

Phosphate: A dietary additive which subtracts years from your life

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Translated from Le Journal de Montréal, march 24, 2014

Many chemical substances must be added to industrial products to improve their taste or shelf life. What is good for the industry is not generally good for our health, such as one class of additives, phosphates, which significantly increases rates of premature death.

Phosphate is an ion which is essential for life and our bodies have many sophisticated means of maintaining blood phosphate levels at constant levels. Phosphate deficiency is rarely seen in modern medicine, particularly because the mechanisms involved in phosphate elimination are usually busy preventing the problems associated with a surplus of phosphate in the blood.

Hyperphosphatemia is a dangerous disease, associated with calcification of blood vessels which both accelerates aging and promotes heart disease⁽¹⁾.

Two hormones are principally involved in preventing this phosphate excess: PTH, secreted by the parathyroid gland, and FGF-23, produced in bone; both act in the kidneys to decrease phosphate reabsorption, permitting elimination of surplus levels of this ion in the urine. The importance of these regulatory mechanisms is illustrated by patients with chronic kidney disease: more than 70% of whom exhibit hyperphosphatemia which contributes to the increased mortality rate seen in these patients.



PHOSPHATE SURPLUS

A number of foods contain appreciable quantities of phosphate (dairy products, meats, whole grains, etc.) and it is very easy to fulfill the daily recommended dose of phosphorus. Beyond the

normal dietary supply, food processing employs frequent use of phosphate-based additives to improve shelf life or to enhance the colour or a particular flavor in foods. Soft drinks, for instance, contain significant quantities of phosphoric acid (500 mg per litre), as do the majority of foods which are processed (frozen products, dehydrated mixtures, deli meats) or served at fast food restaurants. This intake of phosphate is far from negligible; it has been estimated that the average quantity of ingested phosphate doubled during the 1990s, from 500 to 1000 mg per day and sometimes far more in people who consume large quantities of processed foods⁽²⁾.

This excess is additionally significant in that these added phosphates are in an inorganic form, which is much more easily absorbed by the intestines than the organic phosphates which are naturally present in foods. The quantity of phosphates consumed can thus greatly exceed the quantities required by the body (700 mg per day), posing a significant challenge to the body's capacity to regulate phosphate levels.

INCREASED MORTALITY

It has been known for some time that people with renal failure should limit their phosphate intake to prevent aggravating the hyperphosphatemia which accompanies this disease.

Recent results indicate that people in good health should also limit the quantities of ingested phosphate: one study examined the diets of 10,000 Americans between the ages of 20 and 80, and found that the people who consume a quantity of phosphate greater than 1400 mg per day were twice as likely to die prematurely⁽³⁾. This hazard may be due to the increase in FGF-23 necessary to maintain blood phosphate at a constant level; this hormone is, in effect, a growth factor known to stimulate ventricular hypertrophy, and studies have shown that an excess of FGF-23 is correlated with an increased risk of cardiovascular disease and death.

These observations demonstrate once more an example where actions which are performed to improve processed food shelf life or taste can have catastrophic repercussions on health. We must remain realistic, however: highly processed foods can be consumed occasionally, but these foods are bad as much for their levels of sugar, fat or salt as for the conservation agents which they contain.

The only real method to increase the chances of a long, healthy life is to eliminate these products as much as possible and to rediscover the pleasures of preparing one's own food.

- (1) Ohnishi M et Razzaque MS. Dietary and genetic evidence for phosphate toxicity accelerating mammalian aging. *FASEB J.* 2010; 24: 3562-71.
- (2) Kalantar-Zadeh K et coll. Understanding sources of dietary phosphorus in the treatment of patients with chronic kidney disease. *Clin J Am Soc Nephrol.* 2010; 5: 519-30.
- (3) Chang AR et coll. High dietary phosphorus intake is associated with all-cause mortality: results from NHANES III. *Am J Clin Nutr.* 2014; 99: 320-7.