SALT

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1. INTRODUCTION

Salt has been used both to flavour and preserve food since the earliest recorded times. In antiquity, when it was not universally available as it is now, it was highly valued. This is manifest from the use of the word salt, in many languages, in idioms which imply its great worth.

A desire for something often implies a biological need for it, and this is so for salt. Salt is an essential nutrient. However most people, especially in industrialised countries, eat more than they need and possibly more than they should.

2. THE BIOLOGICAL FUNCTIONS OF SALT

The word "salt" as commonly used and in the sense used here denotes a single substance, in chemical nomenclature "sodium chloride". Salt, sodium chloride, is a compound of sodium ions (positively charged sodium atoms) and chloride ions (negative charged chlorine atoms). They are present in equal numbers but the proportion of chloride to sodium by weight is roughly 60:40. Both are essential nutrients but sodium has attracted more attention.

Salt is not the only source of sodium in the diet but is the main one, accounting for about 90 % of a normal intake.

The body of an average person weighing 65 kg contains about 90g of sodium. Sodium ions fulfil several indispensable body functions. They are not only present in and outside all the cells of body, they must be present in the right concentrations for each part of the body function. They are necessary for the transfer of molecules (e.g. amino acids) across membranes, for the transmission of nerve impulses, for the digestion of food and for muscular action. Most of these and other functions involve other ions (notably potassium) and are controlled by hormones.

Any salt in excess of bodily needs is normally excreted via the kidneys. It is also lost in sweat. If sweating is profuse, e.g. during heavy work in a hot area, by athletes, or by newcomers to a hot climate, too much salt may be lost. Such loss must be made good and the need to do so is often signalled by a hunger for salt.

3. ESTIMATES OF THE REQUIREMENTS FOR SALT AND ITS ACTUAL INTAKE

It is difficult to determine the body's minimum requirement for salt. The Food and Nutrition Board of the National Academy of Sciences (1989) have estimated that a safe minimum intake might be set at 500 mg of sodium (1.3g salt) per day. However, the requirements of different individuals vary, and the requirements of a single individual vary from time to time according to his or her level of physical activity, and the ambient temperature.

Sodium is present naturally in most sources of food, but most of the ingested sodium, mainly in the form of salt, comes from manufactured foods and from salt which is added by the consumer during cooking, or as a condiment.

Sodium intakes are difficult to assess from food balance sheets. Dietary surveys are a fairly good method provided the sodium content of different food items is updated. Measuring the quantity of salt added during cooking is however not simple. It is possible to get good estimates of sodium intake by measuring 24h urinary sodium outputs (adding 3-7 % for non-urinary losses).

Typical estimates for average daily intakes of salt, based on medium sodium output in the Intersalt study, are:

Belgium	8-9g	Netherlands	9g
Denmark	8.5g	Portugal	11g
Finland	9-10g	Spain	10-11g
Germany	8.5g-10.5g	UK	9-9.5g
Italy	10-11g	USA	6-8.5g

Extreme figures were found in the north of China with an estimated average intake of 15g of salt and among the Yanamamo Indians of Brazil, where the average estimated intake was below 0.1g.

Comparing the estimated safe minimum intake with the above figures, there is no doubt that most people eat more than is strictly necessary.

4. SALT AND HEALTH

The role of high sodium intakes in the pathogenesis of hypertension has generated much interest, but the evidence supporting this or indicating the relative importance of sodium intakes is unclear.

The large Intersalt study, which involved 52 population groups in 32 countries, and which was thoroughly standardized, failed to find a relationship between the medium sodium intakes of the different populations and medium blood pressure or the prevalence of high blood pressure.

When individuals were compared within the populations, there was a relationship in
only a few of the populations between sodium intake and blood pressure, but also when the individual results of the different populations were pooled together.

One important finding was, however, that sodium intake was related to blood pressure elevation with age. This suggests that life-long high dietary sodium intake may be partly responsible for the age-related increases in blood pressure observed in Western cultures.

It has been found in this and in other studies that also potassium and more important the sodium:potassium ratio in the diet is important in relation to blood pressure. A high intake of potassium has been shown to lower the effect of sodium in blood pressure elevation. Also calcium and magnesium interact with sodium and seem to have a similar, but weaker, effect.

While some people maintain normal blood pressure levels over a wide range of sodium intakes, others are susceptible to salt-induced hypertension (salt sensitivity).

The majority opinion at present is thus that at least some individuals (the salt sensitive), who have hypertension, benefit by reducing their salt intake. A sodium reduction might also lower the age-related blood pressure elevation in populations with high sodium intakes. Obesity seems to be a greater risk factor for hypertension than salt intake, so that greater reduction in blood pressure can be achieved by weight loss and physical activity than in salt intake.

5. INTAKE RECOMMENDATIONS AND LABELLING REQUIREMENTS

Those authorities who advise on diet have had to recognise that the normal consumer has no way of measuring his or her intake of salt exactly. Where a recommendation has been made that everyone should reduce salt intake, it has probably been recognised that, while this may not benefit everyone, it will benefit some without harm to the remainder.

In 1988 WHO Europe published a study group report on "Healthy nutrition, preventing nutrition related diseases in Europe". The recommendation for salt in this report is an intermediate goal of 7-8g of salt per day, and a final goal of 5g per day. The intermediate goal for cardiovascular high-risk groups is 5g.

In 1989 the National Academy of Sciences in the US released its report on Diet and Health. The recommendation for salt intake in this report is to limit total daily intake of salt (sodium chloride) to 6g or less and to limit the use of salt in cooking and avoid adding it to food at the table. Salty, highly processed salty, salt-

preserved, and salt-pickled foods should be consumed sparingly.

The Nordic nutrition recommendations issued in 1989 advise a gradual decrease of sodium intake to a level corresponding to 5g salt (NaCl) per day. As a first step, the salt intake should be decreased by 30 % or approximately 3g per day.

In 1990 another report was issued through WHO, giving global recommendations. The recommendation for salt in this report is maximum 6g of salt per day.

In 1991 the UK Committee on Medical Aspects of Food Policy issued new Dietary Reference Values. The Committee recommends a sodium intake that corresponds to 4g of salt per day.

Other recommendations include one that the consumption of salt by children should be limited, so that they do not develop a taste for higher levels, and recognising that very young infants may suffer dehydration if given too much salt.

In the late 70's and early 80's concern among consumers in the U.S. led to demands for the sodium or salt content of food to be labelled. The FDA responded by requiring the sodium content of food to be included whenever nutritional labelling was mandatory. In 1994 nutritional labelling became mandatory in the US and sodium is one of the nutrients which has to be declared. Requirements for such claims as "low salt" were defined.

The EC directive on nutrition labelling calls for a mandatory nutrition declaration only if a claim for nutrients (such as carbohydrates, proteins, fibre, fat and saturated fat) or energy content is made. So if the sodium content is given (because of requirement or voluntarily) or a claim for sodium, six other nutrients and energy have to be declared as well. This will complicate any voluntary sodium labelling.

6. THE USE OF SALT IN FOOD

As a way of preserving food, salt works primarily by rendering any water present unavailable for the growth of micro-organisms. The effect on taste and flavour, however desirable, is incidental to this. When salt is used for flavouring, it not only adds its own taste, but modifies and intensifies the intrinsic flavour of the food. Salt may be used at a low level where its own taste is not discernible but where the flavour of the food is nevertheless modified. The occasional use of salt in confectionery is of this kind.

The taste for salt, although it signifies a biological need, is also modified by habit. An individual's preferred level of salt in food may be raised or lowered by progressively raising or lowering the actual level over a period of time.

Consumers who wish to limit their intake of salt but find this difficult may avail themselves of a blend of salt and the chemically related potassium chloride.

Potassium is an essential nutrient, has none of the adverse health implications of sodium, and may even partly offset them. However, although potassium chloride tastes something like salt it does not taste the same, and this restricts its use.

7. IOCCC POSITION

The IOCCC's members or industries should make known on request the sodium content of products for the benefit of the minority who may be sensitive to it.

Unless local legislation requires otherwise, the IOCCC takes the same view as Codex Alimentarius on nutritional labelling, namely that only the listing of energy, fat, carbohydrate and protein shoud be mandatory.

The IOCCC opposes any proposal to mention the sodium content separately on the label, since this would allow the false inference that sodium was a hazard to the majority of consumers.

BIBLIOGRAPHY

1. ANONYMOUS. Does Lack of Calcium Cause Hypertension, Science 1984; 225: 705-706.

2. DENTON D., The Hunger for Salt. Springer Verlag 1982. ISBN 3540112863.

3. Dietary Reference Values for Food Energy and Nutrients for the United Kingdom.
   Report on Health on Social Subjects 41, HMSO, London 1991.

4. FOOD AND NUTRITION BOARD, National Research Council. Diet and Health: Implications for Reducing Chronic Disease Risk. National Academy of Sciences, Washington D.C. 1989.

5. FOOD AND NUTRITION BOARD, National Research Council, Recommended Dietary Allowances, 10th ed., National Academy of Sciences, Washington D.C. 1989.

6. HEIMBACH, J.T., The Growing Impact of Sodium Labelling of Foods, Food Tech., Dec. 1986: 102-104.

7. INTERSALT cooperative research group. Intersalt: An International Study of Electrolyte Excretion and Blood Pressure. Results of 24 hour Urinary Sodium and Potassium Excretion. British Medical Journal 1988; 297: 319-328 (1988).

8. JAMES WPT. Healthy Nutrition: Preventing Nutrition Related Diseases in Europe. WHO Regional Office for Europe, WHO Regional Publications, European Series N°24, Copenhagen 1988.

9. KARE, M.R., FREGLY, M.J., BERNARD, R.A. (eds). Biological and Behavioural Aspects of Salt Intake, Academic Press 1980.

10. LAW, M.R., FROST, C.D., WALT, N.J. By How Much Does Dietary Salt Reduction Lower Blood Pressure ? Br Med J 1991; 302:811-824.

11. McCARRON, D.A., MORRIS, C.D., HENRY, H.S. and STANTON, J.L. Blood Pressure and Nutrient Intake in the United States, Science 1982; 224: 1392-1398.

12. NATIONAL TECHNICA Information Service. The Public Response to Labelling of the Sodium Content of Foods, Publ. no PB83-192583. (Heimach JT, Editor), 1983.

13. Nordiska näringsreckommendationer. Andra uppl. PNUN rapport 1989:2, Nordiska ministerrådet, Köpenhamn, 1989.

14. WHO. Diet, Nutrition and the Prevention of Chronic Diseases. Report of a WHO Study. WHO Tech. Rep. Ser. 797, WHO, Geneva 1990.