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***18/MHS07/034***

***PHARMACOLOGY***

***BCH 204***

***MINERAL METABOLISM***

1. POTASSIUM: Potassium is lethal at 75-150 mg/kg IV. Deficiency manifestations include:

A. Weakness and Fatigue: Weakness and fatigue are often the first signs of potassium deficiency.

There are several ways that this mineral deficiency can cause weakness and fatigue. First, potassium helps regulate muscle contractions. When blood [potassium](https://www.healthline.com/nutrition/what-does-potassium-do) levels are low, your muscles produce weaker contractions.Deficiency in this mineral may also affect how your body uses nutrients, resulting in fatigue. For example, some evidence shows that a deficiency could impair insulin production, resulting in high blood sugar levels. 

1. Muscle Cramps and Spasms: Muscle cramps are sudden, uncontrolled contractions of the muscles. They can occur when potassium levels are low in the blood. Within muscle cells, potassium helps relay signals from the brain that stimulate contractions. It also helps end these contractions by moving out of the muscle cells.When blood potassium levels are low, your brain cannot relay these signals as effectively. This results in more prolonged contractions, such as muscle cramps.

3. Digestive Problems: Digestive problems have many causes, one of which may be potassium deficiency.

Potassium helps relay signals from the brain to muscles located in the digestive system. These signals stimulate contractions that help the digestive system churn and propel food so it can be digested.When blood potassium levels are low, the brain cannot relay signals as effectively. Thus, contractions in the digestive system may become weaker and slow the movement of food. This may cause digestive problems like bloating and [constipation](https://www.healthline.com/nutrition/20-natural-laxatives). Additionally, some studies have suggested that a severe deficiency may cause the gut to become completely paralyzed.

However, other studies found that the link between potassium deficiency and a paralyzed gut is not completely clear . 

1. Heart Palpitations: Have you ever noticed your heart suddenly beating harder, faster or skipping a beat? This feeling is known as a heart palpitation and is commonly linked to stress or anxiety. However, heart palpitations can also be a sign of potassium deficiency. This is because the flow of potassium in and out of heart cells helps regulate your heartbeat. Low blood potassium levels can alter this flow, resulting in heart palpitations. In addition, heart palpitations may be a sign of arrhythmia, or an irregular heartbeat, which is also linked to potassium deficiency. Unlike palpitations, arrhythmia has been linked to serious heart conditions.

5. Muscle Aches and Stiffness: Muscle aches and stiffness can also be a sign of a severe potassium deficiency. These symptoms may indicate rapid muscle breakdown, also known as rhabdomyolysis.Blood levels of potassium help regulate blood flow to your muscles. When levels are severely low, your blood vessels can contract and restrict blood flow to your muscles. This means muscle cells receive less oxygen, which may cause them to rupture and leak.  
This results in rhabdomyolysis, which is accompanied by symptoms like muscle stiffness and aches.

2. CALCIUM: Hypercalcemia occurs when serum calcium levels are 10.5 mg/dL (also expressed as 2.63 mmol/L) or greater depending on normative laboratory values.

* Mental confusion, irritability, depression, and anxiety.
* Tooth decay.
* Insufficient blood clotting.
* Bone fractures.
* Osteopenia or osteoporosis.
* Growth and development delays in children.
* Heart problems involving blood pressure and heart rhythms.

1. MAGNESIUM: magnesium toxicity,after serum concentrations exceed 1.74–2.61 mmol/L. Deficiencies 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.

4. CHLORIDE: Values below the appropriate reference range may indicate hypochloremia:

* adults: 98–106 mEq/L
* children: 90–110 mEq/L
* newborn babies: 96–106 mEq/L
* premature babies: 95–110 mEq/L

Deficiencies include:

* fluid loss
* dehydration
* weakness or fatigue
* difficulty breathing
* diarrhea or vomiting, caused by fluid loss

5. IRON: Toxic effects begin to occur at doses above 10–20 mg/kg of elemental iron. Ingestions of more than 50 mg/kg of elemental iron are associated with severe toxicity. In terms of blood values, iron levels above 350–500 μg/dL are considered toxic, and levels over 1000 μg/dL indicate severe iron poisoning.

Iron deficiency **anaemia** is a condition where a lack of iron in the body leads to a reduction in the number of red blood cells.