Committee on TOXICITY

POTASSIUM-BASED SALT REPLACERS: CURRENT STATUS OF COT CONSIDERATION

Introduction and background

1. The Department of Health (DH) has asked the Scientific Advisory Committee on Nutrition (SACN) to review current recommendations on potassium-based salt replacers to inform the setting of new targets for salt as part of the Responsibility Deal. The aim of the targets is to reduce population intakes of sodium, thereby lowering blood pressure and reducing the risk of stroke.

2. DH does not currently recommend the use of potassium-based salt replacers as a means of achieving salt reduction since their use would continue to maintain a higher salt flavour in food. Rather, its aim has been gradually to reduce the salt content of food products so that the palates of consumers become accustomed to lower salt levels. In addition, increasing potassium levels in food might have adverse effects in vulnerable individuals who are at risk of hyperkalaemia because of impaired or immature kidney function, or from use of medicines that cause retention of potassium. These vulnerable groups could include the elderly, very young children and individuals with kidney disease. Some people with impaired kidney function are required to follow a low potassium diet, and would need to avoid products in which sodium salts were replaced by their potassium equivalents, but there are also many people with undiagnosed kidney disease who might be adversely affected by increased levels of potassium in foods.

3. The food industry has asked DH to reconsider its position as some producers would like to use, and may already be using, potassium-based salt replacers to reduce the sodium content of food. In general, the products concerned are those for which further reductions in sodium would not be possible through reformulation because the sodium salt concerned has a function (e.g. as a preservative or a raising agent) as well as providing taste. Potassium cannot totally replace sodium as it does not have the flavouring properties of sodium, and has a metallic aftertaste. It has been suggested that a maximum of 25% of added sodium by weight could be replaced by a potassium equivalent in these foods.

Potassium toxicity

4. Potassium plays a major role in the maintenance of resting cell membrane potentials, including in cardiac and neuromuscular cells. Serum potassium is normally in the range 3.5-5.0 mmol/L and is tightly regulated. Excess potassium is excreted by short- and long-term renal and extra-renal mechanisms, linked to the

homeostasis of water and other minerals. Hyperkalaemia is defined as serum potassium ≥ 5.5 mmol/L.

5. Hyperkalaemia affects the heart and the neuromuscular and gastrointestinal systems. Patients with high serum potassium levels may complain of vague feelings of illness, gastrointestinal symptoms or generalised weakness.

6. As serum potassium levels increase, physiological changes of increasing severity occur in the heart, and may lead to atrioventricular (AV) block or ventricular dysrhythmia. However, the occurrence of serious complications does not relate only to the level of potassium, but depends also on the rate at which serum potassium levels are rising, and the underlying cause of the hyperkalaemia.

7. The most serious hazard is impaired cardiac conduction with risk of sudden death from asystole or ventricular fibrillation. Neuromuscular symptoms and signs include muscle cramps, weakness, paralysis, paraesthesiae and impaired deep tendon reflexes. Usually, severe symptoms do not occur until serum potassium levels reach > 7 mmol/L, and a rapidly rising level is more dangerous than one that increases slowly.

8. In individuals with normal renal function, hyperkalaemia from excess potassium load is very uncommon, and provided that fluid intake is sufficient, and consumption is spread over the course of the day, short term intakes of up to 15 g/day potassium can be tolerated without serum potassium levels increasing beyond the normal range.

9. The large majority of cases of hyperkalaemia occur when potassium excretion is impaired by a medical disorder, or by the use of potassium-retaining medications in patients with some degree of underlying renal dysfunction. Dietary salt substitutes, potassium supplements, penicillin V potassium antibiotic therapy and drinking water softened with potassium salts may also cause hyperkalaemia in people who are pre-disposed.

COT considerations to date

10. To date, the COT have conducted some initial modelling on the changes to potassium intakes that might result from the proposed uses of potassium based salt-replacers, and have assessed information on potentially vulnerable groups, in particular considering infants and young children, and people with impaired kidney function. Further work is now needed to refine this.

11. Few data are available on the effects of higher dietary potassium intakes in infants and young children, but data on renal development and maturation and on potassium distribution suggest that this group would not be more sensitive to increases in dietary potassium than older children or adults.

12. Nearly 2 million adults (4.3% of the population) in England have diagnosed stage 3-5[1] kidney disease, and it has been estimated that a further 0.9-2 million may

[1] The features of stage 3-5 kidney disease are given below

Stage	Glomerular Filtration Rate (ml/min/1.73 m^2)	Description

have undiagnosed kidney disease of comparable severity. A small proportion (approximately 3%) of individuals with kidney disease need to restrict their potassium intake because they no longer have sufficient renal capacity to excrete excess potassium. This includes people with undiagnosed as well as diagnosed kidney disease. However, it is uncertain how often life-threatening hyperkalaemia occurs in individuals who are not already known to be at risk. The Committee is currently seeking information on the additional number of people with undiagnosed renal disease who might suffer serious adverse health effects if potassium intakes in the general population increased.

13. The Committee is also seeking advice on whether there are certain foods in which salt replacement by potassium would present particular difficulties for those trying to follow a low potassium diet.

14. At present there is insufficient information to draw further conclusions, but the topic will be revisited towards the end of 2014, by which time it is hoped further information will be available.

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3A	45-59	Moderate decrease in GFR, with or without other evidence of kidney damage.
3B	30-44	
4	15-29	Severe decrease in GFR, with or without other evidence of kidney damage.
5	<15	Established renal failure.