Labelling Potassium Content of Processed Foods

Healthy individuals need a major increase in their consumption of high-potassium foods, because low potassium intake can cause hypertension, stroke, loss of bone calcium, kidney stones, and kidney disease. Reputable organisations recommend a daily intake of 3 to 4.7 g potassium and no more than 2.3 g sodium. The "typical" American diet has twice as much sodium as potassium, an unsatisfactory situation that is probably mirrored in New Zealand and Australian diets too.

On the other hand, people with defective kidneys or on certain blood pressure drugs must limit their consumption of potassium. Unfortunately, such patients don't know how much potassium is present in commercial foods because most manufacturers do not reveal potassium contents, on the grounds that such information is not required.

Both groups are at present poorly served by labelling requirements on processed foods. I propose that potassium content labelling should be required under the same conditions as now required for sodium content.

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SUMMARY OF SCIENTIFIC BACKGROUND

Potassium deficiency is not a minor health issue. Proper operation of nerves and muscles needs adequate levels of both sodium and potassium. Abnormally low potassium causes muscular weakness but even modestly low potassium intake can cause numerous health problems. These are reviewed in the paper by Morris et al. (2006) that is cited below.

Hypertension and stroke are important health problems that are linked to inadequate potassium intake. As a predictor of health, dietary potassium:sodium ratio is a better predictor than sodium intake alone. Although there has been a major worldwide effort to lower sodium consumption, little attention has been paid to potassium, even though increased daily consumption of potassium reduces risk of death even if sodium (salt) intake is not changed.

A daily average of 4.7 grams of potassium and less than 2.3 grams of sodium has been recommended, whereas typical Western diet has only 2-3 grams daily of potassium. Consumers cannot adopt healthy eating habits in this regard unless they are given adequate information. An easy-to-remember target is that daily K should be at least twice the daily Na, i.e., $K/Na > 2$. (The customary way of expressing this ratio is as Na:K but that means a target of <0.5 is hard to recall and to calculate.)

Kidney-damaged individuals should *avoid* foods with high levels of potassium. At present such people can knowledgeably select non-threatening raw foods, but cannot determine potassium levels in most processed foods that do not include potassium values in their composition tables.

Thus, one group of consumers should minimize potassium intake, and a much larger group should be increasing their potassium. Neither group is well served by current regulations, since only a few manufacturers provide both sodium and potassium analyses.

Having label information for both potassium and sodium might influence consumer choice of purchases.

It is practically impossible to estimate the potassium content of processed food, even from the raw materials, since some potassium may be leached out during processing. The following table comes from USDA analyses, package labels, and McDonalds web pages. In terms of K:Na ratios, McDonald's oft-maligned fries seem to be better than boiled potatoes, although fat content is another problem.

Food	Sodium mg/100 g	Potassium mg/100 g	K:Na
Red Rock Honey Soy Potato Chips	**520**	**1180**	**2.3**
Smiths Chips	**560**	**1600**	**2.9**
Red Rock Rice Crisps	**718**	**144**	**0.7**
Nobbits Peanuts	**600**	**650**	**1.1**
Corn Chips	**600**	**200**	**0.3**
Burger Rings	**1100**	**140**	**0.1**
Pretzels	**1500**	**170**	**0.1**
Potatoes, boiled with salt	**240**	**330**	**1.4**
Potato soup, dry mix	**610**	**1250**	**2.0**
McDonalds Fries	**233**	**575**	**2.5**
Raw potatoes	**5**	**420**	**84**

Sodium and potassium levels in snack foods are generally not available either as printed label information or by contacting manufacturers' 0800 numbers.

Recommendations

1) Schedule 2, Part 3, page 45: amend entry for Potassium to include the same two specific health effects already listed for sodium or salt: “Reduction of blood pressure” and “Maintenance of normal blood pressure”.

2) Make inclusion of both sodium and potassium analyses obligatory wherever sodium values are now required. (Schedule 1, page 31, bottom of table, implies that all nutrition panels should indicate both sodium and potassium contents. I may have misinterpreted this.)

3) As an alternative to recommendation (2), require potassium contents to be provided where other health-related claims (such as “no GME”, “no cholesterol”) are on the package.

4) Do not include specific health claims for potassium, since the situation is too complicated for summary. Nevertheless, it should be noted that US FDA allows the claim that:

> “Diets containing foods that are good sources of potassium and low in sodium may reduce the risk of high blood pressure and stroke.”

5) Added costs of including potassium analyses should be minimal if the requirement is phased in gradually. Both potassium and sodium can be analysed inexpensively by flame photometry, just by using filters of correct wavelength. A single extraction method would suffice for both cations. The main cost would be redesign of current packaging, and it is likely that such redesign will be needed as a result of other initiatives.

A Brief Review of Scientific Literature about Potassium

There are two kinds of applicable evidence: epidemiological and experimental. I have given only a limited selection of citations, favouring of publications by scientifically qualified investigators over excellent but non-peer-reviewed summaries.

Experimental studies, where K and Na intake was altered

* An excellent overall summary (Relationship and interactiton between sodium and Potassium) is by Morris, RC Schmidlin, O, Frassetto, L A, and Sebastian, A, in the Journal of the American College of Nutrition, Vol. 25, No. 3, 262S–270S (2006)
The abstract of this review reads (in part):

> Compared with the Stone Age diet, the modern human diet is both excessive in NaCl and deficient in fruits and vegetables which are rich in K and HCO-yielding organates like citrate. With the modern diet, the K/Na ratio and the HCO/Cl ratio have both become reversed. Yet the biologic machinery that evolved to process these dietary electrolytes remains largely unchanged, genetically fixed in Palaeolithic time. Thus, the electrolytic mix of the modern diet is profoundly mismatched to its processing machinery. Dietary potassium modulates both the pressor and hypercalciuric effects of the modern dietary excess of NaCl. A marginally deficient dietary intake of potassium amplifies both of these effects, and both effects are dose-dependently attenuated and may be abolished either with dietary potassium or supplemental KHCO. … The pathogenic effects of a dietary deficiency of potassium [may engender] *hypertension, kidney stones, and osteoporosis.*

* Numerous short-term studies have demonstrated how added K can alleviate salt-caused hypertension. For instance, Morris et al. (http://hyper.ahajournals.org/cgi/content/full/33/1/18) found .
that 6.6 g of K a day completely blocks hypertensive response to salt by both blacks and "Caucasian" subjects. (Black-skinned people may have salt-retaining genes from ancestors who evolved in salt-short desert regions of Africa.)

* Some Chinese veteran retirement home kitchens were selected randomly to use K-enriched salt, other kitchens to use normal salt. Among the 1000 men involved, age-adjusted cardiovascular disease was lowered by K-enriched salt to 59% of the normal salt group. Men in the high-K homes lived 0.3 to 0.9 years longer and spent significantly less (US$426/year) in inpatient care for cardiovascular disease. "Effect of potassium-enriched salt on cardiovascular mortality and medical expenses of elderly men", Hsing-Yi Chang et al. Am J Clinical Nutrition 83(6): 1289-1296, June 2006.

* About 50 cardiac surgery patients were given either potassium chloride pills or potassium-rich foods, pre-operatively. Both groups had length of stay in hospital significantly reduced by short-term treatment with K. Eighty percent of patients preferred the diet method. "Potassium supplementation, diet vs pills" W Norris et al. Chest 2004:125:404-409

* An 8-week crossover study of 37 hypertensive adults fed 2.5 g potassium a day showed 12 mm Hg lowering of systolic blood pressure and 16 mm lowering of diastolic blood pressure.

* A 4-week study with 18 elderly hypertensive patients found that a daily dose of 2.5 g potassium produced 12 mm drop in systolic and 7 mm drop in diastolic pressures.

Epidemiological Studies, where long-term dietary factors were evaluated.

* The ratio of dietary sodium to potassium is more important than sodium alone in forecasting mortality. In a sample of more than 12 thousand US adults were followed. The quartile with highest sodium intake had increased hazard ratio for all-cause mortality of 1.20. But using the quartile with both high Na and low K, the hazard ratio for all-cause mortality was 1.46. That is, people with low K and high Na intake are 46% more likely to die, especially from cardiovascular disease or stroke. "Sodium and potassium intake and mortality among US adults". Q Yang et al, Arch Intern Med 171 (13): 1183-1191 (2011)

* In a study of 43 thousand US men with no diagnosed cardiovascular disease or diabetes, over an 8-year period the risk of stroke for the top quintile of K intake was about 2/3 (0.62, range 0.43-0.88) compared to the lowest K group. When only men with hypertension were considered, the link with K intake was even stronger. "Intake of potassium, magnesium, calcium, and fiber and risk of stroke among US men" Ascherio et al. Circulation 1998:98:1198-1204

* Corroborating the Ascherio study is a Swedish investigation with 270 thousand subjects that found risk of ischematic stroke was lowered with daily potassium intake, [Ischemic strokes arise from blockage in arteries.] Haemorrhagic stroke (bleeding in the brain) was not affected by potassium.(Susanna C Larsson (Stroke, July 28 2011)

What is the Recommended Intake of Na and K?

* The Centres for Disease Control (US) evaluated diets and medical history of 12 thousand adults over a 15-year period (See Yang et al., above). In 2011, they recommended a maximum of 2.3 g Na a day for most people, but for those people who are over 50, black-skinned or already hypertensive, less than 1.5 g. They further recommended 4.7 g K in food, on the grounds that "potassium may neutralize the heart-damaging effects of salt". (news media quote from Dr Elena Kuklina)

* The American Heart Association in their 2006 publication: "Dietary Approaches to Prevent and Treat Hypertension: A Scientific Statement" (L J Appel, et al. http://hyper.ahajournals.org/content/47/2/296.full) said in part:

> ...High potassium intake is associated with reduced BP. Evidence includes animal studies, observational epidemiological studies, >30 clinical trials, and meta-analyses of these trials. …
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> The dearth of dose–response trials precludes a firm recommendation for a specific level of potassium intake as a means to lower BP. However, it is reasonable to set the recommended potassium intake level as 4.7 g/d (120 mmol/d). This level of intake corresponds to the average total potassium intake in clinical trials, the highest dose in the one available dose–response trial, and the potassium content of the DASH diet intake. It is also the adequate intake level set by an Institute of Medicine committee.
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> On the basis of data from NHANES III, the average intake of potassium is 2.9 to 3.2 g/d ... in adult men and 2.1 to 2.3 g/d ... in adult women; only 10% of men and <1% of women are consuming ≥4.7 g/d (120 mmol/d) potassium.
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> In the generally healthy population with normal kidney function, a potassium intake from foods [greater than] 4.7 g/d (120 mmol/d) poses no risk because excess potassium is readily excreted in the urine. However, in individuals whose urinary potassium excretion is impaired, a potassium intake [less than] 4.7 g/d (120 mmol/d) is appropriate because of adverse cardiac effects (arrhythmias) from hyperkalemia...
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> … Elderly individuals are at increased risk of hyperkalemia because they often have one or more of these conditions or take one or more medications that impair potassium excretion. [Elderly persons are also more likely to have salt-sensitive hypertension that can be eased by higher intake of potasium. – My comments]