# Attention to Food Phosphate and Nutrition Labeling

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PHOSPHATEMIA REPRESENTS A dynamic balance among dietetic absorption, urinary excretion and exchanges with bone tissue, soft tissues and intracellular stocks, and by regulatory hormonal mechanisms.[1] The kidneys are the main organs that operate in the homeostasis of phosphatemia.[1]

In advanced stages of chronic kidney disease (CKD), when urinary phosphate excretion is severely limited, dietetic absorption plays a key role in phosphatemia, highlighting the importance of dietary control in the management of these patients.[2] Thus, prevention and correction of hyperphosphatemia are important components of CKD, achieved by dietary phosphate restriction, phosphate binders administration, and adequate dialysis.[3] In this context, we emphasize the importance of knowledge about the phosphate content in food and in nutrition labeling.

Owing to the existence of phosphate in practically all living beings, it is found in most foods.[4] Dietary phosphate comes in an organic form, such as meat and dairy products, and in an inorganic form as additives that are increasingly added to processed foods and drinks.[5] Protein of animal origin, such as meat, fish, and dairy products contain phosphate mainly in the organic form as phosphoesters, which are easily hydrolyzed and absorbed by the human digestive system.[3] High-protein plant based foods, such as legumes, nuts, cereals, and seeds, contain phosphate mainly in phytate, or the phytic acid form, which is not broken down in the human intestine because of the lack of phytase enzyme, responsible for phosphate liberation.[3] Usually, 40% to 60% of dietary organic phosphate is absorbed, then, in addition to the phosphate content, intestinal absorption is a crucial point.[6]

The cooking process may help decrease phosphate levels, for it causes demineralization both in vegetable and animal origin foods.[6] This dietetic approach could help patients learn to cook with techniques that allow reducing the load of phosphate without compromising protein intake.[7]

In food, an extra quantity of inorganic phosphorus may be added as food additives in large proportions, of which polyphosphates are their main components. The content of phosphate in processed foods is much higher than in raw foods.[8] Ordinary sources of inorganic phosphate include soft drinks, processed meat, frozen food, cereals, snacks, processed cheese, and instant products. Significant amounts of phosphoric acid are usually present in the majority of cola-based soft drinks, and because most of such beverages contain little or no protein, the amount of phosphate is almost exclusively from additives.

Additives are used to preserve humidity or color, emulsify ingredients, enhance flavor, stabilize foods, and prolong shelf life. However, the phosphate contained in additives is many times ignored as the source of such element in food and may make the total content of phosphate much higher.[3] Inorganic phosphorus is not bonded to protein, and it is a salt easily dissociated and absorbed by the intestinal tract. Approximately 90% to 100% is absorbable,[2] resulting in a greater effect of the additives containing phosphate on hyperphosphatemia than the equivalent phosphate quantity naturally present in foods.

However, it is important to emphasize that nutritional labels do not indicate phosphate quantities in foods, and there are not any laws or regulations in place requiring manufacturers to indicate such amounts in food packages, which makes it very difficult to estimate the amount of phosphate in foods.[7] Strict requirements for labeling food products that contain phosphate additives have been under discussion and are necessary to improve nutrition education. After comparing phosphate contents in foods, studies showed that the total amount of phosphate was higher in foods with additives reported in labels,[8,9] highlighting that the extra load of phosphate may be exclusively from

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additives. However, the real amount of phosphate present in foods is still difficult to access.

It is a long way to go to achieve such measures; it involves consumer defense agencies, medical and nutritional advice, government bodies, and support from the food industry. There remains a lack of information about the harmful effects of phosphate excess for the consumers, despite the scientific research and propagation of knowledge to medical institutions.

The mortality of dialysis patients is still high and unacceptable. The control of phosphatemia has been increasingly recognized as an important strategy for dialysis patients,[3] because hyperphosphatemia is a risk factor for cardiovascular diseases, progression of kidney disease, and mortality in CKD as a whole.[5] More specifically, hyperphosphatemia is involved in the pathogenesis of vascular calcification.[10] Phosphate in excess bonds to ionic calcium and is deposited in the arteries and soft tissues, in addition to inducing phenotypic changes in the smooth muscle cells into osteoblasts, thus facilitating vascular calcification.[10] It also contributes to the development of secondary hyperparathyroidism, the consequences of which extrapolate bone disease, aggravating atherosclerosis, heart disease, and anemia.[10]

The following handout on phosphate additives for CKD patients was created with the goal of providing simple education material that can help identify different types and names of phosphate containing food additives. The addition of phosphate content in nutrition labeling would be very useful for these patients, especially those on dialysis that may contribute to a better phosphataemia control.

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# PHOSPHATE CONTAINED IN ADDITIVES

## HOW TO IDENTIFY?

➔ *According to the legislation, all ingredients should be described in the list of ingredients on the labels, including food additives.*

➔ *Most of food additives have the PHOS radical in the name.*

➔ *The INS code is between 338-343iii; 450i-454v; 627; 631.*

**Additives with phosphate: PHOS radical in name**

**OR**

**INS (International Numbering System)**

## Food Additive Examples