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## REVIEW

# Should we eat less salt?

Devons-nous consommer moins de sel ?

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Received 15 November 2012; received in revised form 27 December 2012; accepted 10 January 2013

Available online 11 April 2013

### KEYWORDS

Salt;  
Health;  
Blood pressure

**Summary** High blood pressure is a major cardiovascular risk factor. There is overwhelming evidence that high salt consumption is a major cause of increased blood pressure. There is also a link between high salt consumption and risk of stroke, left ventricular hypertrophy, renal disease, obesity, renal stones and stomach cancer. Reducing salt consumption leads to a decrease in blood pressure and the incidence of cardiovascular disease. There are no deleterious effects associated with reducing salt consumption and it is also very cost-effective. Many organizations and state governments have issued recommendations regarding the suitable amount of salt consumption. In France, the objective is a salt consumption < 8 g/day in men and < 6.5 g/day in women and children. As 80% of consumed salt comes from manufactured products in developed countries, reduction of salt consumption requires the participation of the food industry. The other tool is consumer information and education. Salt consumption has already decreased in France in recent years, but efforts must continue.

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### MOTS CLÉS

Sel ;  
Santé ;  
Pression artérielle

**Résumé** L'augmentation de la pression artérielle est un facteur de risque cardiovasculaire majeur. Les preuves sont très abondantes d'une relation directe entre consommation de sel et pression artérielle. La consommation de sel est liée aussi au risque d'accident vasculaire cérébral, d'hypertrophie ventriculaire gauche, de maladies rénales, d'obésité, de lithiase rénale et de cancer de l'estomac. La diminution de la consommation de sel est liée à une diminution de la pression artérielle et de l'incidence des maladies cardiovasculaires. Elle n'a

**Abbreviations:** Afssa, Agence française de sécurité sanitaire des aliments; BP, blood pressure; CASH, Consensus Action on Salt and Health; CI, confidence interval; DASH, Dietary Approaches to Stop Hypertension; DBP, diastolic blood pressure; INC, Institut National de la Consommation; PNNS, Programme National Nutrition Santé; SBP, systolic blood pressure; TOHP, Trials Of Hypertension Prevention; WASH, World Action on Salt and Health.

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pas d'effets délétères. De nombreux pays ont fait des recommandations de diminution de la consommation de sel. En France, l'objectif est une consommation de sel inférieure à 8 g par jour chez les hommes et à 6,5 g par jour chez les femmes et les enfants. Comme, dans les pays occidentaux, 80% de la consommation de sel provient des produits de l'industrie alimentaire, la réduction de la consommation de sel nécessite la collaboration de celle-ci. L'autre moyen d'action est l'information et l'éducation des consommateurs. La consommation de sel a diminué en France durant ces dernières années, mais les efforts doivent être poursuivis.

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## Background

For millions of years, terrestrial mammals, including primates, ate very small amounts of salt (0.1–0.5 g/day), as plants contain only trace amounts. Even if a diet includes a large amount of meat, it represents no more than 1–2 g of salt per day. Among the various foods that humans ingest, meat has the highest sodium content (0.6 g of salt per lb). As the average daily consumption of food is 4.7 lb, someone eating only meat would ingest 3.1 g of salt. This is less than the 3.75 g of salt recommended by the American Heart Association. Furthermore, as the average daily consumption of meat is 0.5 lb, the actual amount of salt is much lower. Our ancestors probably ingested far less salt than us. Furthermore, the renin-angiotensin-aldosterone system is very effective at preserving sodium. These two facts suggest that the actual salt requirement is much lower [1].

Only 5000 years ago, mankind discovered that salt could help to preserve food. Salt thus became highly coveted, acquired an enormous economic value and sovereigns introduced taxes on salt, such as 'gabelle' in France. When the refrigerator and the freezer were invented, the need for salt as a preservative vanished, but humans were used to eating salt and the daily amount increased over time, partly because of its use in food seasoning but largely because of highly salted processed foods. The average daily consumption of salt is around 10 g in most countries in the world [2]. Our hunger for salt appears to be growing. In the USA, salt consumption has increased by 55% since the 1970s [3].

Although the topic is very controversial, there is a huge amount of data supporting the harmful effects of high consumption of salt on health: it increases blood pressure (BP) and thus cardiovascular and renal diseases; it increases the risk of stroke, left ventricular mass and renal diseases independent of its effect on BP; it increases the risk of renal lithiasis, osteoporosis and stomach cancer; and it may also be linked to the severity of asthma [4].

Salt and sodium are not synonymous. Salt is made up of 60% chloride and 40% sodium. Thus, 1 g of sodium equals 2.5 g of salt. One mmol of sodium equals 23 mg of sodium. For the sake of simplicity, from now on, we will use the term salt.

## Salt and blood pressure

'If too much salt is used for food, the pulse hardens...' (Huang Ti Nei Ching Su Wen [The Yellow Emperor's Classic of Internal Medicine], 2698–2598 BC).

A French paper published at the start of the 20th century appears to be the first paper reporting an association between salt consumption and BP in patients with hypertension [5]. Many investigators confirmed this finding, but some did not. A major controversy developed, which is ongoing [6]. There are two main reasons for the controversy. Firstly, about 80% of the salt we consume in developed countries comes from industry-prepared food, so some manufacturers from the salt lobby do not accept the request by many governments and organizations for a reduction in salt consumption; the most active group is the Salt Institute ([www.saltinstitute.org](http://www.saltinstitute.org)), a trade organization of salt producers [7]. Secondly, different readers have interpreted the same studies differently [4,8]; although some studies are negative, however, the majority support a relationship between salt consumption and BP.

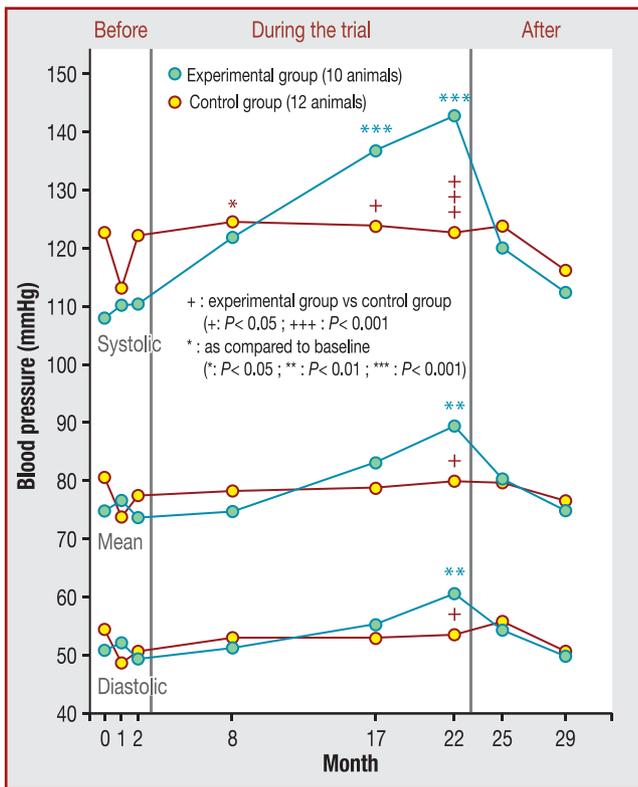
High BP is a major risk factor for coronary heart disease and both forms of stroke (ischaemic and haemorrhagic): 62% of cerebrovascular disease and 49% of ischaemic heart disease are attributable to suboptimal BP (systolic > 115 mmHg) [9]. The risk of cardiovascular disease increases steadily with BP level, from 115/75 mmHg [10].

Numerous data have shown convincingly that salt consumption is directly associated with BP. The relationship has been studied extensively in animal experimental models, population studies on restricted salt consumption, epidemiological studies, intervention studies in populations, controlled clinical trials and meta-analyses [11].

BP can be increased by a salt-rich diet in numerous animal species. Fig. 1 shows the effect of progressively increasing salt in the diet of an experimental group of chimpanzees (5 g/day for 19 weeks, 10 g/day for 3 weeks and 15 g/day for 67 weeks) compared with control chimpanzees [12]. BP increased progressively and at the end of the trial it was on average 33/10 mmHg higher in the experimental group. When additional salt was stopped, BP decreased rapidly.

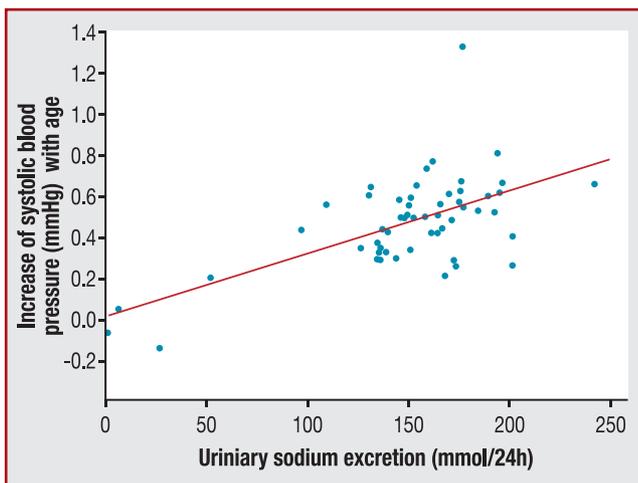
Several studies in primitive societies with no access to salt have shown that BP was lower than in developed societies and that their BP increased when they migrated to more developed environments [13,14].

The Intersalt study is a large cross-sectional study in 10,079 individuals aged 20 to 59 years, in 52 population samples from 32 countries, with a large span of salt consumption (0.5 to 15 g/day) [15]. The 24-hour sodium excretion was significantly related to BP and to an increase in BP with age (Fig. 2). An increase in salt consumption of 6 g/day over 30 years would lead to an increase in systolic BP (SBP) of 9 mmHg. Some studies have shown an inverse relationship between urinary sodium and cardiovascular mortality [16],

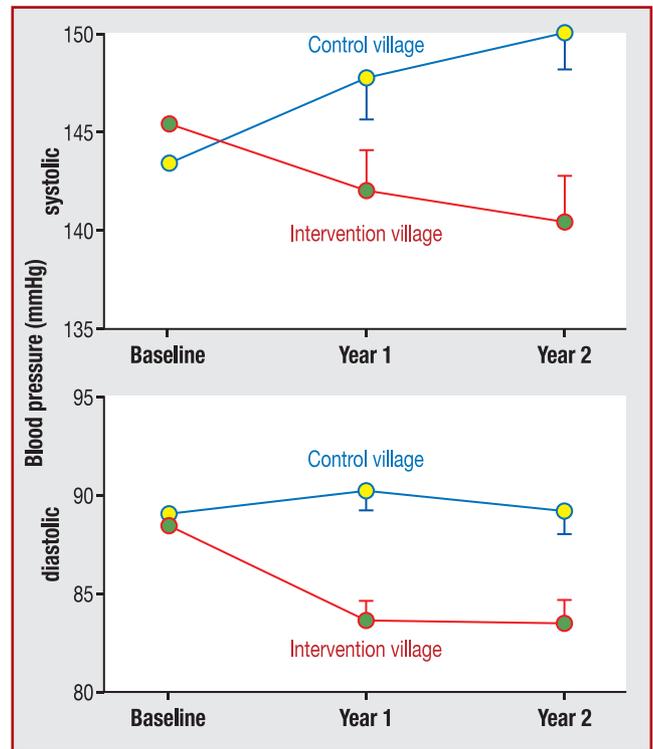


**Figure 1.** Effect of an increase in salt consumption on blood pressure in chimpanzees. Adapted from [12].

but many concerns were raised about the design and analysis of the study (possible underestimation of sodium intake in the low-sodium group, possible differential misclassification bias, residual confounding, overadjustment for factors in the causal pathway, loss to follow-up, missing data, lack of adjustment for multiple testing, reverse causality, generalizability of the cohort and relatively small number of events) [17–19].



**Figure 2.** Relationship between 24-hour urinary sodium excretion and increase in systolic blood pressure with age in the Intersalt study. Adapted from [15].

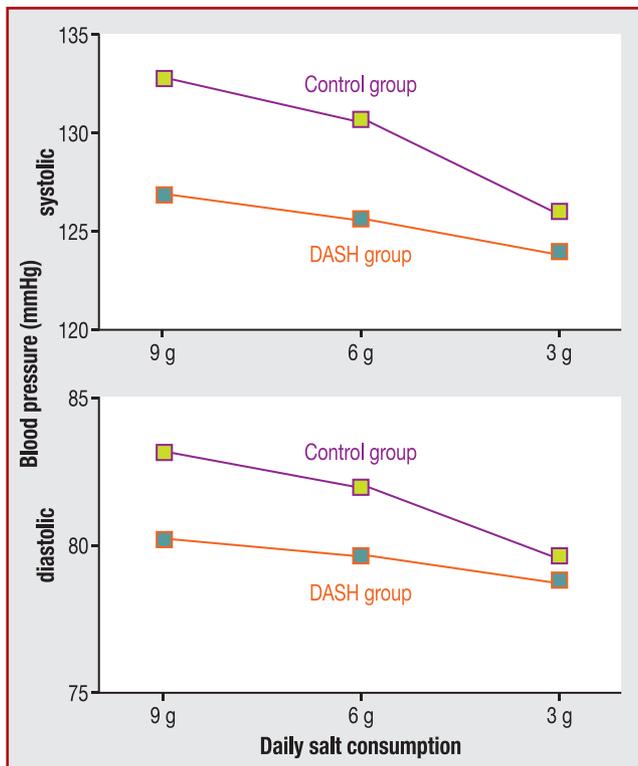


**Figure 3.** Effect of a decrease in salt consumption on blood pressure in a village compared with a control village in Portugal. Adapted from [20].

An overview of population studies suggests that a difference in salt consumption of 6 g/day is associated with an average difference in SBP of 5 mmHg at age 15–19 years and 10 mmHg at age 60–69 years [4]. Diastolic blood pressure (DBP) is reduced by about half as much. The association increases with age and with magnitude of initial BP. It was estimated that a universal reduction in salt consumption by 6 g/day would lead to a 50% reduction in the number of people requiring antihypertensive therapy, a 22% reduction in the number of deaths resulting from stroke and a 16% reduction in the number of deaths from coronary heart disease.

Several intervention studies at population level showed that a decrease in salt consumption led to a decrease in BP. Fig. 3 shows a 13/6 mmHg reduction of BP at 2 years in the Portuguese village that reduced its salt consumption by 42% at 1 year and by 47% at 2 years, compared with a similar village that did not change its salt consumption [20]. A population study in China similarly showed a significant reduction in BP in the intervention group [21].

Numerous randomized trials have been performed. Two trials tested three rather than just two levels of salt consumption [22,23]. In the Dietary Approaches to Stop Hypertension (DASH) trial, 412 participants were randomly assigned to eat either a control diet typical of the diet in the USA or the DASH diet, which is rich in vegetables, fruits and low-fat dairy products. Within the assigned diet, participants ate foods with high, intermediate and low levels of salt for 30 consecutive days each, in a random order [23]. Fig. 4 shows a clear dose-response relationship between salt consumption and BP, in both the control diet group and the



**Figure 4.** Effect of a decrease in salt consumption on blood pressure in the Dietary Approaches to Stop Hypertension (DASH) trial. Adapted from [23].

DASH diet group. Reducing salt consumption from 9 to 6 to 3 g/day reduced SBP by 2.1 mmHg and then by 4.6 mmHg during the control diet and by 1.3 mmHg then 1.7 mmHg during the DASH diet. The DASH diet was associated with a significantly lower SBP at each salt consumption level; the difference was greater with high salt consumption levels than with low ones.

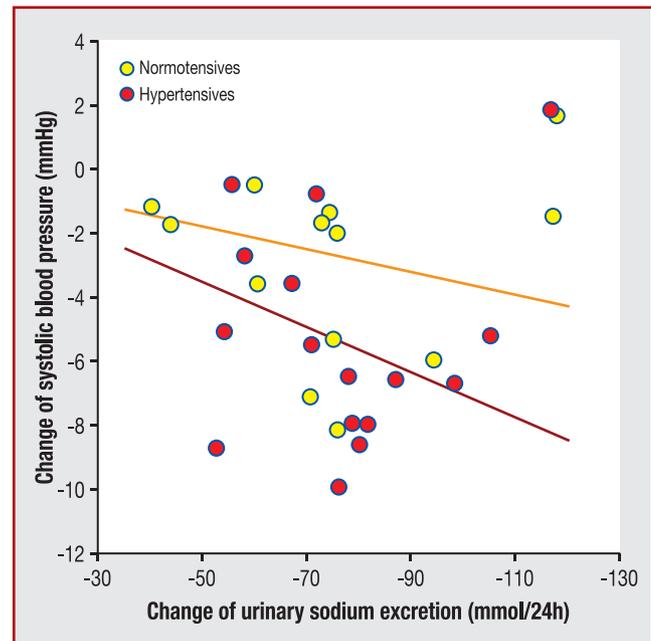
More than 15 meta-analyses (!) and overviews of meta-analyses have studied the relationship between salt consumption and BP in clinical trials and epidemiological studies [24–28]. A reduction in salt consumption by 6 g/day is associated with a reduction in BP by 7/4 mmHg in hypertensives and 4/2 mmHg in normotensives (Fig. 5) [25].

Clinical trials have also demonstrated the sustainable BP-lowering effects of restriction of salt consumption in infancy [29] as well as in the elderly, in whom it provides a useful non-pharmacological therapy [30].

The mechanisms by which salt increases BP are not completely elucidated. The kidneys play an important role. The central nervous system, various neurohumoral factors, various vasoactive substances, the extracellular volume and a direct role for plasma sodium may also be involved [4].

## Salt sensitivity

There is no consistent definition for salt sensitivity. BP response to salt consumption varies among individuals. According to the degree of the response, some individuals



**Figure 5.** Relationship between the decrease in 24-hour urinary sodium excretion and the change in systolic blood pressure in a meta-analysis of trials of a modest reduction in salt consumption. Adapted from [25].

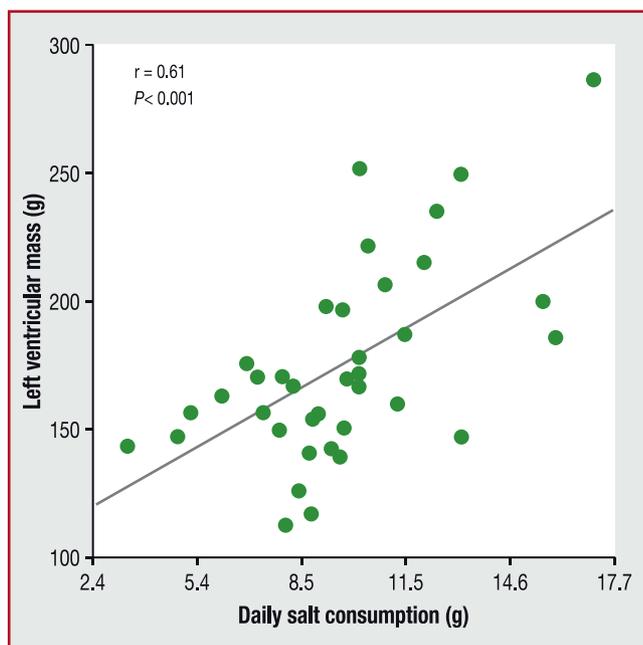
are salt sensitive and some are salt resistant. In a study by Weinberger et al., an intravenous infusion of 2 L of saline was administered over 4 hours [31]. On the following day, dietary salt was decreased to 0.6 g and three doses of furosemide 40 mg were administered orally. The decrease in mean arterial pressure was > 10 mmHg in salt-sensitive individuals and < 5 mmHg in salt-resistant individuals. A third group had a decrease in BP of between 6 and 9 mmHg. In the total population, 51% of hypertensive patients are salt sensitive and 33% are salt resistant. This means that BP control would improve in half of the hypertensives with dietary salt restriction. Among normotensives, 26% are salt sensitive and 58% are salt resistant. Risk factors that promote salt sensitivity include black race, intrinsic kidney disease and aging *per se* [32].

## Salt and cardiovascular diseases

The effects of salt on cardiovascular diseases are largely due to its effect on BP, but salt also has effects independent of BP.

Left ventricular hypertrophy is an important and independent cardiovascular risk factor. As shown in several cross-sectional studies, there is a positive relation between salt consumption and left ventricular hypertrophy, which is independent of BP. A reduction in dietary sodium has been shown to reduce left ventricular hypertrophy. Fig. 6 illustrates such a relationship [33].

High salt consumption may increase the risk of stroke, independent of its effects on BP [34]. In a meta-analysis of 19 prospective studies, including more than 170,000 participants and a follow-up between 3.5 and 19 years, higher salt

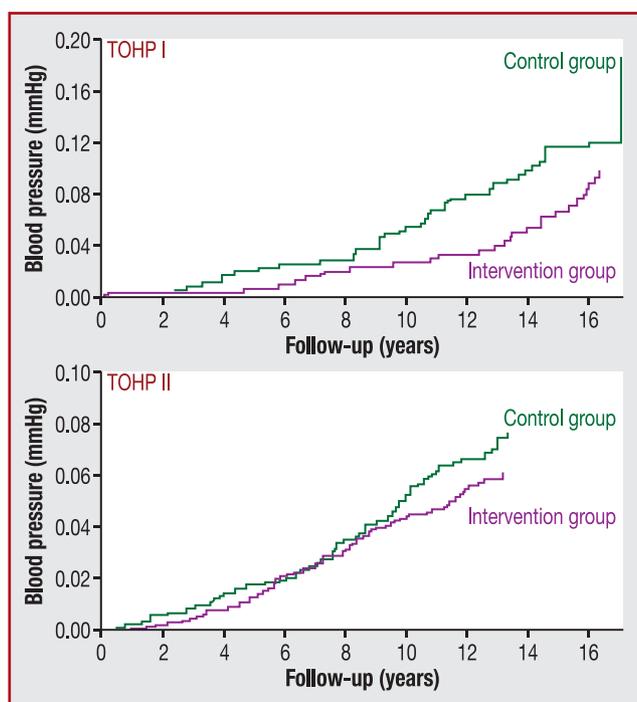


**Figure 6.** Relationship between salt consumption and left ventricular mass in individuals whose systolic blood pressure is  $> 121$  mmHg. Adapted from [33].

consumption was associated with a significantly greater risk of stroke (pooled relative risk 1.23, 95% confidence interval [CI] 1.06–1.43;  $P=0.007$ ) and an almost significantly higher risk of cardiovascular disease (pooled relative risk 1.14; 95% CI 0.99–1.32;  $P=0.07$ ) [28]. In one of the meta-analyses of randomized trials, it was estimated that a decrease in salt consumption by 6 g/day would lead to a 24% decrease in deaths due to stroke and a 18% decrease in deaths due to coronary heart disease [26]. That would mean 35,000 fewer deaths due to stroke or coronary heart disease each year in the UK (about the same in France) and 2.5 million worldwide [4].

In a Finnish study in 1173 men and 1263 women aged 25–64 years, the hazard ratios for coronary heart disease, cardiovascular disease and all-cause mortality, associated with a 100 mmol increase in 24-hour urinary sodium excretion (i.e. an increase in salt consumption by 6 g/day) were 1.51 (95% CI 1.14–2.00), 1.45 (95% CI 1.14–1.84) and 1.26 (95% CI 1.06–1.50) respectively [35]. High salt consumption predicted mortality and risk of coronary heart disease independent of other cardiovascular risk factors, including BP.

The primary aim of the randomized trials of hypertension prevention phase I (TOHP I, 744 subjects) and phase II (TOHP II, 2,382 subjects) was to study the influence of various non-pharmacological interventions, including reduction of salt consumption, on BP [36]. Compared with controls, salt consumption decreased by 25–30% in the intervention groups. The BP decrease was 1.7/0.9 mmHg at 18 months in TOHP I and 1.2/0.7 mmHg at 36 months in TOHP II. No more dietary advice was given after the end of the trials. After 10–15 years of follow-up, the risk of cardiovascular events was 30% lower in both intervention groups after adjustment



**Figure 7.** Incidence of cardiovascular events adjusted for age, sex and clinic in the trials of hypertension prevention (TOHP) I and II trials. Adapted from [36].

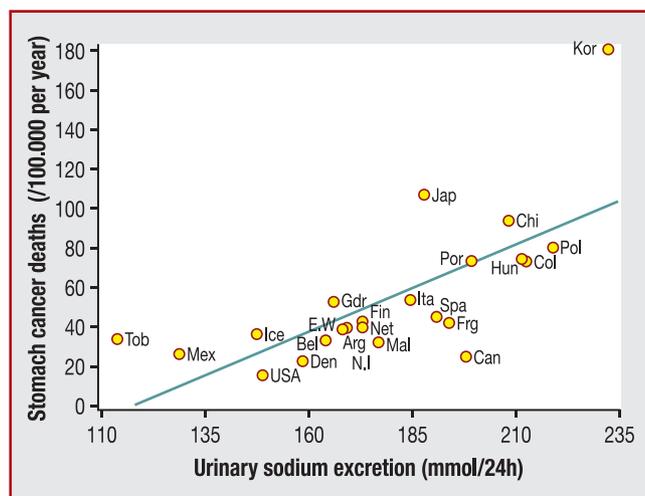
for age, race, sex, weight and baseline sodium excretion (Fig. 7).

## Salt and non-cardiovascular diseases

Albumin urinary excretion is an important and independent risk factor for renal diseases. There is a direct association between salt consumption and urinary albumin excretion. This relationship is independent of BP [37].

Infection with the bacterium *Helicobacter pylori* is an established risk factor, but not a sufficient cause, for the development of stomach cancer [38]. Diet seems to be important in the aetiology of this disease; substantial evidence suggests that risk is increased by high consumption of some salted foods, especially meats and pickles, and with salt *per se* (Fig. 8) [39,40]. Studies are needed to examine whether some of the dietary associations may be partly confounded by *H. pylori* infection and whether dietary factors may modify the association of *H. pylori* with risk [41].

As salt consumption is a major factor for calcium urinary excretion and as calcium is the principal component of renal stones, high salt consumption favours renal stones [42]. Salt consumption also favours osteoporosis. A study in postmenopausal women showed that the loss of hipbone density over 2 years was related to 24-hour urinary sodium excretion at the start of the study and that the connection with bone loss was as strong as that for calcium intake [43]. Reducing salt consumption causes a positive calcium balance; it could thus slow the loss of calcium from bone that occurs with aging.



**Figure 8.** Relationship between 24-hour urinary sodium excretion and stomach cancer mortality. Adapted from [39].

## Cost-effectiveness of reduction of salt consumption

Several studies have shown that reduction of salt consumption is cost-effective [44]. In 23 countries that account for 80% of the chronic disease burden in the developing world, a 15% reduction in salt consumption would prevent 8.5 million deaths over 10 years whereas a 20% reduction in tobacco smoking would prevent 5.5 million deaths [45]. Costs of these measures would be \$0.07/person/year for salt reduction and \$0.29/person/year for tobacco reduction. A reduction in salt consumption by 3 g/day in the USA would reduce the annual number of new cases of coronary heart disease by 60,000 to 120,000, stroke by 32,000 to 66,000, myocardial infarction by 54,000 to 99,000, total deaths by 44,000 to 92,000 (to extrapolate to France, divide by five) and annual health care costs by \$10 billion to \$24 billion; all would benefit, but relative benefits would be greater for blacks and presumably for all salt-sensitive individuals [46]. The cardiovascular benefits of reducing salt consumption are similar to the benefits of population-wide reductions in tobacco use, obesity and cholesterol levels. A modest reduction in a risk factor, applied at the level of a whole population, has an enormous effect in terms of public health. Even if only a modest reduction of 1 g/day was achieved gradually between 2010 and 2019, such an intervention would be more cost-effective than using medications to lower BP in all hypertensives.

## Role of the food industry in reduction of salt consumption

In most developed countries, 80% of consumed salt comes from industry-prepared food (5% come from natural salt; 15% comes from salt added during cooking or eating). Thus, if we want a reduction of salt consumption at the population level, we need the collaboration of the food processing industry.

Salt is a precious ally for the food industry: it is a flavour enhancer, able to season the most insipid dishes and liven up bland food; it is a good preservative; it favours some colourations, such as bread crust; it increases the weight of some foods (because of water retention); and it plays a role in the texture of some foods (e.g. ham without enough salt cannot be cut). The reduction of the quantity of salt in foods has to be acceptable in terms of taste, technology and hygiene.

By eating healthier food, people will live longer and the food industry will be able to sell them food over a longer time and thus will not lose profit. Many companies have understood that they should reformulate their products. But some companies remain reluctant to do so, as salt is a source of immediate profit. Profit comes from several origins: salt increases thirst, thus people drink more mineral water and soft drinks, which the food industry sells; salt increases food weight; an overconsumption of salt increases the craving for very salted food and leads to a salt addiction [4].

In France, more and more manufacturers are committing themselves to nutritional charters, instigated by the governmental Programme National Nutrition Santé (PNNS; national nutrition and health programme). The objective is to reduce the proportion of salt in stages, over a fairly long time (up to several years) so that the consumer can get used to it. Some manufacturers choose to use salt substitutes, but some organizations discourage it, for two reasons: to help consumers adjust their perception of 'saltiness'; and to avoid additives, which may have other effects on health [47].

Displaying the amount of salt on packages is not mandatory in France. Manufacturers must display this information only when there is a claim, such as '25% less salt'. According to surveys by the Institut National de la Consommation (INC; National Consumption Institute), the amount of sodium or salt was displayed on 9% of packages in 2003, on 12% in 2005, on 40% in 2008 and on 66% in 2012 [48,49]. In almost 50% of the cases, there was mention of both sodium (which is not very meaningful for many consumers) and salt. A European regulation has been passed recently, stating that the amount of salt must be displayed on all packages from December 14, 2016.

## Salt reduction programmes

Many organizations and state governments have issued recommendations regarding the suitable amount of salt consumption. The recommendation was < 6 g/day in the UK in 2003 [50]. In 2010, the text from the British National Institute for Health and Clinical Excellence (NICE) on the prevention of cardiovascular disease made reduction of salt consumption its number one recommendation [47]. In the USA, the goal was < 6 g/day in 2005 and < 4 g/day in 2010 [51]. The 2012 guidelines on cardiovascular prevention from the European Society of Cardiology recommended consumption of < 5 g/day ([www.escardio.org](http://www.escardio.org)). In 2002, the World Health Organization advised restriction of salt to < 5 g/day [41]. In October 2011, the World Health Organization Regional Office for Europe listed salt reduction as one of the five priority interventions in the most recent Action Plan for the implementation of the European strategy on the prevention and control of non-communicable diseases

(2012–2016) [52]. The office gives two country examples of the most successful salt reduction programmes in Europe. In 1996, medical and scientific experts in the UK created the Consensus Action on Salt and Health (CASH; <http://www.actiononsalt.org.uk>). Considerable reductions in the salt content of processed foods (up to 30% in certain foods) have been achieved. Another feature of the programme is the clear labelling of the salt content of all processed foods, which enables consumers to make more informed decisions when purchasing products. In July 2008, the UK's Food Standards Agency published the results of a 24-hour urinary sodium analysis, showing that the average daily salt consumption has fallen from 9.5 g to 8.6 g since 2000. The reduction in salt consumption reflects the great progress made by the food industry in reformulating products, as well as behavioural changes made by consumers. In Finland, the North Karelia project launched over 30 years ago has received international recognition for its impact on cardiovascular risk factors such as high BP. The population-wide salt interventions initiated by the project have seen salt consumption reduced by one third with a collaborative effort from the food industry and the health and community services. The World Health Organization European Salt Action Network (ESAN), led by the UK, leads this network and has been joined by 23 countries, including France. The aim of the network is for countries to share their experience with salt reduction efforts, provide background information and materials and act as a resource for technical expertise.

Following CASH, WASH (World Action on Salt and Health; <http://www.worldactiononsalt.com>) was established in 2005 and is a worldwide group with the mission to improve the health of populations throughout the world by achieving a gradual reduction in salt consumption. WASH encourages multinational food companies to reduce salt in their products and works with governments in different countries highlighting the need for a population salt reduction strategy. The overall aim is to bring about a reduction in salt consumption throughout the world by reducing the amount of salt in processed foods as well as salt added to cooking and at the table. The French branch of WASH, *sodium alimentaire limitons les taux* (SALT; <http://www.salt.asso.fr>), was launched in October 2010. At the same time, nineteen of the biggest manufacturers in France have signed a deal with the government promising to cut the amount of salt they use in products by 5% to 25%, depending on the product concerned. The reduction will be made gradually over several years to make the taste change less noticeable to consumers.

In France, the objective of the PNNS 2011–2015 (<http://www.sante.gouv.fr/IMG/pdf/PNNS.2011-2015.pdf>), as it was in the PNNS 2006–2010, is a salt consumption < 8 g/day in men and < 6.5 g/day in women and children. Materials are available on the web, from the PNNS [53] or from other organizations [54]. In 2002, the governmental Agence française de sécurité sanitaire des aliments (Afssa; French food safety agency) estimated that mean salt consumption in French adults was 9–10 g/day, including 1–2 g from the salt cellar (salt added during cooking or during the meal). Afssa set the objective of a 20% salt reduction over 5 years and gave some recommendations on how to achieve it: reduction of salt content in products that contain most salt, such as bread

and cooked pork meats; and consumer information and education to foster a more responsible attitude towards the control and management of sodium consumption [55]. According to the INCA 1 and 2 surveys (*études individuelles nationales des consommations alimentaires*; [www.anses.fr/Documents/PASER-Fi-INCA2resultats.pdf](http://www.anses.fr/Documents/PASER-Fi-INCA2resultats.pdf)), salt consumption decreased by 5% between 1998–1999 and 2006–2007, from 8.1 to 7.7 g/day. The decrease was greater in men (–7%; from 9.3 to 8.6 g/day) than in women (–4%; from 6.9 to 6.6 g/day). The proportion of heavy consumers (> 12 g/day) has decreased from 15.8% to 10.5% (–33%) in men and from 2.2% to 1.7% (–23%) in women.

The INC and the Afssa measured the salt content of about 350 products from 30 or so product families in 2003, 2008 and 2012 [49]. As we often eat bread, we consume a lot of salt. In 2002, the Afssa urged bakers, who were adding 24 g of salt per kg of flour, to decrease the quantity of salt by 5% per year, in order to reach the goal of 18 g of salt per kg of flour in 2008. Actually, there was no decrease between 2003 and 2008, but there was a 15% decrease in salt content in bread between 2008 and 2012. Importantly, the vast majority of consumers did not notice it! This provides additional proof that reducing salt in processed foods is possible. The most salted cooked pork meats are cured hams. The amount of salt has decreased, but there are very large differences from one manufacturer to another. This means that improvements are possible for most salted hams. The best reduction comes from cooked hams: there are more and more 'low-salt' cooked hams, which means a 25% salt reduction compared with a similar product. Between 2003 and 2008, the amount of salt in dehydrated soups has decreased by 50%, whereas there has been almost no reduction in soups in cartons and bottles, which are much less salted. The amount of salt varies widely from one cheese to another. The most salted cheeses are blue cheese, then goat's cheese, Camembert, cheese spreads and Emmenthal. There was almost no change in the amount of salt between 2003 and 2012. There have been large reductions in the salt content of ready-made meals.

In 2012, the INC created three daily meals that provide 2000–2500 kcal per day. Breakfast: farmhouse bread, 60 g; butter; jam; yoghurt. Lunch: green salad with vinaigrette, 15 mL; ready-made couscous, 300 g; apple. Dinner: assortment of cooked pork meats (sausage, cured hams), 100 g; French beans; goat's cheese, 30 g; baguette, 80 g; orange; added salt, 0.5 g. The total amounts of salt provided by the least and most salted products are 8.5 g and 13.5 g, respectively. This means that the amount of salt provided by the least salted meals is above the 2002 Afssa goal and that the most salted meals provide 5 g more than the least salted ones (+59%).

## Conclusion

There is abundant evidence for the deleterious effects of salt overconsumption on health. The reduction of salt consumption is efficacious and cost-effective. As 80% of consumed salt comes from manufactured products in developed countries, reduction of salt consumption requires the participation of the food industry. The other tool is consumer information and education.

## Disclosure of interest

The oral communication “Agir sur le quotidien des patients à risque cardiovasculaire: l'exemple de la réduction de la consommation de sel” during the “Approche non pharmacologique de la prévention et de la prise en charge du risque cardiovasculaire: vers la fin du «tout médicament»?” session was supported by Danone during the 24th Congress of the National College of French Cardiologists held in Marseilles on 18–20 October 2012.

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