

Health effects of salt

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The **health effects of salt** are the conditions associated with the consumption of either too much or too little salt. Salt is a mineral composed primarily of sodium chloride (NaCl) and is used in food for both preservation and flavor. Sodium ions are needed in small quantities by most living things, as are chloride ions. Salt is involved in regulating the water content (fluid balance) of the body. The sodium ion itself is used for electrical signaling in the nervous system.^[1]

Salt consumption has increased during modern times. Scientists have become aware of health risks associated with high salt intake, including high blood pressure in sensitive individuals.^[2] Therefore, health authorities recommend limitations on dietary sodium.^{[3][4][5][6]} The United States Department of Health and Human Services recommends that individuals consume no more than 1500–2300 mg of sodium (3750–5750 mg of salt) per day depending on age.^{[2][7]}

As an essential nutrient, sodium is involved in numerous cellular and organ functions. Salt intake that is too low may also increase risk for cardiovascular disease^{[8][9]} and early death.^[10]



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Acute effects

Hypernatremia, a blood sodium level above 145 mEq/L, causes thirst, and due to brain cell shrinkage may cause confusion, muscle twitching or spasms. With severe elevation, seizures and comas may occur.^{[11][12]} Death can be caused by ingestion of large amounts of salt at a time (about 1 g per kg of body weight).^[13] Deaths have also been caused by use of salt solutions as emetics (typically after suspected poisoning),^[14] forced salt intake, and accidental use of salt instead of similar-looking sugar in food.

Hyponatremia, or blood sodium levels below 135 mEq/L, causes brain cells to swell; the symptoms can be subtle and may include altered personality, lethargy, and confusion. In severe cases, when blood sodium falls below 115 mEq/L, stupor, muscle twitching or spasms, seizures, coma, and death can result.^[15] Acute

hyponatremia is usually caused by drinking too much water, with insufficient salt intake.^[16]

Long-term effects

Although many health organizations and recent reviews state that high consumption of salt increases the risk of several diseases in children and adults,^{[17][18][19][20]} the effect of high salt consumption on long term health is controversial.^[21] Some suggest that the effects of high salt consumption are insignificant.^{[22][23]}

Sodium intake is well known to be associated with increased blood pressure, particularly in sensitive populations.^[17] Most studies suggest a "U" shaped association between salt intake and health, with increased mortality associated with both excessively low and excessively high salt intake.^{[9][10][24]}

Health effects associated with excessive sodium consumption include:

- Stroke and cardiovascular disease.^[25]
- High blood pressure: Evidence shows an association between salt intakes and blood pressure among different populations and age range in adults.^[26] Reduced salt intake also results in a small but statistically significant reduction in blood pressure.^{[21][27]}
- Left ventricular hypertrophy (cardiac enlargement): "Evidence suggests that high salt intake causes left ventricular hypertrophy. This is a strong risk factor for cardiovascular disease, independently of blood pressure effects."^[26] "...there is accumulating evidence that high salt intake can predicts left ventricular hypertrophy."^[28] Excessive salt (sodium) intake, combined with an inadequate intake of water, can cause hypernatremia. It can exacerbate renal disease.^[12]
- Edema: A decrease in salt intake has been suggested to treat edema (fluid retention).^{[12][29]}
- Stomach cancer is associated with high levels of sodium, "but the evidence does not generally relate to foods typically consumed in the UK."^[30] However, in Japan, salt consumption is higher.^[31]
- Kidney disease: A US expert committee reported in 2013 the common recommendation by several authorities "to reduce daily sodium intake to less than 2,300 milligrams and further reduce intake to 1,500 mg among persons who are 51 years of age and older and those of any age who are African-American or have hypertension, diabetes, or chronic kidney disease", but concluded that there was no health-outcome-based rationale for reducing intake below 2,300 mg, and did not have a recommendation for an upper limit.^[32]

One report stated that people excreting less salt (thus, presumably ingesting less) were at increased risk of dying from heart disease. However, a recent meta-analysis conducted by the Cochrane Hypertension group found this article was subject to methodological flaws, and urges great caution when interpreting their results.^[33]

Another meta-analysis investigated the association between sodium intake and health outcomes, including all-cause mortality and cardiovascular disease (CVD) events.^[10] Sodium intake level was a mean of <115 mmol (2645 mg), usual sodium intake was 115-215 mmol (2645–4945 mg), and a high sodium intake was >215 mmol (4945 mg), concluding: "Both low sodium intakes and high sodium intakes are associated with increased mortality, consistent with a U-shaped association between sodium intake and health outcomes".

Recommended intake

Recommended intakes of salt are usually expressed in terms of sodium intake. Salt (as sodium chloride) contains 39.3 percent of sodium by weight.

Country	Description	Sodium intake mg per day	Salt intake mg per day	Authority	Remarks
United Kingdom	The Reference Nutrient Intake (RNI) defined for a typical adult	RNI: 1600	RNI: 4000	Scientific Advisory Committee on Nutrition (SACN) (2003) ^[34]	However, average adult intake is two and a half times the RNI. SACN states, "The target salt intakes set for adults and children do not represent ideal or optimum consumption levels, but achievable population goals." The Food Safety Authority of Ireland endorses the UK targets. ^[28]
Canada	An Adequate Intake (AI) and Upper Limit (UL) recommended for persons aged 9 years or more.	AI: 1200–1500 UL: 2200–2300	AI: 3000–3750 UL: 5500–5750	Health Canada (2005) ^[35]	
Australia and New Zealand	An Adequate Intake (AI) and an Upper Level of intake (UL) defined for adults	AI: 460–920 UL: 2300	AI: 1150–2300 UL: 5750	NHMRC (2006) ^[36]	Not able to define a recommended dietary intake (RDI)
United States	An Upper Limit (UL) defined for adults. A different upper limit defined for the special group comprising people over 51 years of age, African Americans and people with hypertension, diabetes, or chronic kidney disease (regardless of age).	UL: 2300 UL for special group: 1500	UL: 5750 UL for special group: 3750	Department of Agriculture and Department of Health and Human Services (2010) ^{[7][37][38]}	The Food and Drug Administration itself does not make a recommendation, but refers readers to the dietary guidelines given by this authority. ^[39]

As of 2009 the average sodium consumption in 33 countries was in the range of 2,700 to 4,900 mg/day. This ranged across many cultures, and together with animal studies, this suggests that sodium intake is tightly controlled by feedback loops in the body. This makes recommendations to reduce sodium consumption below 2,700 mg/day potentially futile.^[40] Upon review, an expert committee that was commissioned by the Institute of Medicine and the Centers for Disease Control and Prevention reported that there was no health outcome-based rationale for reducing daily sodium intake levels below 2,300 milligrams, as had been

recommended by previous dietary guidelines; the report did not have a recommendation for an upper limit of daily sodium intake.^{[32][41]}

Labeling

UK: The Food Standards Agency defines the level of salt in foods as follows: "High is more than 1.5 g salt per 100 g (or 0.6 g sodium). Low is 0.3 g salt or less per 100 g (or 0.1 g sodium). If the amount of salt per 100 g is in between these figures, then that is a medium level of salt." In the UK, foods produced by some supermarkets and manufacturers have 'traffic light' colors on the front of the packet: red (high), amber (medium), or green (low).^[42]

USA: The FDA *Food Labeling Guide* stipulates whether a food can be labeled as "free" "low," or "reduced/less" in respect of sodium. When other health claims are made about a food (e.g., low in fat, calories, etc.), a disclosure statement is required if the food exceeds 480 mg of sodium per 'serving'.^[43]

Campaigns

Consensus Action on Salt and Health (CASH)^[44] established in the United Kingdom in 1996, actively campaigns to raise awareness of the alleged harmful health effects of salt. The 2008 focus includes raising awareness of high levels of salt hidden in sweet foods that are marketed towards children.^[45] In 2004, Britain's Food Standards Agency started a public health campaign called "Salt – Watch it", which recommends no more than 6g of salt per day; it features a character called Sid the Slug and was criticised by the Salt Manufacturers Association (SMA).^[46] The Advertising Standards Authority did not uphold the SMA complaint in its adjudication.^[47] In March 2007, the FSA launched the third phase of their campaign with the slogan "Salt. Is your food full of it?" fronted by comedian Jenny Eclair.^[48]

The University of Tasmania's Menzies Research Institute maintains a website to educate people about the problems of a salt-laden diet.^[49] In Australia, the "Drop the Salt! Campaign" aimed to reduce the consumption of salt by Australians to 6g per day over the course of five years ending in 2012.^[50]

In January 2010, New York City launched the National Salt Reduction Initiative (NSRI), modeled after an initiative in the United Kingdom.^[51] It is the only coordinated, voluntary effort to reduce sodium in the United States, an effort supported by the Institute of Medicine as an interim goal in advance of federal action on sodium reduction.

As of 2013, over 90 state and local health authorities and health organizations have signed on as partners of the NSRI. Together, the NSRI partnership encourages food manufacturers and chain restaurants to voluntarily commit to NSRI sodium reduction targets for 2012 and 2014. The NSRI aims to reduce sodium in the food supply by 25 percent in five years and reduce population sodium intake by 20 percent in the same time, thereby reducing risk for heart attacks and strokes.^[52]

Twenty-one companies met their 2012 NSRI commitment. Notable reductions include: 15 percent reduction of sodium in Heinz ketchup; 32 percent reduction of sodium in the Subway's Subway Club sandwich; 33 percent reduction of sodium in Nabisco's Honey Teddy Grahams; 18 percent reduction of sodium in Kraft Single American Slices; and 20 percent reduction of Ragu Old World Style Traditional Tomato Sauce.^[53]

Separate from the NSRI, a number of major food producers have pledged to reduce the sodium content of their

food. Pepsi is developing a "designer salt" that's slightly more powdery than the salt it regularly uses. The company hopes this new form of salt will cut sodium levels by 25 percent in its Lay's potato chips.^[54] Nestlé's prepared foods company, which produces frozen meals, announced that it will reduce sodium in its foods by 10 percent by 2015.^[55] General Mills announced that it will reduce the sodium content of 40 percent of its foods by about 20 percent by 2015.^[56] A number of chain restaurants have made pledges to lower sodium over time. MenuStat, a free online database of past and current nutrition data from chain restaurants developed by the NYC Health Department, is available to monitor and evaluate these pledges.

In the United States, taxation of sodium has been proposed as a method of decreasing sodium intake and thereby improving health in countries where typical salt consumption is high.^{[57][58]} Taking an alternative view, the Salt Institute, a salt industry body based in North America, is active in promoting the use of salt,^[59] and questioning or opposing the recommended restrictions on salt intake.^[60]

Lowering salt in diet


A low sodium diet reduces the intake of sodium by the careful selection of food. The use of a salt substitute can provide a taste offsetting the perceived blandness of low-salt food; potassium chloride is widely used for this purpose. The World Health Organization (WHO) recommends daily potassium intake of not less than 3,510 mg.^[19] Excessive potassium intake may be detrimental to health, and it is advised that potassium chloride not be used by those taking certain prescription drugs. The use of seaweed granules in the manufacture of processed foods is being researched as an alternative to salt.^[61]

Studies found that excessively low sodium intake, below about three grams of salt per day,^[8] is associated with increased mortality^[10] and higher risk for cardiovascular disease.^[9]

Sea salt and table salt

Sea salt is sometimes promoted as being healthier than table salt, but they both have the same nutritional value and sodium content.^[62]

References

- Caldwell, J. H.; Schaller, KL; Lasher, RS; Peles, E; Levinson, SR (2000). "Sodium channel Nav1.6 is localized at nodes of Ranvier, dendrites, and synapses". *Proceedings of the National Academy of Sciences*. **97** (10): 5616–5620. doi:10.1073/pnas.090034797. PMC 25877 . PMID 10779552.
- "Salt". US Centers for Disease Control, Department of Health and Human Services, Atlanta, GA. 1 June 2016. Retrieved 9 June 2016.
- "American Heart Association 2010 Dietary Guidelines" (PDF). *2010 Dietary Guidelines*. American Heart Association. 23 January 2009. Retrieved 16 May 2010.
- "Nutrient Reference Values for Australia and New Zealand – Sodium". *Nutrient Reference Values for Australia and New Zealand*. Australian Government National Health and Medical Research Council/ New Zealand Ministry of Health. Retrieved 16 May 2010.
- "Sodium Chloride". *Eat Well, Be Well*. UK Government Food Standards Agency. Retrieved 16 May 2010.
- "Health Canada, Healthy Living, Sodium". *Healthy Living*. Health Canada. 2008. Retrieved 16 May 2010.
- "Dietary Guidelines for Americans 2010" (PDF). US Department of Agriculture and US Department of Health and Human Services. Retrieved 14 February 2015.
- "Eating half the recommended amount of salt per day could increase the risk of heart attacks, scientists warn" (<http://www.telegraph.co.uk/news/2016/05/21/eating-half-the-recommended-amount-of-salt-per-day-could-increas/>),

- The Telegraph*, 21 May 2016 (accessed 3 June 2016)
9. Mente Andrew; et al. (2016). "Associations of urinary sodium excretion with cardiovascular events in individuals with and without hypertension: a pooled analysis of data from four studies". *The Lancet*. doi:10.1016/S0140-6736(16)30467-6.
 10. Graudal, Niels; Jürgens, Gesche; Baslund, Bo; Alderman, Michael H. (1 April 2014). "Compared With Usual Sodium Intake, Low- and Excessive-Sodium Diets Are Associated With Increased Mortality: A Meta-Analysis" (PDF). *American Journal of Hypertension*. Retrieved 8 May 2014.
 11. Lewis, J. L. (March 2013). "Hypernatremia". *Merck Manual of Diagnosis and Therapy*. Medical Library Association. Retrieved 25 December 2015.
 12. Department of Health & Human Services, State Government of Victoria, Australia Better Health Channel: Salt (<https://www.betterhealth.vic.gov.au/health/healthyliving/salt>) Last updated: May 2014
 13. Safety data for sodium chloride (http://msds.chem.ox.ac.uk/SO/sodium_chloride.html) The Physical and Theoretical Chemistry Laboratory of Oxford University (18 November 2005). Retrieved 7 July 2011.
 14. Turk, E; Schulz, F; Koops, E; Gehl, A; Tsokos, M (2005). "Fatal hypernatremia after using salt as an emetic?report of three autopsy cases". *Legal Medicine*. **7** (1): 47–50. doi:10.1016/j.legalmed.2004.06.005. PMID 15556015. (subscription required (help)). Full text (<http://thirdworld.nl/fatal-hypernatremia-after-using-salt-as-an-emetic-report-of-three-autopsy-cases>)
 15. James L. Lewis, III, MD (May 2009). "Hyponatremia". *Merck Manual of Diagnosis and Therapy*.
 16. "Hyponatremia ("Water Intoxication")". *The DEA.org*. Retrieved 7 March 2013.
 17. "Most Americans should consume less sodium". *Salt*. US Centers for Disease Control and Prevention. Retrieved 9 June 2016.
 18. "EFSA provides advice on adverse effects of sodium". European Food Safety Authority. 22 June 2005. Retrieved 9 June 2016.
 19. "WHO issues new guidance on dietary salt and potassium". World Health Organization. 31 January 2013.
 20. He FJ, Li J, Macgregor GA (2013). "Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomised trials". *Brit Med J*. **346**: f1325. doi:10.1136/bmj.f1325. PMID 23558162.
 21. Dumler, F (January 2009). "Dietary sodium intake and arterial blood pressure". *Journal of Renal Nutrition*. **19** (1): 57–60. doi:10.1053/j.jrn.2008.10.006. PMID 19121772.
 22. Alderman Michael H (2014). "The Science upon Which to Base Dietary Sodium Policy". *Adv Nutr*. **5**: 764–769. doi:10.3945/an.114.006593.
 23. Peter Whorisky (6 April 2015). "More scientists doubt salt is as bad for you as the government says". *The Washington Post*. Retrieved June 3, 2016.
 24. Asayama K, et al. (2014). "Systematic Review of Health Outcomes in Relation to Salt Intake Highlights the Widening Divide Between Guidelines and the Evidence". *American Journal of Hypertension*. **27** (9): 1138–1142. doi:10.1093/ajh/hpu126.
 25. Strazzullo P, D'Elia L, Kandala NB, Cappuccio FP (2009). "Salt intake, stroke, and cardiovascular disease: meta-analysis of prospective studies". *BMJ*. **339**: b4567. doi:10.1136/bmj.b4567. PMC 2782060 . PMID 19934192.
 26. Scientific Advisory Committee on Nutrition (SACN) *Salt and Health* (http://www.sacn.gov.uk/pdfs/sacn_salt_final.pdf), page 3
 27. He, FJ; Li, J; Macgregor, GA (Apr 3, 2013). "Effect of longer term modest salt reduction on blood pressure: Cochrane systematic review and meta-analysis of randomised trials.". *BMJ (Clinical research ed.)*. **346**: f1325. doi:10.1136/bmj.f1325. PMID 23558162.
 28. Food Safety Authority of Ireland Salt and Health: Review of the Scientific Evidence and Recommendations for Public Policy in Ireland (http://web.archive.org/web/20110721124257/http://www.fsai.ie/publications/reports/salt_report.pdf), p. 12
 29. Australia: Better Health Channel (Australia, Victoria) Fluid retention (http://www.betterhealth.vic.gov.au/bhcv2/bhcArticles.nsf/pages/Fluid_retention?OpenDocument)
 30. Scientific Advisory Committee on Nutrition (SACN) *Salt and Health* (http://www.sacn.gov.uk/pdfs/sacn_salt_final.pdf), page 18
 31. Salt raises 'stomach cancer risk' (<http://news.bbc.co.uk/2/hi/health/3370141.stm>), BBC News Online, 7 January 2004
 32. Strom BL, Yaktine AL, Oria M (editors) (2013). *Sodium Intake in Populations: Assessment of Evidence*. Washington, DC: National Academies Press; Committee on the Consequences of Sodium Reduction in Populations; Food and Nutrition Board; Board on Population Health and Public Health Practice; Institute of Medicine. ISBN 978-0-309-28295-6. PDF (<http://www.worldactiononsalt.com/news/saltnews/2013/99714.pdf>)

33. He FJ, Li J, MacGregor GA (2013). "Effect of longer-term modest salt reduction on blood pressure". *Cochrane Database of Systematic Reviews*. **2013** (4): CD004937. doi:10.1002/14651858.CD004937.pub2.
34. Scientific Advisory Committee on Nutrition (SACN) *Salt and Health* (http://www.sacn.gov.uk/pdfs/sacn_salt_final.pdf)
35. Health Canada Dietary Reference Intakes (http://www.hc-sc.gc.ca/fn-an/nutrition/reference/table/ref_elements_tbl_e.html)
36. NHMRC Reference Nutrient Values, Sodium (<http://www.nrv.gov.au/nutrients/sodium.htm>)
37. Zied, Elisa (31 January 2011). "New U.S. Dietary Guidelines Focus on Salt Reduction". *U.S. News & World Report*.
38. Gardner, Amanda (31 January 2011). "Hold the salt! New food rules lower sodium limits". MSNBC.
39. Alexandra Greeley A Pinch of Controversy Shakes Up Dietary Salt (http://web.archive.org/web/20090512055212/http://www.fda.gov/fdac/features/1997/797_salt.html). US Food and Drug Administration
40. McCarron, D. A.; Geerling, J. C.; Kazaks, A. G.; Stern, J. S. (2009). "Can Dietary Sodium Intake Be Modified by Public Policy?". *Clinical Journal of the American Society of Nephrology*. **4** (11): 1878–82. doi:10.2215/CJN.04660709. PMID 19833911.
41. Kolata, Gina (14 May 2013). "No Benefit Seen in Sharp Limits on Salt in Diet". *New York Times*. Retrieved 3 June 2013.
42. Understanding labels (http://www.salt.gov.uk/understanding_labels.html). Salt.gov.uk (6 November 2009). Retrieved 7 July 2011.
43. Food and Drug Administration A Food Labeling Guide—Appendix A (<http://web.archive.org/web/20060321031336/http://www.cfsan.fda.gov/~dms/flg-6a.html>)
44. "CASH: Consensus Action on Salt and Health". Retrieved 7 March 2013.
45. Smithers, Rebecca (28 January 2008). "Child health fears over high salt levels in sweet foods". *The Guardian*. London. Retrieved 23 May 2010.
46. Salt Manufacturers Association press release New salt campaign under attack (<http://web.archive.org/web/20100325211142/http://www.saltsense.co.uk/releases/rel015.htm>)
47. Advertising Standards Authority Broadcast Advertising Adjudications: 20 April 2005 (http://web.archive.org/web/20110716153541/http://www.asa.org.uk/NR/rdonlyres/EFB31ED5-A00D-4AE7-8988-F69B20DF8C6D/0/Broadcast_rulings_20_April_05.pdf) (PDF)
48. Salt TV ads (http://www.salt.gov.uk/tv_ads.html). Salt.gov.uk (6 November 2009). Retrieved 7 July 2011.
49. Dr Trevor Beard (26 March 2009). "Salt Matters". University of Tasmania. Retrieved 17 May 2010.
50. "Drop the Salt! Campaign". Australian Division on World Action on Salt & Health. Retrieved 7 March 2013.
51. <http://www.nyc.gov/html/doh/html/pr2010/pr002-10.shtml>
52. <http://www.nyc.gov/html/doh/downloads/pdf/cardio/cardio-salt-factsheet.pdf>
53. <http://www1.nyc.gov/office-of-the-mayor/news/058-13/mayor-bloomberg-deputy-mayor-gibbs-health-commissioner-farley-results-national>
54. McKay, Betsy (22 March 2010). "PepsiCo Develops 'Designer Salt' to Chip Away at Sodium Intake". *The Wall Street Journal*.
55. Nestle Prepared Foods Company to Decrease Sodium by Another 10% by 2015" (<https://web.archive.org/http://www.prnewswire.com/news-releases/nestle-prepared-foods-company-to-decrease-sodium-by-another-10-by-2015-105520828.html>), Prnewswire
56. Scott-Thomas, Caroline, "General Mills announces sodium reduction strategy," (<http://www.foodnavigator-usa.com/Financial-Industry/General-Mills-announces-sodium-reduction-strategy/>) Food Navigator, 14 April 2010.
57. Wilson, N (October 2004). "Salt tax could reduce population's salt intake". *BMJ*. **329** (7471): 918. doi:10.1136/bmj.329.7471.918-c. PMC 523164. PMID 15485985.
58. "Salt tax could massively reduce US mortality rates, healthcare costs". 11 March 2010.
59. "About the Salt Institute". Salt Institute. 2009. Retrieved 5 December 2010.
60. "Food salt & health". Salt Institute. 2009. Retrieved 5 December 2010.
61. Daniells, Stephen (2008-09-23). "Seaweed granules may replace salt in foods". *FoodNavigator.com*. Retrieved 2013-02-07.
62. Zeratsky, Katherine (27 August 2009). "Is sea salt better for your health than table salt?". Mayo Foundation for Medical Education and Research. Retrieved 22 April 2011.

Further reading

- Surender R. Neravetla, MD (2012). *Salt Kills*:. Springfield, OH: Health Now Books, LLC. ISBN 978-1938009006. Lay summary – *The National Academies* (20 April 2010).
- Gary Taubes (2 June 2012). "Salt, We Misjudged You". *The New York Times*.
- Committee on Strategies to Reduce Sodium Intake (2010). Henry, Jane E ; Taylor, Christine L, eds. *Strategies to Reduce Sodium Intake in the United States*. Washington, DC: The National Academies Press. ISBN 978-0-309-14805-4.
- Panel on Dietary Reference Intakes for Electrolytes and Water (2005). *Dietary Reference Intakes for Water, Potassium, Sodium, Chloride, and Sulfate*. Washington, DC: The National Academies Press. ISBN 978-0-309-09158-9. Lay summary – *The National Academies* (11 February 2004).

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