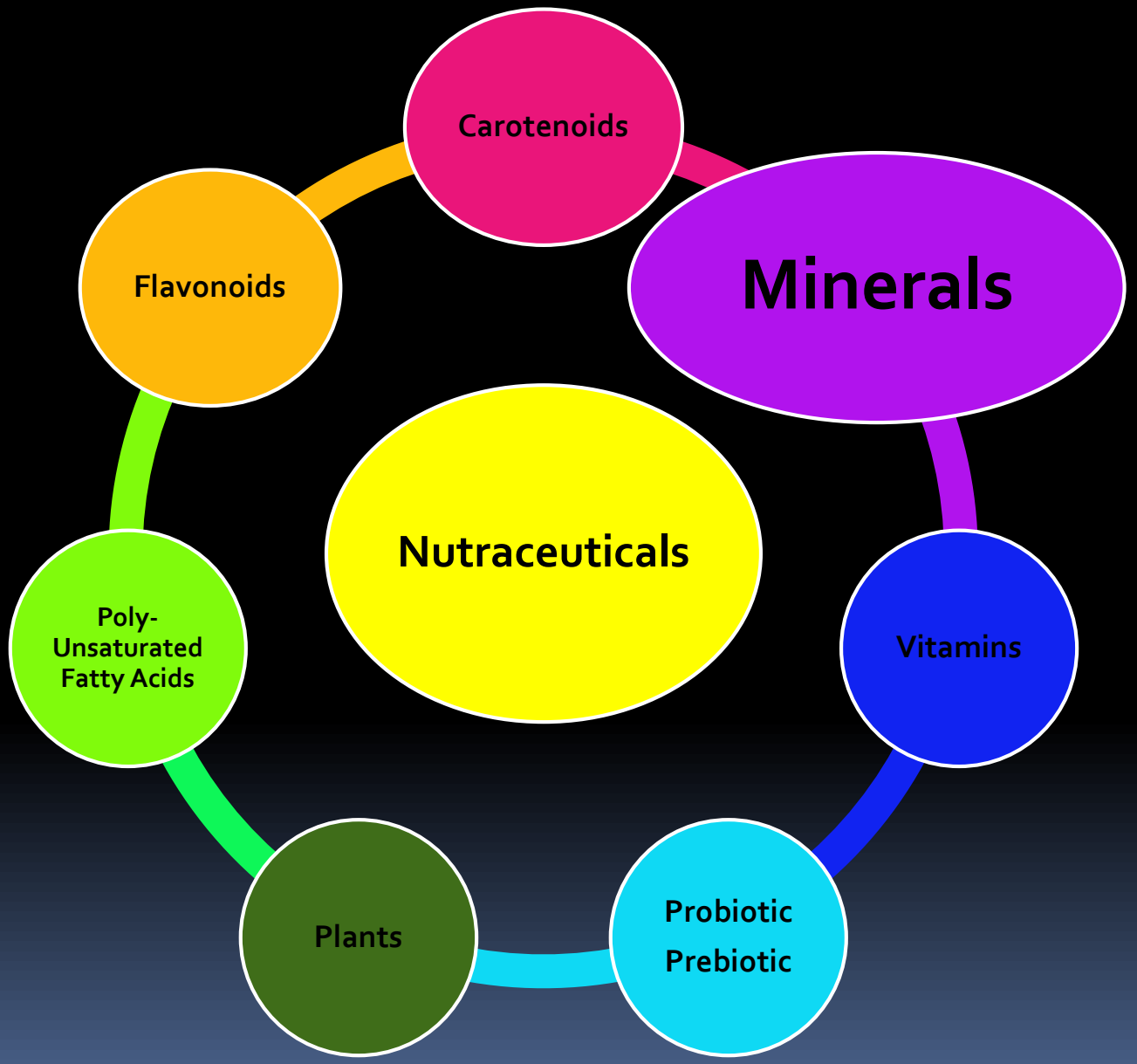
Carotenoids
Minerals
Flavonoids
Nutraceuticals
Poly-
Unsaturated
Fatty Acids
Vitamins
Plants
Probiotic
Prebiotic

Minerals

- The origin of minerals is soil.
- Not found in humans or animals.
- 15 minerals essential for human health have been identified.
- Some minerals, such as calcium and phosphorus, are abundant in our bodies and have many functions.
- Some minerals such as cobalt and iodine are found in small amounts and have several special functions.

Minerals

- In general, minerals have function with other minerals, vitamins or hormones in
  - maintanence of the strength and robustness of the bones,
  - providing the biochemical balance and acid-base balance of our body fluids,
  - metabolic events by activating the enzyme systems.

Mineral Deficiency & Toxicity

- Mineral deficiency or excessive intake lead to certain symptoms.
- For example, iron deficiency causes anemia.
- Excessive intake of iron causes sudden poisoning and death in children.

Mineral Need of the Body

- Absorption of minerals varies according to the needs of our body.
- Ex: a patient in need of iron can absorb more iron than other people.
- We can get enough of the minerals we need with a balanced diet.

Mineral Need of the Body

- The need for iron and calcium increases during pregnancy.
- The need for different minerals may increase depending on the region.
- Nowadays, the enrichment of foods with some mineral supplements somewhat prevents deficiencies.

Mineral Need of the Body

- Mineral supplements should be used cautiously. Even very low doses of some minerals can be toxic.
- Multivitamin preparations contain certain minerals, such as calcium, magnesium and zinc, in daily doses.
- It should be used in consultation with a doctor in cases where a dose higher than daily need is to be used.

Classification

- Macrominerals: Minerals found in large quantities in the body
  - Ca, Mg, K, P, Na etc.
- Microminerals: Minerals found in trace amount in the body
  - Cu, I, Fe, Mn, Mo, Se, Zn, F, Cr etc.

Calcium, Ca

- The most common mineral in the human body.
- Approximately 2% of our total weight
- 99% of the calcium in our body is stored in our bones and teeth.
- The remaining 1% is found in the bloodstream and in muscles, nerves and other soft tissues.

Calcium, Ca

- Approximately 20-30% of the calcium we take with diet is absorbed from the intestines.
- The amount absorbed increases during pregnancy, healing of fractures in bones and development of children since the need is greater in these periods.

Function of Calcium

- **Construction of bones and teeth**; Required for strength and rigidity. Although our bone structure appears to be hard and constant, there is constant change. Calcium and some other minerals are utilized in the bone tissues.
- **Control of muscle functions and heart beat;** Muscle tissues, especially cardiac muscles, need calcium for contraction and relaxation.

Function of Calcium

- **Transmission of nerve impulses;** It is required for sending impulses from nerve cell to another nerve cell or muscles. Calcium provides some impulses to be transmitted to specific receptors (ex: control of blood pressure)
- **Blood clotting and wound healing;** It is necessary to begin the processes of blood clotting and wound healing.

Function of Calcium

- **Other functions;**
- It acts as a coenzyme in various metabolic activities.
- It controls membrane permeability of cells.
- It helps synthesis of hormones and enzymes necessary for digestion.
- According to the results of recent studies, it has a protective role against colon cancer.

Therapeutical Use of Calcium

- Particularly important in the prevention and treatment of osteoporosis, especially in older women. The dose of 500-600 mg, 2 or 3 times a day is recommended. It is recommended to give it in combination with vitamin D (200-400 IU) to increase the absorption of calcium.
- Lactose, sufficient gastric acid and particularly some proteins, lysine and arginine also increase calcium absorbtion.

Cautions

- Calcium supplements obtained from bone powder, oyster shells or dolomite are not recommended due to the possible heavy metal content such as arsenic and lead, thereof toxicity risk.

Factors that negatively affect calcium absorption

- Unbalance of phosphorus content; calcium and phosphorus should be consumed in approximately equal amounts.
- Consuming too much meat or phosphorus-containing beverages (such as cola and dietary drinks) reduces the absorption of calcium and increases its excretion.
- Bran and dietary fibers; Phytic acid in bran and dietary fibers prevent absorption by binding with calcium.

Factors that negatively affect calcium absorption

- Oxalic acid-containing foods such as beet leaves, spinach, swedish cheese, rhubarb and cocoa reduce the absorption of calcium.
- Exessive consumption of lipids; especially the high consumption of saturated animal fats leads to the formation of soap-like compounds by the combination of fatty acids and calcium, and reduced absorption of calcium.

Factors that negatively affect calcium absorption

- Tea; tannins combine with calcium and reduce its absorption. It is recommended that people using calcium supplement consume tea 2 hours after Ca intake.
- Other factors; stress, aging, weight lifting exercises and the use of antacids such as magnesium and aluminum also affect the absorption of calcium negatively.

Phosphorus, P

- It is the second most abundant mineral in our body.
- Approximately 1% of our body weight
- Approximately 85% of the phosphorus in our body is in the form of calcium phosphate in our bones and gives our bones hardness and strength.
- All of our body cells contain a small amount of phosphorus and this is used for some metabolic processes and body functions.

Phosphorus, P

- Phosphorus is found in all animal foods, especially in milk and meat.
- In addition, many beverages and processed foods are rich in phosphorus.
- Approximately 70% of the phosphorus we receive from diet is absorbed. Compared with calcium (20-30%), this rate is quite high.

Function of Phosphorus

- It is necessary for strong and healthy bones and teeth along with calcium .
- It is a component of genetic material (DNA and RNA) and phospholipids that carry cholesterol and other fatty substances in the blood.
- It is necessary for the normal secretion of milk in lactating women.

Function of Phosphorus

- Strengthening of cell membrane
- Production of muscle tissue
- To maintain acid-base balance of body fluids
- It has functions in energy and protein metabolism along with some enzymes.

Therapeutical Use

- Rarely need supplementation; in case of severe burns, kidney and digestive system disorders, suplementation is recommended.
- Must be used under doctor's supervision.

Cautions

- The amount of calcium and phosphorus taken should be almost equal.
- Excessive phosphorus intake due to the consumption of meat, processed food and drinks causes calcium to be released from the bones and osteoporosis.

Magnesium, Mg

- Magnesium is the fourth most common element in the body.
- Approximately 60% are found in our bones and teeth,
- 28% are found in muscles, liver and other soft tissues,
- 2% are found in body fluids.

Magnesium, Mg

- Essential for the health of bones and teeth
- Takes part in numerous metabolic functions
- Included in antacid and laxative drugs
- Recent studies show that Mg deficiency may cause coronary artery disease and arteriosclerosis. It is the most important cause of heart attacks.

Function of Magnesium

- Required for strong bones and teeth
- Essential for the body metabolism: Mg activates many enzymes and performs about three thousand metabolic functions, including the synthesis and digestion of proteins, energy production, and insulin synthesis.

Function of Magnesium

- Necessary for the functions of nerves and muscles: It is a critical mineral for the transmission of nerve impulses, for relaxation of muscles after contraction and for cardiac functions.
- Stimulates the functions of Ca: It acts as a calcium antagonist and regulates the role of calcium in heartbeat and other functions.

Function of Magnesium

- Prevents tooth decay: strengthens tooth enamel and making provides resistance against dental caries.
- Other functions: supports the immune system, takes part in the production of DNA, increases the efficacy of potassium and some of vitamin B.

Therapeutical Use

- Intake at a dose of 400 mg/day significantly reduces the risk of arteriosclerosis and heart disease.
- Using 500 mg daily helps to lower high blood pressure and regulate insulin metabolism in patients with diabetes.
- In cases of cardiac arrhythmia and asthma, the recommended dose is 400 mg, twice a day.

Therapeutical Use

- It is used as supplement in the treatment of high blood pressure, cardiac arrhythmia, asthma, diabetes and fibromyalgia.
- It is used for the prevention of premature labor.
- It is used against some convulsions and tachycardia.

Therapeutical Use

- It is useful in prevention and treatment of migraine attacks.
- The dose of 150 mg twice daily Mg combined with 600 mg malic acid is found to be effective in fibromyalgia patients .

Cautions

- Mg supplementation should be made in combination with calcium supplementation, so that maximum efficiency can be achieved.
- Excessive calcium and phosphorus intake, excessive consumption of lipids, bran and whole grains, foods rich in oxalic acid such as spinach, rhubarb adversely affect Mg absorption.

Cautions

- Mg reduces the efficacy of tetracyclines
- Kidney patients should not take Mg supplements unless prescribed by the doctor.

Sodium, Na

- NaCl is known as table salt.
- Sodium, potassium and chloride are known as electrolytes and have electrical properties.
- Electrolytes are necessary to maintain the balance of body fluids and chemicals.
- An average adult body comprises about 100 g of sodium.

Function of Sodium

- Sodium is found in the fluid around all our body cells.
- Maintanence of the balance of biochemicals: Essential for acid-base balance of body fluids
- Nerve and muscle functions: Positively charged ion; important for the transmission of nerve impulses and for contraction of muscles

Function of Sodium

- Necessary for proper absorption and metabolism of carbohydrates
- Found in sweat, tears, bile and pancreatic digestive fluids

Sodium Deficiency

- May be required as a result of prolonged diarrhea, vomiting or excessive fluid loss, such as sweating.
- In patients with Addison's disease (irregularity of the adrenal glands), there is excessive excretion of sodium in the urine.
- Patients with hypotension require sodium intake.
- Apart from these situations, Na deficiency is rarely encountered.

Cautions

- Consumption of sodium more than required amount can cause serious problems in patients with a genetic tendency to high blood pressure.
- Excessive sodium intake causes an increase in the amount of fluid and an overload of the heart.
- Prolonged high blood pressure increases the risk of heart attacks, strokes and kidney diseases.

Chloride, Cl

- It is present with sodium in table salt.
- It functions as electrolyte.
- It provides the body's acid-base balance and fluid balance along with sodium and potassium.
- An average adult person has about 100 g of chloride in the body.

Chloride, Cl

- The highest concentration of Cl in the body is in the gastric secretion and in the fluids around the brain and spinal cord.
- It is also present in the fluids surrounding the cells along with sodium .

Function of Chloride

- To maintain the chemical and fluid balance of the body; chloride is a negatively charged electrolyte and works in conjunction with positively charged phosphorus and sodium.
- Provides biochemical balance and acid-base balanceof body
- Regulates the osmotic pressure

Function of Chloride

- Regulates the function of red blood cells; Most of the chloride in the body is located in the extracellular part, but it enters the red blood cells and maintains the fluid balance between the intracellular and the surrounding environment. This balance allows the red blood cells to move carbon dioxide to the lungs and replace it with oxygen.

Function of Chloride

- Production of gastric acid: It is necessary for the production of HCl. HCl is required for the activation of enzymes necessary for hydrolysis of starch, as well as for the absorption of iron and vitamin B12.
- Protection against bacteria and other microorganisms: Hydrochloric acid destroys many microorganism in the stomach.
- Disinfectant

Requirement & Deficiency

- The consumption of normal amount of salt in daily diet fulfills the requirement.
- Chlorine deficiency may occur in those who use very low amounts of salt due to heart, kidney and liver diseases.

Requirement & Deficiency

- Prolonged diarrhea and vomiting, diuretics, low salt diets can lead to chlorine deficiency.
- Supplement should be used at the dose recommended by a doctor.
- Generally sodium-free forms are preffered.

Potassium, K

- Positively charged electrolyte.
- Like other electrolytes (Na, Cl etc.), it is necessary for the maintanence of body fluid and acid-base balance.
- It composes 5% of body mineral content.
- Potassium is the third most common mineral in the body.
- 98% of the potassium in the body is located in the cell.

Function of Potassium

- Potassium is required to maintain the balance of body fluids and acid-base balance along with sodium.
- While sodium provides extracellular fluid balance, potassium is responsible for the balance of fluid in the cell.

Function of Potassium

- It provides the transmission of impulses from nerves to muscles. Stimulates muscles to relax after contraction.
- I has function for contraction process of heart: Cardiac muscles are stimulated and relaxed by using potassium, following its contraction which is stimulated by calcium.
- Potassium-poor diet causes heart attack, stroke and high blood pressure.

Function of Potassium

- It provides blood sugar to be converted to glycogen and stored in liver and muscle tissue.
- It has a very important role in insulin secretion.
- It is involved in protein synthesis and carbohydrate metabolism.

Use of Potassium

- It may be used for lowering blood pressure.
- It should be used under doctor's consultation.
- Potassium supplements should be taken on a full stomach, otherwise it may cause gastric complaints
- It is not recommended for the patients using ACE inhibitors and kidney patients.

Deficiency

- Defficiency is rare.
- Commonly found in foods
- Retention and processing of food causes a decrease in potassium content.
- It is recommended to consume fresh and unprocessed food.
- Long-term diarrhea and vomiting, diuretic use and long-term diet may cause depletion of potassium storage of the body.

Iron, Fe

- Best known micromineral
- Iron is required for hemoglobin production. Hemoglobin gives the color of red blood cells and carries oxygen to all body cells.
- It also acts as a component of enzymes involved in metabolism.
- Iron constitutes 4 g of the average body weight in men and 2.5 g in women.

Iron, Fe

- Iron is also found in myoglobin which absorbs oxygen in muscle tissue.
- The excess iron is stored in the form of ferritin and hemosiderin in the liver, bone marrow and spleen.
- About 10% of the iron we take in daily diet is absorbed, but absorbtion may increase in case of deficiency.

Iron, Fe

- The heme iron form found in animal foods has the ability to be absorbed 2-5 times more than the non-heme iron form found in plants.
- The form found in plants should be consumed together with vitamin C in order to increase the absorption of iron.

Function of Iron

- Iron combines with the protein called globin to form hemoglobin. This molecule is responsible for the oxygen transport in red blood cells.
- It acts as a component of enzymes involved in the conversion of food into energy.

Use of Iron

- It should be used under doctor's consultation.
- Requirement increases during pregnancy period.
- It is prescribed for anemia caused by iron deficiency.
- It can be recommended as a supplement to patients before surgery at a dose of 20-30 mg three times a day.

Deficiency

- The body regains and uses iron from the red blood cells that have finished functioning.
- Excessive menstruation bleeding, blood loss due to wound or surgical intervention, presence of tumor cause iron deficiency.

Cautions

- The tannins in tea,
- Foods rich in oxalic acid such as spinach,
- Phytic acid found in bran and other whole grain products

reduce the absorption of iron.

- It should not be taken without prescription.

Cautions

- It may cause sudden poisoning, especially in children.
- It is generally recommended to be taken on an empty stomach but in this case it may cause gastric problems.
- Therefore, it is recommended to take it with orange juice or vitamin C or meat to increase its absorption.