



CALCIUM: BEYOND BONES

It is well established that an adequate intake of the mineral calcium is essential for healthy bones and teeth. Did you know that calcium also plays an important role in other systems in the body? It circulates in the blood to carry out important functions relating to the clotting of blood, regulation of muscle contraction, transmission of nerve impulses, and maintaining a steady heartbeat. Some studies are suggesting that calcium may also play a role in weight loss, prevention of colon cancer, the control of cholesterol and blood pressure levels, along with alleviating pre menstrual symptoms. Is this really so? In this issue of **Nyam News** we will look at some of these findings, discuss the key functions of calcium in the body and highlight the dietary sources of this nutrient.

Protecting Bone Health

Calcium is an essential nutrient and the most abundant mineral in the body. It is necessary for the proper growth, development and maintenance of healthy bones and teeth. Ninety-nine percent of the calcium in the body is stored in the bones and the remainder is in teeth, soft tissues and the extracellular fluid (blood plasma and the fluid surrounding cells).

By forming insoluble salts with phosphoric acid, calcium provides rigidity to the skeleton. Throughout life, bone tissue is constantly being formed, broken down and reformed. Bone cells function to maintain a very precise balance between bone formation and bone resorption that allows bones to grow and remain strong.

From infancy up to about the thirties, the period of skeletal

growth and maturation, bone formation predominates and calcium accumulates in the skeleton resulting in the increase of bone mass. Adequate calcium intake is critical to maximizing peak bone mass which is usually achieved in late adolescence, maintaining adult bone mass and reducing the rate of bone loss associated with aging.

Other nutrients that are important in bone formation are protein, Vitamin D (required for calcium absorption), copper, zinc, magnesium, fluoride, manganese, vitamins C and K. Regular physical activity, especially weight-bearing exercise, also plays a role in increasing bone mass in childhood and adolescence and helps in the maintenance of bone strength in older years.

In addition to supporting the structural functions of the skeleton, the vast reserve of

calcium in bone plays another key role. It forms a large reservoir from which the body can draw to maintain a constant calcium concentration in extracellular fluid. Although less than 0.1 per cent of total body calcium is in the extracellular fluid, its concentration is tightly regulated because of the vital role that calcium plays in the neuromuscular system, in regulation of the heart, enzyme-dependent reactions and in many other processes. When calcium levels in the extracellular fluid fall, the rate of bone breakdown is increased and calcium is released. When blood calcium levels get high, the extra calcium is stored in the bones or passed out of the body in urine and stool.

Essential for Muscle Contraction

Our muscles help us to do everything from walking to keeping our blood flowing. Calcium is essential for muscle contraction, wherever it takes place in the body. It may be for the contraction of skeletal muscle, for example, the muscles that we use in walking or for contractions of smooth muscle as happens all day long in the intestines to move material through the digestive tract or in the larger blood vessels to circulate blood throughout the body, or for the contraction of cardiac muscle in the heart necessary for the pumping of blood.

A muscle is a bundle of many cells called fibers. Muscle contraction and relaxation are regulated by changes in the level of calcium in muscle cells. The influx of calcium into the cells triggers a set of reactions which result in the release of energy to power the contraction. When calcium is drawn out of the muscle cells, the muscle relaxes.

Necessary in the Transmission of Nerve Impulses

The nervous system is made up of a network of millions of nerve cells which transmit information in the form of electrical signals or nerve impulses from one part of the body to another. Although there are so many cells in this vast network, they never actually touch. Nerve impulses are passed from nerve cell to nerve cell across gaps or synapses through special chemicals called neurotransmitters. Calcium in nerve cells stimulates the release of this chemical which then carries the impulse to the next cell in the chain as it continues on its path to the target tissue in the body.

Required for the Clotting of Blood

Calcium, vitamin K, and a protein called fibrinogen help blood platelets to form clots. Calcium is required to form fibrin which is made from fibrinogen. Fibrin threads trap

the blood cells in a web-like mesh which hardens forming a clot.

Important Role in Cellular Metabolism

Calcium plays an essential role in activating or influencing the actions of enzymes which regulate many chemical reactions essential for life. For example, it is needed to activate pancreatic lipase which is a fat-splitting enzyme produced by the pancreas. It is also involved in the transport of nutrients and other substances across cell membranes.

Does Calcium Play a Role in the Following Areas?

(a) Promoting Weight Loss

Findings from some clinical studies suggest that a diet rich in calcium and low in energy may play a role in the prevention and treatment of obesity as it leads to a greater reduction in body fat, specifically abdominal fat, than a low calcium, low energy diet. Although the effects were greater with dairy rich diets, benefits were also evident with other sources of calcium such as supplements, and non-dairy foods including green leafy vegetables, beans, and calcium fortified foods.

A recently published review that evaluated evidence from 49 clinical trials on the effect of dairy products or calcium intake on body weight and body fat

concluded, however, that the majority of the current evidence from clinical trials does not support the hypothesis that calcium or dairy consumption aids in weight or fat loss.

(b) Prevention of Colon Cancer

Research also indicates that high dietary calcium intakes may help to prevent colon cancer as well as the recurrence of pre-cancerous colon polyps, which may lead to colon cancer. The authors of a systematic review of the evidence from these studies concluded that although the evidence from two clinical trials suggests that calcium supplementation might contribute to a moderate degree to the prevention of polyps, this did not constitute sufficient evidence to recommend the general use of calcium supplements to prevent colon cancer.

(c) Regulation of Blood Pressure

There is evidence that calcium may have a role in the regulation of blood pressure. Some epidemiological studies have reported that people with a higher intake of calcium tend to have lower blood pressure. But reviews of the scientific evidence have reached conflicting conclusions. It has been suggested that larger, longer and better quality clinical studies are needed to confirm the causal association between calcium supplementation and blood pressure reduction.

(d) Pre-menstrual Symptoms (PMS)

PMS refers to physical and psychological symptoms that begin sometime after ovulation and subsides with the onset of menstruation. The cluster of symptoms include but are not limited to depression, irritability, fatigue, abdominal cramping, and headaches. Low dietary calcium intakes have been linked to PMS in several studies, and supplemental calcium has been shown to decrease severity of symptoms. However, large-scale clinical trials addressing this issue are needed before a recommendation can be made about the role of calcium in treating and preventing PMS.

Which Foods are Good Sources of Calcium?

Good sources of calcium are found in the six Caribbean Food Groups:

- Foods From Animals especially dairy foods (milk, yogurt, cheese), canned fish eaten with bones such as sardines, mackerel, and salmon.
- Vegetables including callaloo, and pak choi.
- Legumes – beans and nuts including soy milk fortified with calcium.
- Fruit Juices fortified with calcium such as orange juice.
- Staples fortified with calcium such as breakfast cereals.

The table below shows some foods that are good calcium sources.

It is important to note that Vitamin D is essential for calcium to be efficiently absorbed and utilized by the body. Dairy foods, especially milk, contain greater quantities of calcium per serving than other foods and the body

Food	Servings	Calcium Content
Milk, whole or low-fat	1 cup	300 mg
Soy or Rice Milk	1 cup	300 mg
White beans	½ cup	113 mg
Almonds	1 oz	80 mg
Sardines, canned	1 oz	108 mg
Instant Oatmeal	1 cup	100 mg
Pak Choi (Chinese Cabbage)	½ cup	80 mg
Broccoli, cooked	½ cup	35 mg
Broccoli, raw	1 cup	35 mg
Cheddar cheese	1.5 oz	307 mg
Yogurt, low-fat	8 oz	372 mg
Orange Juice, calcium fortified	1 cup	350 mg
Orange, medium	1	40-50 mg
Sweet potatoes, mashed	½ cup	44 mg

absorbs the calcium in dairy foods more efficiently than it does calcium from other sources. The presence of Vitamin D in dairy foods may account for this effect. Calcium absorption from plant

sources is hindered by high levels of phytate which binds calcium and prevent its absorption by the body.

Calcium can also be obtained from supplements. The advice of

a nutritionist or doctor should be sought before taking these supplements. ♦



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