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Sodium reduction in savory snacks

Table salt (NaCl) has a major impact on the taste of food and makes it sensorially attractive. The "saltiness" and "umami" tastes mutually enhance each other and ensure a rounded flavor. The sensory attractiveness of salty foods has led to the fact that a wide variety of salty snacks have become a fixed part of the daily diet in almost all cultures for many decades now. Savory, salty snacks are also a popular part of informal and other social gatherings or as a small snack between meals. The amount of salt that is then ingested in addition to the main meals can contribute significantly to the sodium load in the body depending on the amount consumed.

However, it has been well-known for a long time now that habitual increased salt and/or sodium consumption can lead to a whole range of chronic illnesses. Above all, these include[1,2]:

– High blood pressure
– Cardiovascular diseases
– Kidney diseases
– Eye damage

In particular, several studies have proven that there is a link between salt consumption and high blood pressure[3,4]. Therefore, the WHO called for effective and sustainable measures in a strategy paper in 2004 for reducing diet-related hypertension and secondary diseases, and recommended a maximum daily intake of 2 g Na/day (5 g salt/day)[5]. This recommendation was approved in 2012 in a WHO Guideline and has also been extended to children aged 2–15[6]. According to the WHO, children with an elevated blood pressure have a high risk of suffering from high blood pressure as adults[7].

This knowledge is of particular importance because salty snacks are also being consumed by children in significant quantities in some cases. The reduction of sodium in these products are thus of particular importance.

Sodium content of various snacks[8]

Product	Sodium content (mg) per 100 g
Potato chips	458–663
Salted popcorn	106–572
Pretzels	250–1716
Crackers	225–11,165[9]
Beef jerky	1301[9]

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Due to the high salt content in many popular snacks such as potato chips, popcorn, pretzels or crackers, reducing sodium in these products can lead to a measurable relief on the organism of the consumer even when these do not count as staple foods.

In contrast, salted peanuts are relatively low in salt with a sodium content of 420 mg/100 g and thus correspond to the criteria of the U.S. FDA for low sodium food (< 140 mg/portion (1 oz.))[10].

Strategies for sodium reduction

There is a broad international consensus that the reduction of sodium or rather salt in food can make a measurable contribution to reducing high blood pressure and its secondary diseases. And this has been continually confirmed in several studies[11].

Europe

The European Food Safety Authority currently recommends to reduce the daily per capital consumption of table salt of 8–11 g to 5–7 g[12]. The British Heart Foundation has a more restrictive recommendation in this regard: it considers the maximum daily intake of salt to be 6 g and 2.5 g for sodium. Low sodium food can be labeled as such with a corresponding advertising statement. Thus, this makes it easier for consumers to make low sodium and health-conscious food choices. In Regulation (EC) no. 1924/2006, the so-called Health Claims Regulation, limit values for sodium content and the respectively permitted health-related statements are defined, among other things[13].

Conditions for claim assertion

Nutrition facts	Sodium content in 100 g and/or 100 ml	Salt content in 100 g and/or 100 ml
"Low sodium" "Low salt"	max. 0.12 g	max. 0.3 g
"Very low sodium" "Very low salt"	max. 0.04 g	max. 0.1 g
"Sodium free" "Salt free"	max. 0.005 g	max. 0.0013 g
"Reduced sodium content"	Reduction of the sodium/salt content from a min. 25% compared to a comparable product	

The effectiveness of these measures were confirmed by the EFSA in a Scientific Opinion in 2011[14].

USA

In 2011, the U.S. Department of Health and Human Services started the Million Hearts initiative together with several partners. Its stated goal is to prevent one million heart attacks and strokes nationally over the following five years.

An essential part of this initiative are measures from the U.S. Food and Drug Administration (FDA) and Food Safety and Inspection Services (FSIS) to give consumers the opportunity to avoid salt in foods and to strengthen their control over this issue[15].

In order to achieve this goal, the sodium content of food must be listed in the nutrition facts. According to the FDA, the maximum daily intake of sodium is 2400 mg. In addition, the FDA also defines health-related claims that may be listed by the manufacturer depending on the sodium content of the food. The Code of Federal Regulations 21 CFR 101.61 defines the limit values and thus the related claims as follows[16]:

Health-related facts	Sodium content
Free	• < 0.5 mg per RACC* and labeled serving • For meals and main dishes: < 5 mg per labeled serving • "Salt free" must meet criteria for "sodium free"
Very low sodium	• < 35 mg per RACC* and per 50 g if reference amount is small • For meals and main dishes: < 35 mg per 100 g
Low	• ≤ 140 mg per RACC* and per 50 g if reference amount is small • For meals and main dishes: ≤ 140 mg per 100 g
Reduced (lower, fewer)	• At least 25 % reduction for the nutrient per RACC* compared to an appropriate reference food • For meals and main dishes, at least 25 % reduction per 100 g of food compared to an appropriate reference food
No salt added/ Unsalted	• Declaration: "This is not a sodium free food" if food is not sodium free
Salt free	• Must meet criteria for "sodium free"
Lite in sodium/Light in sodium	• 50 % reduction in sodium
Lightly salted	• 50% less sodium than normally added to reference food • If not low in sodium, so labeled on the information panel

*RACC: "reference amounts customarily consumed"[17]

Canada

Several Canadian organizations already defined the max. daily intake of salt as 3–7 g of salt/day in 1999[18]. Currently, the recommendation is at 2300 mg of Na per day, which corresponds to a salt quantity of

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5.8 g[19]. The Canadian recommendation is thus still somewhat higher than that of the WHO.

Asia/Pacific

The Asia-Pacific region also has a number of national initiatives for reducing salt and/or sodium in food. Due to regional dietary habits, this affects spice mixtures and sauces in particular, above all, soy sauce.

These initiatives are geared towards the WHO's recommendation for a max. daily intake of sodium (max. 2 g Na and/or 5 g salt/day)[3,20].

South Africa

In 2013, the South African Department of Health defined several different upper limits for food regarding salt and/or sodium content. These limit values went into effect on 30.06.2016. In 2019 these values were adjusted and tightened. The values specifically for salty snacks are between 550 mg and 800 mg Na/100 g.[21]

South America

In 2012, the Brazilian Health Ministry decided to introduce a gradual reduction of salt in food. Thus, the salt content in various salty snacks should be reduced [22].

An analysis of the progress towards achieving their voluntary salt reduction targets has found that there was a significant 8–34 % reduction in the average sodium content.

Possibilities for sodium reduction in savory snacks

Reduction of the salt quantity

The "saltiness" taste is learned and difficult to replace. Food quickly loses its typical and attractive taste when the usual amount of salt is not added. Nevertheless, the gradual reduction of the added amount of salt over a long period of time (possibly years) is one of several options to keep the sodium content of food low.

Addition of monosodium glutamate, amino acids or nucleotides

Monosodium glutamate (MSG) is used as a flavor enhancer especially in Asian cuisine and supports the tastes saltiness and umami[23]. However, MSG also contains sodium. In addition, the use of MSG has been generally controversial for many years now due to many health reasons[24]. The amino acid L-arginine and the nucleotides inosine- 5′-monophosphate (IMP) and guanosine-5′-monophosphate enhance the saltiness and/or the umami taste of low salted products[23]. It cannot be ruled out, however, that the consumption of these types of prepared products will not lead to allergic reactions[25].

Consumption of alternative snack products

Along with classic snack products such as potato chips, crackers or popcorn, there is also a growing variety of alternative snacks available on the market. For example, vegetable chips are increasingly offered as an alternative to potato chips, which initially evokes a decidedly healthy impression[26]. However, these products also contain salt.

Use of mineral substitute mixtures

A number of inorganic mineral salt mixtures, for example, Loma-Salt® from Dr. Paul Lohmann®, have a familiar salty taste, but contain significantly less sodium (50–100 %). Food and snacks that have been made using these mixtures can be advertised using health-

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related statements as per Regulation (EC) no. 1924/2006. These products, which meet food law regulations and do not cause health concerns, offer an attractive option for the reduction of sodium in food and savory snacks.

Enrichment with other mineral substances

LomaSalt® – in cooperation with the manufacturer Dr. Paul Lohmann®, products can be enriched with other selected mineral substances such as iodine. Nutritional snacks enriched with individually developed mixtures receive a significant health added value in this way. Even other parameters such as particle size can also be adapted. The company is also helpful with the selection of the respective health-related claims.

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