World Health Organization recommends that no more than 5 grams of salt per day should be consumed, whereas people in many Western countries typically eat twice as much. Public-health authorities are already looking at ways of cutting the salt content of foods. For instance, Britain's Food Standards Agency is working with food manufacturers to reduce sodium, and the New York City health department is spearheading a national initiative to cut Americans' salt consumption by 20% over 5 years. Nature examines the new study and its implications for such policies.

How might salt cause heart disease?

Consuming sodium causes the body to retain water, thereby increasing blood pressure, and hypertension is a risk factor for heart attack, stroke and other cardiovascular diseases.

A number of clinical trials and meta-analyses have suggested that cutting one's salt intake reduces blood pressure, says Rod Taylor, a statistician at the University of Exeter, UK, who led the new study. But his team says that it is unclear whether restricting salt intake reduces blood pressure sufficiently to protect against heart disease. A previous meta-analysis found that eating less salt reduced people's blood pressure -- but on average only slightly<sup>2</sup>.

On the other hand, many studies comparing how much salt people consume with their incidence of cardiovascular disease have come up with clearer links. A 2009 meta-analysis<sup>3</sup> of 13 such studies, incorporating 177,000 patients, found that a high-salt diet increased the risk of stroke by 23%.

Why has it been so difficult to prove whether or not cutting salt prevents cardiovascular disease?

Observational studies, which look at the correlation between salt intake and the incidence of disease, can't directly pin reductions in cardiovascular disease on eating less salt, Taylor says. "People are choosing to reduce their salt, but it may be associated with a whole host of other healthy behaviors. They may be more active and eating less saturated fat" -- factors that also protect against cardiovascular disease.

"To inform policy and whether we should be advising people to reduce their salt, observational studies do fall short," Taylor adds. Controlled experimental trials, in which patients are placed on a low- or high-salt diet and followed over time, should offer a clearer

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answer, he says.

How was the new study conducted?

Taylor's team trawled through 2,600 published journal articles on the link between salt and cardiovascular disease, and came up with seven controlled studies that included a total of 6,250 patients who were tracked for 6 months or longer. Taylor's team grouped the patients into three categories--those with normal blood pressure, those with high blood pressure and those diagnosed with heart failure--and analyzed how their salt intake was associated with blood pressure, incidence of cardiovascular disease and incidence of death.

What did they find?

People on low-salt diets saw their blood pressure drop. But Taylor's team found no statistically significant difference in the subjects' rates of heart disease compared with rates in people who didn't reduce their salt intake. Furthermore, a low-salt diet was not linked to reduced death rates in people with normal blood pressure or high blood pressure. "In one trial in heart-failure patients, we rather worryingly found that reductions in salt increased risk of death," Taylor adds.

Why is this result different from those of other observational studies?

Taylor isn't sure why his team's review came to a different conclusion from previous observational studies. It could be that there is no link between cutting salt and preventing cardiovascular disease, Taylor says. But he questions that interpretation because his team noticed reductions in blood pressure.

Perhaps the study did not have looked at enough patients to uncover a statistically significant effect. This possibility is raised by Francesco Cappuccio, who heads the World Health Organization Collaborating Centre for Nutrition at the University of Warwick, UK. "The only problem here is that they're not statistically significant and the reason for that is the meta-analysis is too small," Cappuccio says. He notes that low-salt diets did show a trend towards protecting against cardiovascular disease.

Taylor thinks the best explanation is that patients cut their salt intake early on in the studies but eventually allowed their intake to creep up, masking any benefit. "They're intensively followed up for a couple years, and 8 or 10 years later these people's behavior has probably reverted to what it was," he says.

Could a larger, closely supervised clinical trial get to the bottom of the link between salt and cardiovascular disease?

Taylor thinks that studies that rely on dietary advice directed at individuals, like those his team analyzed, do not do enough to cut people's salt consumption. Rather, scientists should look to studies that investigate the effects of public-health efforts, such as clearer labeling of a food's salt content, to see if these can prevent cardiovascular disease and death. "We need to design studies that are population-level interventions," he says, "essentially where we take a community of individuals and we target them in various ways to change their behavior and help them sustain that behavior, rather than just give them a pamphlet and have them sit down with a counselor for an hour."

However, Cappuccio says that such studies are costly, impractical and unnecessary. "They hold public health to ransom by asking for something that's impossible," he explains. "Salt, like many other nutritional factors, falls into the category where action has to be taken in the face of overwhelming evidence, even in the absence of a controlled clinical trial."

What are the policy implications of the new study?

The answer depends on whom you ask. Michael Alderman, an emeritus epidemiologist at the Albert Einstein College of Medicine in New York City, believes the study adds to growing evidence that cutting salt does not help people who consume modest amounts of the stuff. Public policies aimed at forcing salt reductions are misguided and potentially dangerous, he says. Eating less salt may reduce blood pressure, which is beneficial for the heart, but it could also increase insulin resistance, triglyceride levels and sympathetic-nerve activity -- all risk factors for cardiovascular disease.

Taylor, too, worries that policies directed at compelling people to eat less salt could have unintended health and economic consequences, and he calls for more research into the health effects of salt reduction. "Whilst intuitively reducing salt across the board appears to be a good thing, I would say we still need the evidence to prove it," he says.

Cappuccio is concerned that the new study will be used as a smokescreen, making it more difficult for public-health authorities to convince or even compel food manufacturers to reduce salt in processed and prepared foods, as these account for most of the salt in our diets. "It's creating a sense of controversy where policy is pushing forward," he explains.

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