NAME: ESAN FAITH

DEPARMENT: PHARMACOLOGY

MATRIC NUMBER: 18/MHS07/017

COURSE: BCH 204- MEDICAL BIOCHEMISTRY- MINERAL METABOLISM

OUTLINE THE TOXICITY VALUES AND DEFICIENCY MANIFESTATIONS OF THE FOLLOWING MINERALS

POTASSIUM

An excess of potassium in the blood is known as hyperkalemia. The condition is characterized by a blood level higher than 5.0 mmol per liter, and can be dangerous. For a healthy adult, there is no significant evidence that potassium from foods can cause hyperkalemia. For this reason, potassium from foods does not have a tolerable upper intake level. This is the most a healthy adult can consume in a day without adverse effects. Hyperkalemia generally affects people with poor kidney function, or people who take medications that may affect kidney function. This is because excess potassium is mainly removed by the kidneys. Therefore, poor kidney function may result in a buildup of this mineral in the blood. However, poor kidney function isn’t the only cause of hyperkalemia. Taking too many potassium supplements may also cause it. Compared to foods, potassium supplements are small and easy to take. Taking too many at once may overwhelm the kidneys’ ability to remove excess potassium. Additionally, there are several groups of people who may need less of this mineral than others, including:

* **People with chronic kidney disease:** This disease increases the risk of hyperkalemia. People with chronic kidney disease should ask their doctor how much potassium is right for them).
* **Those taking blood pressure medications:** Some blood pressure medications, such as ACE inhibitors, may increase the risk of hyperkalemia. People taking these medications may need to watch their potassium intake).
* **Elderly people:** As people age, their kidney function declines. Elderly people are also more likely to take medications that affect the risk of hyperkalemia

A potassium deficiency, also known as hypokalemia, is characterized by a blood level of potassium less than 3.5 mmol per liter. Surprisingly, deficiencies are rarely caused by a lack of potassium in the diet. They usually occur when the body loses too much potassium, such as with chronic diarrhea or vomiting. You may also lose potassium if you’re taking diuretics, which are medications that cause your body to lose water. Symptoms of deficiency depend on your blood levels. Here are the symptoms for three different levels of deficiency:

* **Mild deficiency:** When a person has blood levels of 3–3.5 mmol/l. It usually does not have symptoms.
* **Moderate deficiency:** Happens at 2.5–3 mmol/l. Symptoms include cramping, muscle pain, weakness and discomfort.
* **Severe deficiency:** Happens at less than 2.5 mmol/l. Symptoms include irregular heartbeat and paralysis.

CALCIUM

TOXICITY VALUES

In health total plasma calcium concentration is maintained within the approximate reference range of 8.8-10.5 mg/dL (2.20-2.62 mmol/L) so that raised plasma calcium (hypercalcemia) is usually diagnosed if plasma calcium is >10.5 mg/dL (>2.62 mmol/L) and severe, potentially life-threatening hypercalcemia is roughly defined as plasma calcium >14.4 mg/dL (>3.60 mmol/L).

DEFICIENCY MANIFESTATIONS

Insufficient intakes of calcium do not produce obvious symptoms in the short term because the body maintains calcium levels in the blood by taking it from bone. Over the long term, intakes of calcium below recommended levels have health consequences, such as causing low bone mass (osteopenia) and increasing the [risks](https://ods.od.nih.gov/factsheets/Calcium-Consumer/) of [osteoporosis](https://ods.od.nih.gov/factsheets/Calcium-Consumer/) and bone [fractures](https://ods.od.nih.gov/factsheets/Calcium-Consumer/).

MAGNESIUM

TOXICITY VALUE

Average daily level of intake sufficient to meet the nutrient requirements of nearly all (97%–98%) healthy individuals; often used to plan nutritionally adequate diets for individuals of 300 to 420mg.

DEFICIENCY MANIFESTATION

Symptomatic magnesium deficiency due to low dietary intake in otherwise-healthy people is uncommon because the kidneys limit urinary excretion of this mineral. However, habitually low intakes or excessive losses of magnesium due to certain health conditions, chronic alcoholism, and/or the use of certain medications can lead to magnesium deficiency. Early signs of magnesium deficiency include loss of appetite, nausea, vomiting, fatigue, and weakness. As magnesium deficiency worsens, numbness, tingling, muscle contractions and cramps, seizures, personality changes, abnormal heart rhythms, and coronary spasms can occur]. Severe magnesium deficiency can result in hypocalcemia or hypokalemia (low serum calcium or potassium levels, respectively) because mineral homeostasis is disrupted

CHLORIDE:

TOXICITY VALUE

Chlorides are salts resulting from the combination of the gas chlorine with a metal. Some common chlorides include sodium chloride (NaCl) and magnesium chloride (MgCl2). Chlorine alone as Cl2 is highly toxic and it is often used as a disinfectant. In combination with a metal such as sodium it becomes essential for life. Small amounts of chlorides are required for normal cell functions in plant and animal life.

DEFICIENCY MANIFESTATION

Hypochloremia (Low Chloride): Hypochloremia is an [electrolyte imbalance](http://chemocare.com/chemotherapy/side-effects/electrolyte-imbalance.aspx) and is indicated by a low level of chloride in the blood.  The normal adult value for chloride is 97-107 mEq/L.

Chloride in your blood is an important electrolyte and works to ensure that your body's metabolism is working correctly. Your kidneys control the levels of chloride in your blood. Therefore, when there is a disturbance in your blood chloride levels, it is often related to your kidneys.  Chloride helps the acid and base balance in the body.

Causes of Hypochloremia:

* Loss of body fluids from prolonged vomiting, diarrhea, sweating or high fevers.
* Drugs such as: bicarbonate, corticosteroids, diuretics, and laxatives.

Symptoms of Hypochloremia:

* Many people do not notice any symptoms, unless they are experiencing very high or very low levels of chloride in their blood.
* Dehydration, fluid loss, or high levels of blood sodium may be noted.
* You may be experiencing other forms of fluid loss, such as diarrhea, or vomiting

IRON

TOXICITY VALUES:

Iron overload may develop chronically as well, especially in patients requiring multiple transfusions of red blood cells. This condition develops in patients with sickle cell disease, thalassemia, and hematologic malignancies such as myelodysplastic syndromes. However, iron toxicity can significantly increase the levels of "free" iron in the body. Free iron is a pro-oxidant - the opposite of an [antioxidant](https://www.healthline.com/nutrition/antioxidants-explained/) - and may cause damage to cells. Several conditions may cause this to happen. These include:

* **Iron poisoning:** Poisoning can occur when people, usually children, overdose on iron supplements.
* **Hereditary hemochromatosis:** A genetic disorder characterized by excessive absorption of iron from food.
* **African iron overload:** A type of dietary iron overload caused by high levels of iron in food or drinks. It was first observed in Africa, where homemade beer was brewed in iron pots. Acute iron poisoning happens when people overdose on iron supplements. Single doses as low as 10–20 mg/kg may cause adverse symptoms. Doses higher than 40 mg/kg require medical attention.

Similarly, repeated high-dose iron supplementation may cause serious problems. Make sure to follow the instructions on iron supplements, and never take more than your doctor recommends. Early symptoms of iron poisoning may include stomach pain, nausea and vomiting.

Gradually, the excess iron accumulates in internal organs, causing potentially fatal damage to the brain and liver. The long-term ingestion of high-dose supplements may gradually cause symptoms similar to iron overload. Iron toxicity refers to the harmful effects of excess iron. It may occur when 1) people overdose on iron supplements, 2) take high-dose supplements for too long or 3) suffer from a chronic iron overload disorder.

DEFICIENCY MANIFESTATION

Iron deficiency anemia is a common type of anemia — a condition in which blood lacks adequate healthy red blood cells. Red blood cells carry oxygen to the body's tissues. As the name implies, iron deficiency anemia is due to insufficient iron. Without enough iron, your body can't produce enough of a substance in red blood cells that enables them to carry oxygen (hemoglobin). As a result, iron deficiency anemia may leave you tired and short of breath. You can usually correct iron deficiency anemia with iron supplementation. Sometimes additional tests or treatments for iron deficiency anemia are necessary, especially if your doctor suspects that you're bleeding internally.