

MINERALS

Magnesium

- Magnesium (Mg) has been discovered in 1808 by Sir Humphrey Davy. It is one of the 11 vital minerals (calcium, phosphorus, sodium, potassium, iron, zinc, copper, chromium, iodine, selenium, magnesium). It is perhaps the most important mineral among them.
-

- Since our bodies can not produce this mineral itself, we have to take it with foodstuff. Magnesium is found in the soil and sea water. This mineral has to be taken regularly for numerous functions. Malnutrition or decrease in magnesium content of the soil lead to insufficient magnesium intake. A person sweating a lot, or using laxatives or diuretics excrete magnesium more. The need for magnesium increases during stressful events, pregnancy or lactation.
-

- If our bodies can not get enough magnesium, then we start using our body reserves (magnesium stored in the bones). Our bodies contain approximately 20-28 g magnesium and 60% magnesium is found in the bones and teeth in humans. The remaining 40% is found in body fluids. It is found more in the brain and the heart compared to other tissues. Though consists of **0.05%** of our body weight, it is the cofactor in hundreds of enzymes.
-

- Magnesium that is found in the soil is used by plants. Magnesium is known as the iron in the plant kingdom since it is found in the structure of chlorophyll.
-

- Magnesium requirement varies according to age and lifestyle. An adult woman needs 300 mg/day and an adult man needs 350 mg/day.
 - During pregnancy and lactation this amount may rise up to 450-700 mg/day, or miscarriage or term birth may occur. During recovery periods magnesium requirement increases. Some lifestyles (diet, sports, alcohol consumption, smoking) may result in increased need, as well.
-

- The main magnesium store is the bones and 60% of magnesium is found here with phosphate. However, the real function of magnesium is not related to the bones, but the blood and muscle system. Strengthening of muscles, protein synthesis and enzyme system activities, cell growth and cell renewal requires magnesium. Magnesium is easily absorbed by the body and Daily magnesium requirement may be met with a normal diet. 40-60% of magnesium found in the plants may be easily absorbed by the body.
-

- Magnesium results in the relaxation of nervous system and the muscles, therefore it is also known as "Anti-stress mineral". This vital mineral is also necessary for our bodies to benefit from vitamin C, calcium, phosphorus, sodium and potassium. It aids in the flexibility of arteries in the heart and prevent heart attacks, and it also lowers blood pressure due to its dilating effect on the veins.
-


Zinc (Zn)

- Zinc is active in various cellular functions including signal transmission, transcription and replication and it is also effective on the non-specific and acquired immunity.
-

- Recommended daily intake is mere 10 mg elemental zinc, however many people living in both industrialized and developing countries can not meet this requirement. Zinc content of foodstuff Show great variety. It is found more in meat and animal originated food (such as oyster, liver, beef meat, pig, poultry etc.) compared to vegetables and herbal products.
-

- Zinc deficiency is known to have a negative effect on the immune system. If zinc is supplemental for 1-2 months till it reaches physiological levels, then the immune response becomes functional again; it decreases the incidence for infections and increases survival.
-

- In addition, zinc was shown to be effective in common cold. However if taken high amounts for a long time in both adults and children, anemia, growth retardation, copper deficiency and immunosuppression might be induced. Therefore you should be careful when using zinc supplements for an extended period of time.
-



**CELL DEATH
GENETIC
MUTATIONS**

CELL DEATH

Every cell has to grow, develop, mature, age and then die. In multicellular eukaryotic organisms, we see two kinds of cell death:

- 1) Necrosis (Cell death due to damage)
 - 2) Apoptosis (Programmed cell death)
-

1) Necrosis (Cell death due to damage):

This is a pathological cell death due to infection, being exposed to high temperatures, radiation, physical or chemical reactions. Mechanic damage, lack of oxygen and toxic substances pave the way for cell death. With disintegration of the cell, the contents lead to inflammation.

2) Apoptosis (programmed cell death):

It is disappearance of cells due to non-physiological reasons. The cells first separate from their neighboring cells, then disappear as a result of certain changes. Contrary to necrosis, inflammation is not seen after apoptosis. Apoptosis is effected by genetic structure of the cell, growth factors and environmental factors like cytokines.

Apoptosis is generally controlled genetically. The below mentioned stages can be seen:

- Cell density increases and the cell membrane loses its regular form
 - Endoplasmic Reticulum widens and joins with the cell membrane
 - Organelles gather together however they do not swell as in necrosis, i.e. they preserve their normal structures
 - Neighboring cells separate from each other
-

- Nucleus gets smaller, nucleus membrane become undulate and then disintegrates
 - Intercellular calcium amount and thus endonuclease activity increases, DNA starts to fragment as 180-200 base pairs (or its times)
 - Budding starts at the cell membrane, the cell breaks into small apoptotic particles; however the content of the cells does not leak out of the cell
 - Neighboring epithelial cells and macrophages phagocyte the apoptotic bodies that break off after budding and they are digested in the lysosomes, therefore no inflammation is seen
-

Why does apoptosis occur?

- For the completion of the organism during the process of development: This is important for the integrity of the organs during embryonic development. For example, in mammals, the membrane between the fingers are removed with the help of apoptosis.
-

- To eliminate some cells for the survival of the organism: Preservation of the integrity of mature cells, maintaining the number of cells and elimination of damaged cells are provided by this way. For example, in order to maintain the balance of blood cell production in the bone marrow, 5×10^{11} blood cells are eliminated with apoptosis per day. Endometrial cell lysis and removal of damaged cells are other examples.
-