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**MATRIC NUMBER: 18/MHS04/005**

**DEPARTMENT: HUMAN NUTRITION AND DIETETICS**

**COURSE TITLE: HUMAN BIOCHEMISTRY AND NUTRITION II**

**LECTURER: DR AUSTIN**

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**COURSE CODE: NTD 206**

**ASSIGNMENT:**

**1. DISCUSS CALCIUM AS A MACROMINERAL UNDER THE FOLLOWING HEADINGS**

**A. FOOD SOUCES**

**B. FUNCTIONS**

**C.DIETARY SOURCES**

**D.FACTORS AFFECTING ABSORPTION AND FACTORS STIMULATING ABSORPTION**

**E. HYPOCALCAEMIA AND HYPERCALCAEMIA.**

**1A) Sources of Calcium include:**

* Milk, cheese and other dairy foods.
* Yogurt
* Green leafy vegetables – such as broccoli, cabbage and okra, but not spinach.
* Soya beans.
* Tofu.
* Nuts.
* Bread and anything made with fortified flour.
* Fish where you eat the bones – such as sardines and pilchards.

**1B) Functions of Calcium include:**

* It helps form and maintain healthy teeth and bones. A proper level of calcium in the **body** over a lifetime can help prevent osteoporosis.
* It helps to carry out many important functions.
* The body also needs calcium for muscles to move and for nerves to carry messages between the brain and every body part.
* It helps in oocyte activation,
* It aids blood clotting, nerve impulse, transmission, regulating heart beat and fluid balance within cells.
* The requirements are greatest during the period of growth such as childhood, during pregnancy, when breast feeding. Long term of calcium deficiency can lead to osteoporosis in which the bone deteriorates and there is an increased rise of

fractures.

**1C) Dietary Sources of Calcium:**

* Milk, cheese and other dairy foods.
* Yogurt
* Green leafy vegetables – such as broccoli, cabbage and okra, but not spinach.
* Soya beans.
* Tofu.
* Nuts.
* Bread and anything made with fortified flour.
* Fish where you eat the bones – such as sardines and pilchards

**1D) FACTORS AFFECTING ABSORPTION AND FACTORS STIMULATING ABSORPTION:**

**Factors that stimulate Calcium include:**

1. Vitamin D: Vitamin d works in the digestive tract to absorb calcium into the bloodstream from the walls of the duodenum. Vitamin D also helps maintain normal blood calcium levels.
2. Parathyroid Hormone: It increases calcium transport across the membrane of intestinal cells.
3. Acid Environment: Hydrochloric acid secreted in the stomach during the process of digestion is required for the absorption of calcium in the duodenum. Calcium supplements could be taken with magnesium at bedtime or between meals due to the acid environment needed in the stomach to assimilate the calcium. Always consult a physician before beginning a new supplement regimen.
4. Milk Lactose: it favors absorption in infants. Lactose is acted upon by intestinal microbial flora to form acid which causes the lowering of ph which makes calcium more soluble.
5. Amino Acids: Supplemental calcium is often chelated, or combined with protein molecules called amino acids, to help the body absorb them during digestion. Lysine and arginine increase calcium absorption.
6. Exercise: Exercise along with Vitamin D intake helps calcium absorption thereby making bones strong.
7. Magnesium helps our body absorb and retain calcium

**Factors affecting the absorption of Calcium:**

1. Oxalic acid phytic acid: Foods that are high in oxalic acids such as spinach, chard, and chocolate, reduce calcium absorption. Oxalic acid binds with the calcium to form a salt crystal, calcium oxalate which cannot be absorbed. Phytic acid, which is found in whole-grain foods and high-fiber foods, affects calcium absorption the same way.
2. Phosphorus: Too much phosphorus in the diet causes precipitation of calcium in the form of calcium phosphate.
3. Stress: Stress can have a negative effect on hcl production in the stomach and on normal digestive behavior in the body, and can, therefore, have a negative effect on calcium absorption.
4. Caffeine, drugs like anticoagulants, cortisone, and thyroxin reduce calcium absorption in the body.
5. Lack of exercise and vitamin d deficiency leads to decrease in calcium absorption.
6. Fat

1E) **Hypocalcaemia and hypercalcaemia**

**Hypocalcaemia**

**Hypocalcaemia** is low calcium levels in the blood serum. The normal range is 2.1–2.6 mmol/L (8.8–10.7 mg/dl, 4.3–5.2 mEq/L) with levels less than 2.1 mmol/l defined as hypocalcemia. Mildly low levels that develop slowly often have no symptoms. It can also be caused by lack of vitamin D. It can also signal a condition of the four small glands in the neck (the parathyroid glands), the kidneys or the pancreas. In severe cases, symptoms include muscle cramps, confusion and tingling in the lips and fingers.

Treatment includes calcium and vitamin D supplements. If there's an underlying condition, that will also need treatment.

**Hypercalcaemia**

**Hypercalcaemia** is high calcium (Ca2+) level in the blood serum. The normal range is 2.1–2.6 mmol/L (8.8–10.7 mg/dL, 4.3–5.2 mEq/L), with levels greater than 2.6 mmol/L defined as hypercalcemia. Hypercalcaemia is most often caused by over activity in the four tiny glands in the neck (parathyroid glands) or from cancer. Extra calcium in the blood affects many bodily systems.

Symptoms of hypercalcaemia range from mild to severe. They may include increased thirst and urination, stomach pain, nausea, bone pain, muscle weakness, confusion and fatigue.

Treatment may include drugs or surgical removal of an overactive gland.