Seaweed can reduce salt intake in food

Simon Ranger describes how research is confirming the potential of his organic seaweed ingredient to reduce salt in food

Most people are aware that there is overwhelming evidence for reducing our salt intake. But most dietary salt in Westernized nations comes from eating processed foods – particularly bread, responsible for some 75% of the excess sodium in the public diet.

Thus any population-wide policy of salt reduction can only be implemented in co-operation with the food industry. And from thereon, it all becomes only more confusing, and polarized between conventional and holistic approaches to food research.[1,2]

The scientific studies that underpin concern over dietary salt[3] treat three different substances – salt, sodium and sodium chloride – as though they were all 'salt'. At one end of the scale, sodium chloride is about 40% sodium, 60% chloride and devoid of other minerals. At the other, whole, unrefined natural salt contains a wide range of minerals valuable to health.[4]

This confusion is reflected in a Food Standards Agency 'calculator' being imposed on food manufacturers, which assumes that sodium is always accompanied by chloride.[5] The highly respected Campden Food Research Association commented: 'The flaw in these calculations is that compounds of sodium and chloride, other than salt, may be present in food.' For example, there is no chloride in seaweed, but 27mg of sodium per gram or 2.7g per 100g. This certainly does not equate to 6.75g of salt!

In fact if sodium chloride is 'salt', then Marmite is a vegetable. Sodium chloride is a highly refined, mineral-deficient 'salt', one of many 'sterile white powders' beloved of manufacturing technologists for its absolute consistency and convenience. But an increasing number of food industry and academic voices are speaking out and, like Dr David Brownstein, are insisting that "refined salt has no place in our diet".[6]

Salt alternatives

Knowing that time is up for sodium chloride, Big Pharma and chemical companies with their multi-billion-dollar market in food ingredients – the biggest growth being in 'neutraceuticals' – are working overtime to develop salt alternatives.

Typically these are a new generation of 'sodium reduction systems', for example 'a proprietary blend of ingredients that mimics the characteristics of salt – water soluble, heat and acid stable, easily flowing, providing the same great salty taste consumers crave without leaving any aftertaste. We are keeping the formulation confidential at this time, but…all ingredients are Generally Recognised As Safe (GRAS)'.[7] So is sodium chloride.

In the past two decades, so-called 'low-sodium' salts 'cleverly' substituted potassium and even magnesium for sodium, no 'healthier' than sodium chloride. This enabled food brands to claim 'reduced sodium' but these alternative minerals 'do not have a clean taste'. So the new sodium reduction systems 'contain flavour blends to mask the metallic aftertaste associated with potassium chloride'.[7] And the consumer is duped again.

But times have changed and the tricksters are not having it all their own way. As well as many consumers, there are those in the food industry and academia who favour more wholesome solutions.

Cathryn Higgs, 'traffic lights on foods' campaigner and Food Policy Manager for The Co-operative Food, Britain's fifth largest food retailer with 17 million customers, told the food industry last year: 'It's not about yet another range of the same kind of foods; (what is needed) is a fundamental change in the way we consider reformulations and new products'.[8]

Yet such is the size and complexity of the salt debate, salt has also become synonymous with cardiovascular problems and the food industry has become the target. Large international organizations have sprung up, for example the Worldwide Action on Salt & Health (WASH), of which Consensus Action on Salt & Health (CASH) is its vociferous British member.

Today few people question that excessive sodium can cause cardiovascular problems, but this has sidelined the more serious and important truth – that mineral imbalances lead to many health problems, not just high blood pressure and heart disease, as nutritionist Patrick Holford explains:

'Minerals work together and need to be balanced. For example, potassium and magnesium work with sodium to regulate water balance and nerve and muscle impulses. The more sodium you eat, the more potassium and magnesium you need. Few of us eat enough of these, yet we eat high amounts of sodium in salt. This leads to potassium and magnesium deficiency, where muscles become tight, nerves are over-stimulated, and you feel more anxious'.[9]

The latest research also notes that 'the biggest risk factors for hypertension include overweight and obesity, regular analgesic use and physical inactivity' and 'the resultant epidemic of obesity may be a more important determinant'.[10] And where hypertensive men and particularly women have restricted their salt intake, significant iodine deficiency has been found.[11]

Although it has attracted only a fraction of the tax-funded research and media advertising of the salt debate, the

nutritional, mineral and micronutrient imbalance of modern foods – which includes iodine deficiency – is at least of equal concern throughout the world and has been for more than two decades.[12]

For this reason alone, the statistics on mineral deficiencies in soil, livestock and vegetables, as well as manufactured foods, must inform the salt conundrum; and when they do, 'mineral imbalance' emerges as even more important for human health than simply replacing sodium chloride in manufactured foods!

Mineral and trace element changes in Britain in the 51 years from 1940 to 1991 show that farmed meat lost 41% calcium and 54% iron, while vegetables lost an average 50% calcium, 25% iron and magnesium, 76% copper and 59% zinc. Of 72 foods analysed annually between 1940 and 2002, including fruit and vegetables, meat and meat products, cheeses and dairy products, results showed that 'collectively there has been an average 19% loss in magnesium, a 29% loss in calcium, a 37% loss in iron, and 62% loss in copper – iron and copper being the only trace elements analysed for in 1940'.[13]

Salt and seaweed balance

Seagreens was invited to participate in research on natural alternatives to salt, fats and sugar in 2007 at Sheffield Hallam University by Asda supermarket. As a rich source of all the minerals, it was hoped seaweed might be able to replace salt – and so it turned out.

The first stage of the project[14] culminated in February this year. A consumer trial in which half of the salt was replaced by Seagreens in white and wholemeal bread led researcher Dr Andrew Fairclough to state: 'This study demonstrates that Seagreens can be used to achieve salt levels below the recommended limit.'

Reviewing Seagreens® Organic seaweed ingredients among the latest salt alternatives in the prestigious American journal, Nature Medicine, Stephen Strauss spoke of 'ground up wrack seaweed ... tasting much like the real thing (salt), does not contain salt molecules ... can create bread with a browner crust and a fluffier body than most salt substitutes'.[15]

Given the average daily intake of at least 9 grams of salt, which the WHO and national governments worldwide acknowledge to be too high, this could in theory introduce up to 4.5 grams of seaweed into the UK population's daily diet – the same amount in the traditional Japanese diet, acknowledged by many to be among the healthiest in the world.[16]

Having realised the need to optimise the balance of minerals and micronutrients in our food, I was looking beyond simply replacing sodium chloride in manufactured foods to promoting a mix of natural, unrefined salt and seaweed because it provides an ideal mineral balance, combining the appealing taste and composition of salt with the much broader nutritional balance of the Seagreens seaweed – a natural, complete, whole food.

Seaweed also helps remove toxic metals, reduce cholesterol and dissolve fats in the blood. Research shows its special polysaccharides to be an effective blood anticoagulent, in some trials as effective as the drug Heparin.[17]

Japanese research has shown wrack seaweed to act as an antidote to excessive salt. It was discovered that 'when stroke-prone rats were overfed salt, only those also fed seaweed powder did not have strokes'.[18]

Such a holistic approach to health concerns, nutrition and research is therefore concerned less with individual nutrients and more with the relationship between them and with the body. As for sodium, it predominates in sea water and is one of the most important minerals in our bodies. And, whilst sea salt contains very little or no iodine, seaweed is the richest, natural source of iodine.

A chronic lack of dietary iodine 'is largely responsible for an epidemic of hypo-thyroid linked illnesses and breast cancer'.[19] And of course that is why so much salt, as a ubiquitous global food, has long been fortified with iodine – though not the better absorbed, natural, colloidal form in seaweed.

More than this, wild wrack seaweed provides a broad nutritional foundation that more generally aids the endocrine system, digestion and metabolism. On this basis, while the university research continues, now at the Centre for Food Innovation in Sheffield, I have set up the not-for-profit Seaweed Health Foundation, specifically to pursue this holistic approach in seaweed research.

The Foundation has already begun to focus on the benefits that seaweed ingredients might deliver in preventive health and nutritional therapy, the most urgent concerns being cardiovascular health and metabolic disorders like obesity, directly related to salt replacement.

Its early studies suggest that if seaweed succeeds as a natural ingredient in our bread and many daily foods, it may also have some effect on obesity. The idea is in keeping with US food industry studies where Stanford University's Dr Crystal Smith-Spangler concluded that, although a population salt reduction of just 9.5% might achieve per person on average a very small decrease in blood pressure, 'over large populations, we saw a significant reduction in cardiovascular disease and cost savings'.[20] ✪ *Continued on page 44*

Nutrient	Sea salt	Seaweed	Salt + Seaweed
Boron	0.001µg	60.0µg	60.0µg
Calcium	4.1 mg	20.0mg	24.1 mg
Chloride	628.9mg	(chlorine)	628.9mg
Cobalt	2.0µg	5.4µg	7.40µg
Copper	1.0µg	0.2mg	1.20µg
Gold	1.0µg	390µg	391.0µg
Iodine	100µg	390µg	490.0µg
Iron	284.0µg	575µg	859.0µg
Magnesium	31.2mg	7.0mg	38.2mg
Manganese	3.0µg	30µg	33.0µg
Phosphorus	0.395mg	1.5mg	1.895mg
Platinum	4.0µg	trace	>4.0µg
Potassium	6.4mg	31mg	37.4mg
Selenium	2.0µg	0.15µg	2.15µg
Silicon	2.7mg	1.0mg	3.7mg
Silver	0.031µg	trace	>0.031µg
Sodium	314.2mg	35mg	349.2mg
Sulphur	11.7mg	30mg	41.7mg
Zinc	1.0µg	130µg	131.0µg

Table 1: Typical profile of minerals and trace elements in 1 gram of unrefined Atlantic sea salt and Seagreens® Organic wrack seaweed (approximately 1/4 teaspoon) – a complete natural balance of all the minerals and trace elements. The above is not comprehensive but illustrates the combination of minerals and trace elements common in salt and seaweed. More than 60 further trace elements are present in salt, from bismuth to zirconium, most only identified in the 1970s and their value in human nutrition still unclear. A gram of seaweed also typically contains protein 75mg, carbohydrate 579mg, polysaccharides 80mg, fibre 50mg, fat 32mg and 12% moisture. It should also be noted that sodium in salt is not in the same form in seaweed; in salt it is a separate, inorganic element; in seaweed a chelated, soluble, colloidal mineral attached to protein ions as an incorporated part of the living organism – a true food form.

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Simon Ranger *developed Seagreens over the last decade and has pioneered Europe's highest standards for harvesting and producing food quality seaweed in Norwegian Lapland and the Outer Hebrides. In July, the Scottish factory was awarded the 2010 Crown Estate Business Award for Marine Enterprise. More details: www.seagreens.com .*