

## Food Phosphates - Nutritional Aspects

Nancy Stachiw – Phosphate Forum of the Americas, Chairman

The Food and Nutrition Board, supported by the Commission on Life Sciences of the National Academy of Sciences, periodically publishes updated Recommended Dietary Allowances which are defined as ‘the levels of intake of essential nutrients that on the basis of scientific knowledge are judged by the Food and Nutrition Board to be adequate to meet the known nutrient needs of practically all healthy persons’. (Recommended Dietary Allowances. 10<sup>th</sup> Edition National Research Council, 1989).

Phosphorus is classified as a mineral nutrient, and approximately 85% of the human body’s phosphorus content is found in the bone and teeth. Energy production and storage in the body depend upon phosphorylated compounds such as adenosine triphosphate (ADT). Other phosphorus compounds impact genetic information as well as the functioning of various enzymes and hormones. Phosphate compounds are also important body buffers for controlling acid-base balance (pH).

The Recommended Dietary Allowances (RDA) for phosphorus is listed as follows:

Men ages 19 through 24: 200 mg/day  
 Men ages 25 through 50: 800 mg/day  
 Men over 50: 800 mg/day

Women ages 19 through 24: 1200 mg/day  
 Women ages 25 through 50: 800 mg/day  
 Women over 50: 800 mg/day

For further, more specific guidance such as those for infants, adolescents and pregnant women, please refer to the RDA 10<sup>th</sup> Edition.

Calcium, magnesium, and potassium also essential minerals; phosphate salts therefore act as dual purpose compounds and have been used in fortified beverages, dairy products, cereals and numerous food products. Typical levels of phosphorus found in foods commonly manufactured with phosphate food ingredients or phosphoric acid are listed in below.

| Food              | Amount     | Phosphorus (milligrams) * |
|-------------------|------------|---------------------------|
| Pancakes          | 3 pancakes | 430                       |
| Cinnamon Rolls    | 2 rolls    | 234                       |
| American Cheese   | 1 oz.      | 211                       |
| Self Rising Flour | 100 g      | 480                       |

|                     |                                      |     |
|---------------------|--------------------------------------|-----|
| White Cake from Mix | 1 slice (1/12 <sup>th</sup> of cake) | 170 |
| Cola                | 12 oz                                | 63  |

\* Taken from Indiadiets.com website ([www.indiadiets.com](http://www.indiadiets.com))

The adult body contains approximately 1200 grams of calcium, 99% of which is in the skeleton and bones. Bone constantly resorbs and calcium is lost via feces, urine and sweat. Calcium must be replaced by proper diet and in many cases by use of calcium phosphate supplements. Failure to maintain adequate mineral levels can result in osteoporosis and other bone diseases, especially in post-menopausal women. More detailed discussions are available in the RDA 10<sup>th</sup> Edition and in nutritional literature. "Calcium Effects on Phosphorus Absorption: Implications for the Prevention and Co-Therapy of Osteoporosis," by Robert P. Heaney (Journal of the American College of Nutrition, Vol. 21, No. 3, 239-244 (2002)) discusses the effectiveness of calcium phosphate in osteoporosis treatment.

The adult human body contains 20 to 28 grams of magnesium, 40% of which is in the muscles and soft body tissues; about 1% is in the extracellular fluids and the remainder is in the skeleton. Magnesium activates numerous enzymes and impacts biochemical and physiological processes. Magnesium phosphate can be used to provide a source of magnesium in the diet.

Potassium is present in cell water at a concentration of 145 milliequivalents/l and in the plasma and interstitial fluid at 3.8 to 5 milliequivalent/l. At this low level, potassium has critical physiological effect on transmission of nerve impulses, control of skeletal muscle contractions and to the maintenance of normal blood pressure. In October 2000, the FDA approved the use of a "heart healthy claim" for products that meet the nutritional criteria as outlined in the U.S. Food and Drug Administration "Health Claim Notification for Potassium Containing Foods",

2000. To be heart healthy a product must contain:

- 350 mg of potassium per serving,
- Less than 140 mg of sodium per serving,
- Less than 3gm of fat, 1gm of saturated fat and 20 mg of cholesterol

Monopotassium phosphate, dipotassium phosphate and tripotassium phosphate can provide a source of potassium for heart healthy foods.