agMOOCs

Major Minerals 2

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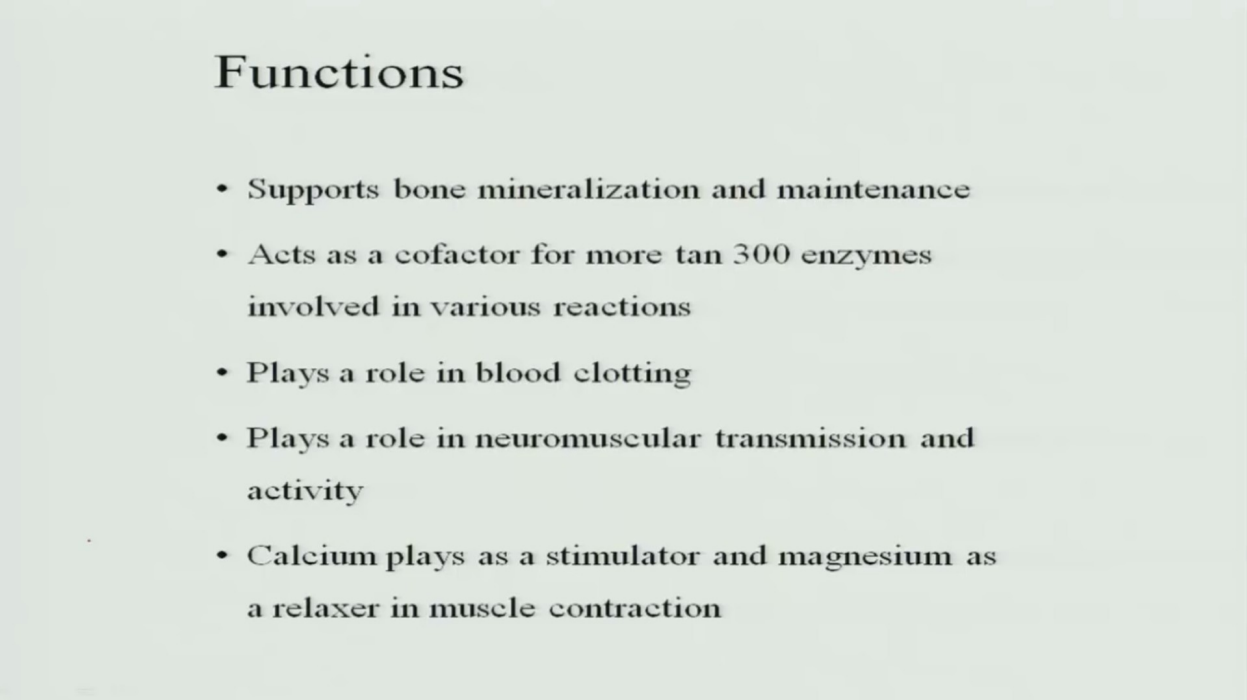
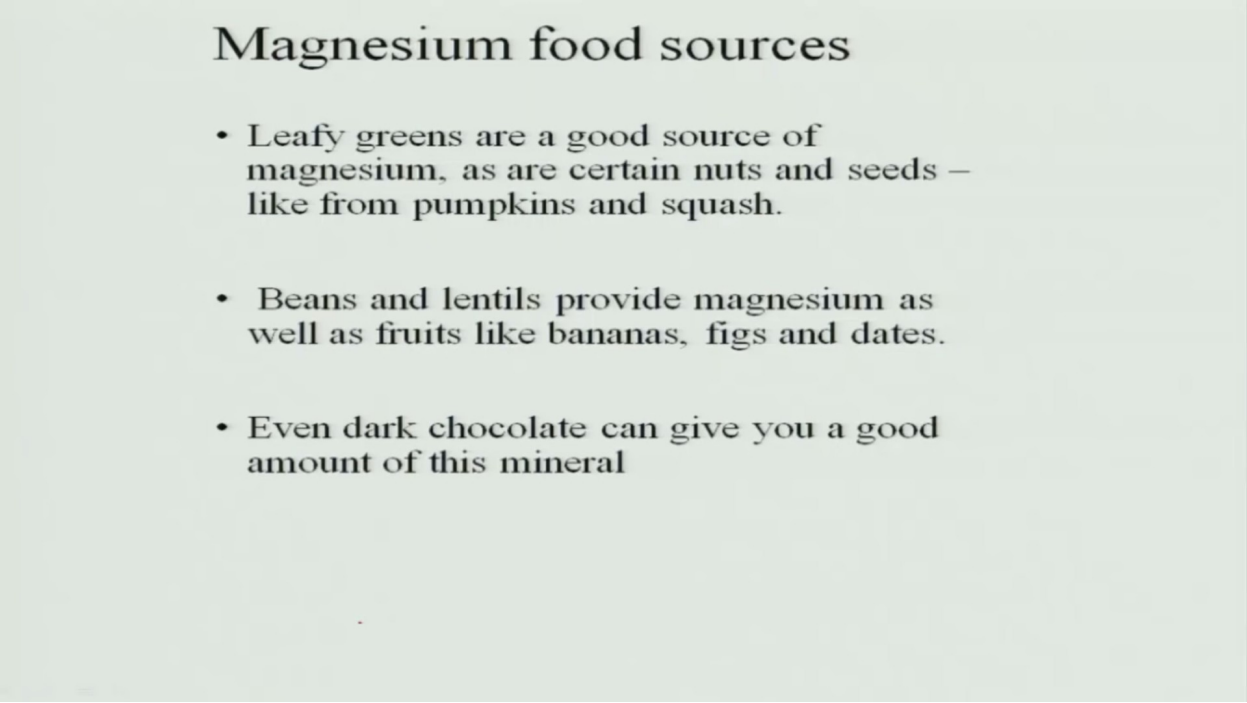
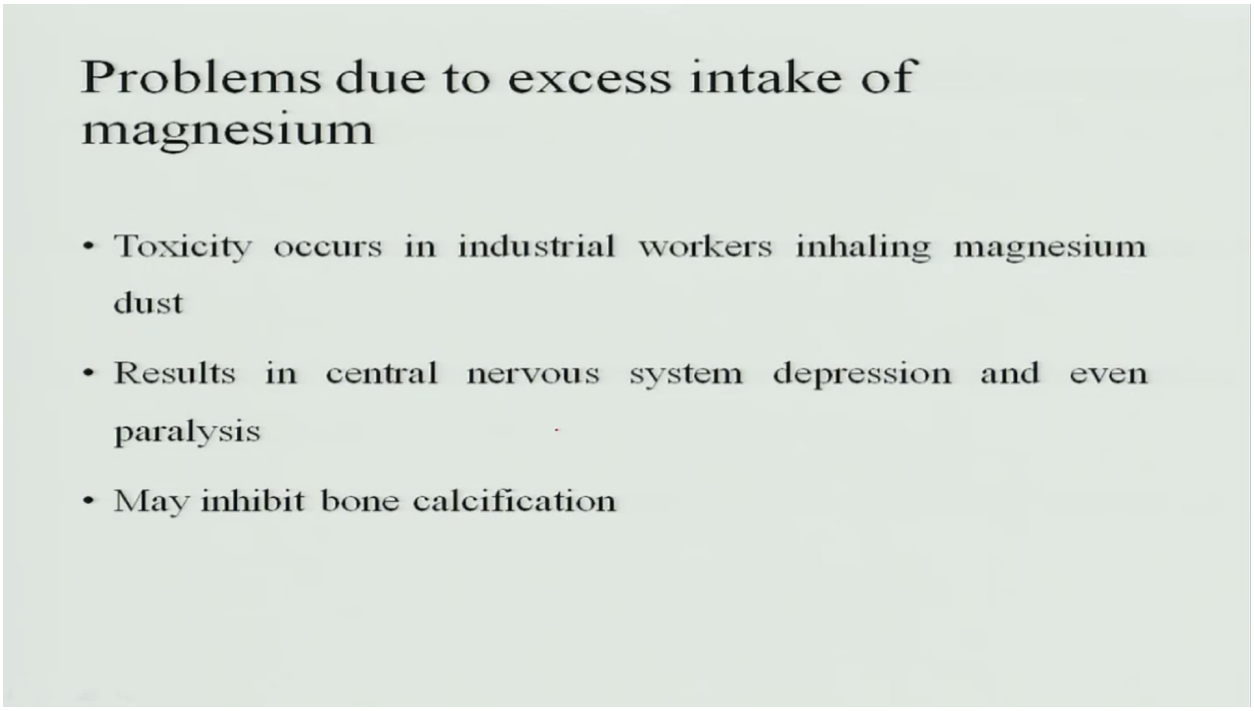
So let us continue with the topic on minerals and if we see in the last class, we have spoken about the various minerals like the major calcium and phosphorus, how they are important for our bones and teeth, how they are important for muscle contraction, and how they are important for the nervous system, what are the food sources, and what is the requirement.



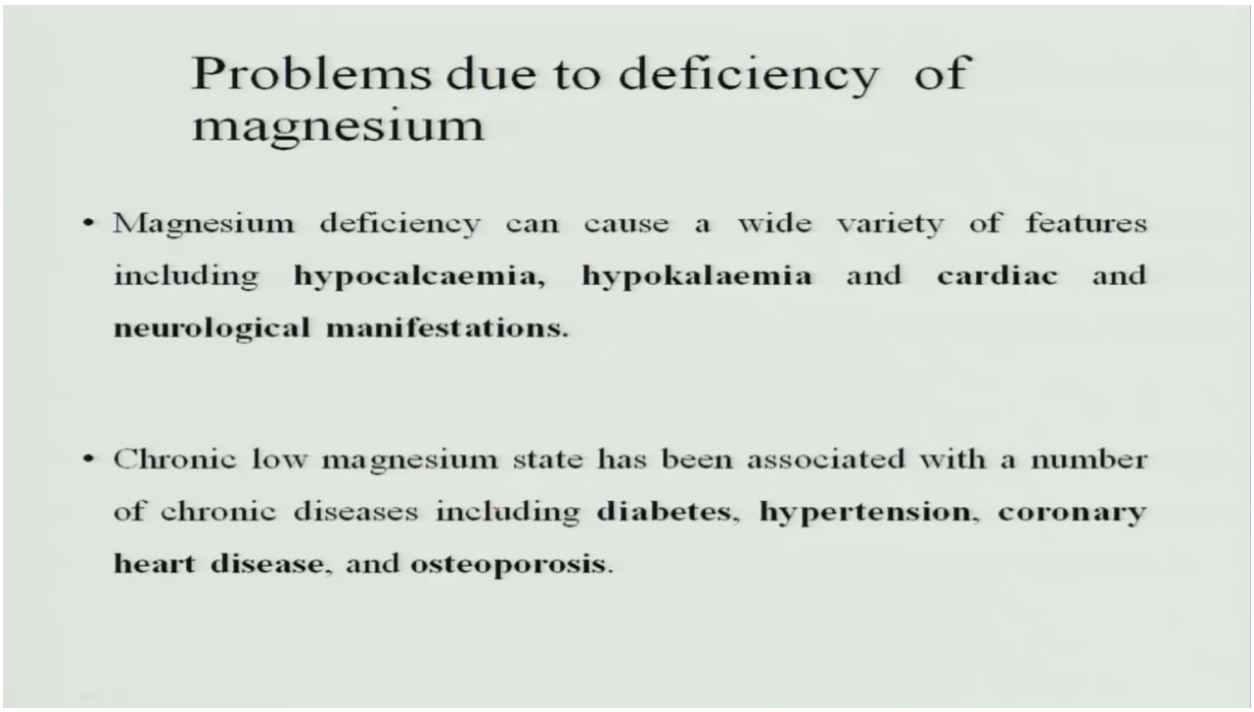
So today let us continue with magnesium, which is again an important mineral. So this supports the bone mineralization and maintenance and it acts as a cofactor for more than 300 enzymes that are involved in various reactions. All the carbohydrate protein and fat metabolism, there are so many reactions which require the magnesium as a cofactor. Then it plays a very important role in blood clotting, and so just like calcium it is also a factor which is involved in the clotting mechanism of blood. Then it plays a role in neuromuscular transmission and activity of the muscles. When the calcium place as stimulator of muscle contraction, magnesium acts as a relaxer. That means both calcium and magnesium should be there for muscle contraction and relaxation. You imagine how the heart beats, it contracts and relaxes, therefore both calcium and magnesium should be present for the normal rhythm of the heart if we take it in as an important example, and the heartbeat continues properly?



Now the four sources of magnesium are: green leafy vegetables are good source of magnesium and there are certain nuts and seeds, and especially the pumpkin seeds and the square of the fruits are also good in the magnesium. Apart from that beans and lentils they provide magnesium as well as the bananas are rich in magnesium, figs and dates also are good sources of magnesium. Now we are talking so much about dark chocolate, this dark chocolate is very rich in magnesium so it keeps the heart healthy, I mean the relaxation of heart and thus, it is very well. The food sources of magnesium you can see here.

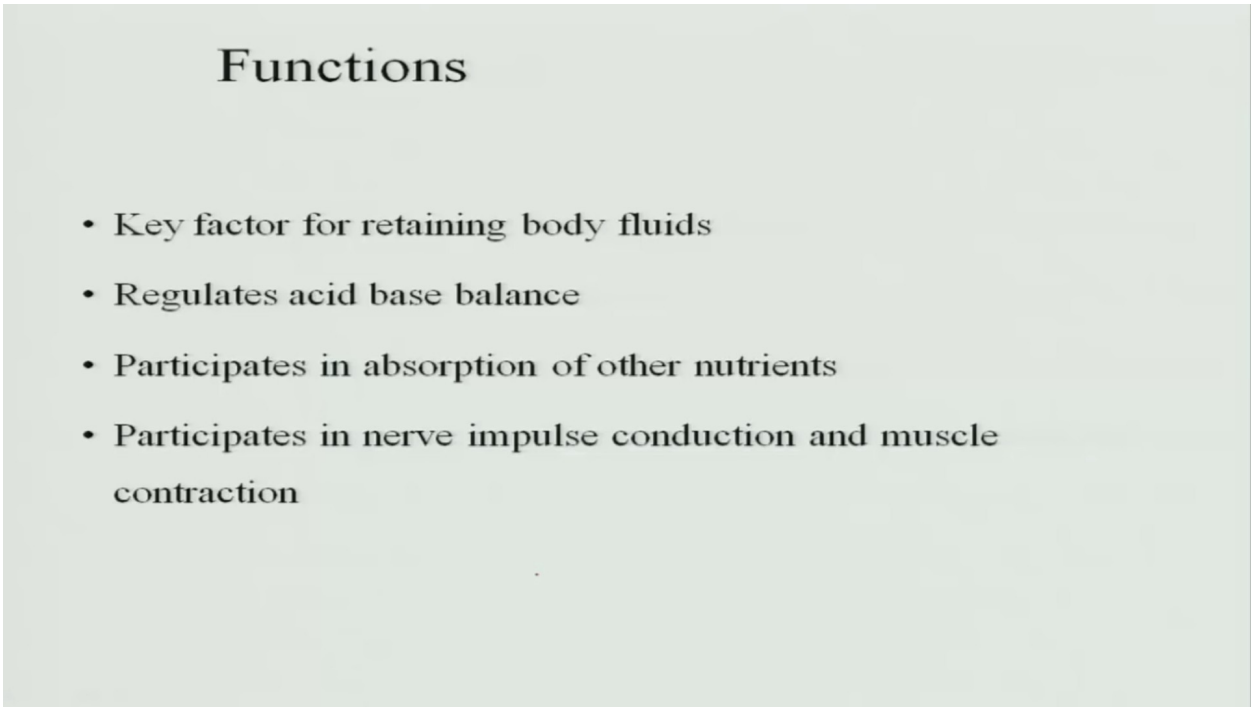


Now what is the problem and excess intake of magnesium is there. So since minerals are again stored in the body, toxicity occurs, and especially in industrial workers who are working in the factories where magnesium is component of the industry, they inhale lot of magnesium and it causes toxicity in the body and it results in central nervous system depression and even paralysis, and it also may inhibit the bone calcification when it interferes with the calcium metabolism.

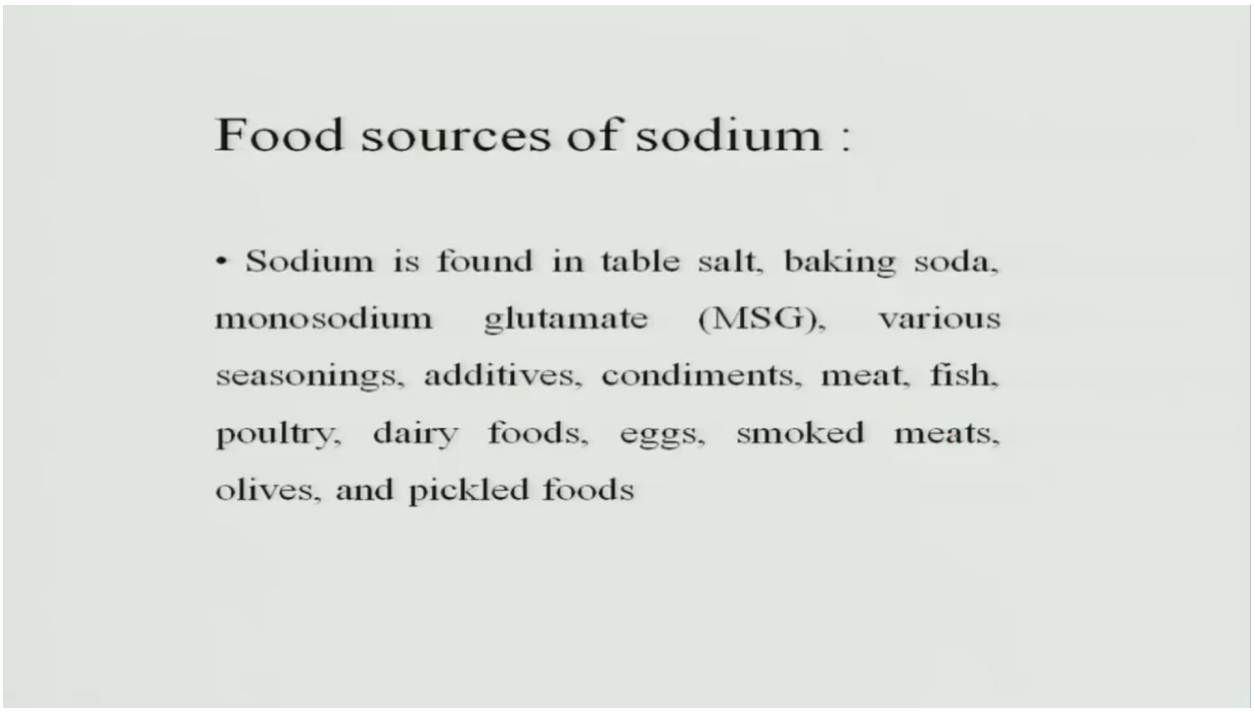


Now due to deficiency of magnesium also there is some problem. So magnesium deficiency causes a very wide variety of features like hypocalcaemia, that is a reduction in the absorption of calcium, hypokalemia that is reduction in the phosphorus, and cardiac and neurological manifestation because it has a role in contraction of the muscles and it acts on the nervous system. Now chronic low magnesium state has been associated with a number of chronic diseases including diabetes, hypertension, coronary heart disease and osteoporosis. So how the diabetes is involved in along with magnesium is it acts on the insulin and it helps the pancreas also to contract and release the insulin, and hypertension, it maintains the calcium balance, therefore it is important for the blood hypertension, maintaining the amount of blood and the blood pressure; and coronary heart disease is it helps in relaxing, if it is deficient, then relaxation of heart will not be there; and osteoporosis, since it is important for the absorption of calcium, there may be osteoporosis even if magnesium is low in the diet.

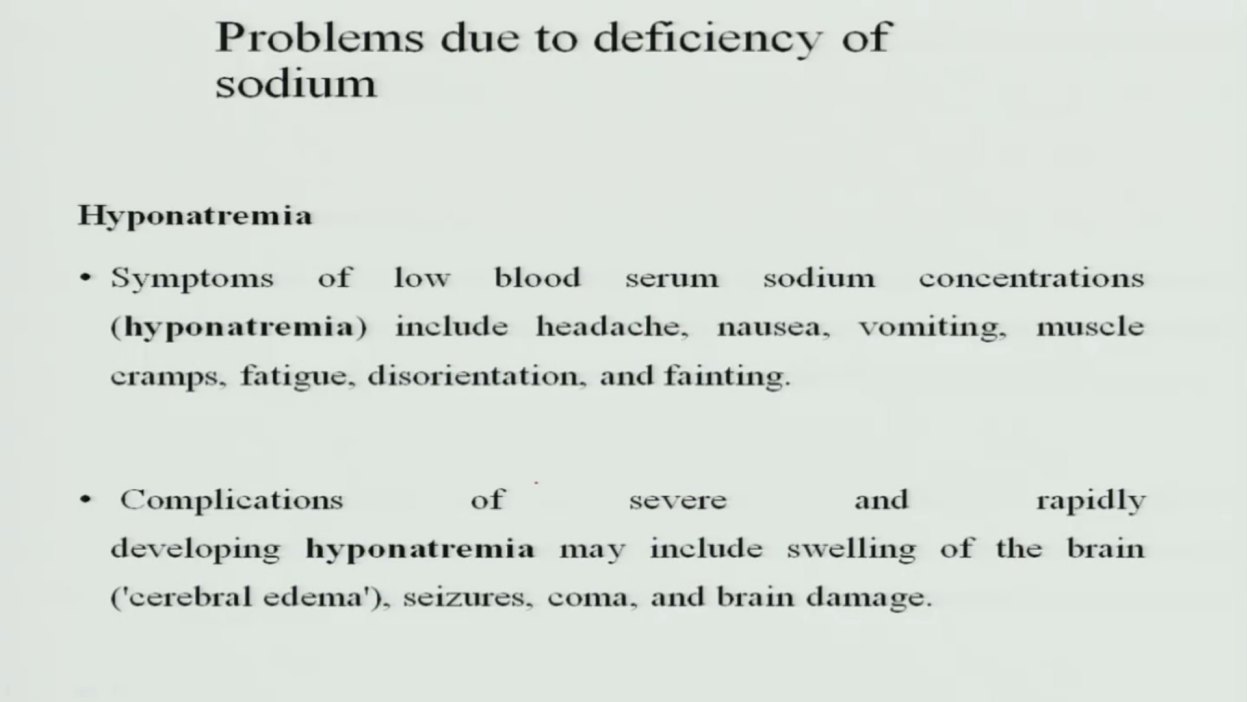
The next important mineral is sodium so this sodium is a part of the fluid that is present in the compartments of the body, which maintain the electrolyte and fluid balance.



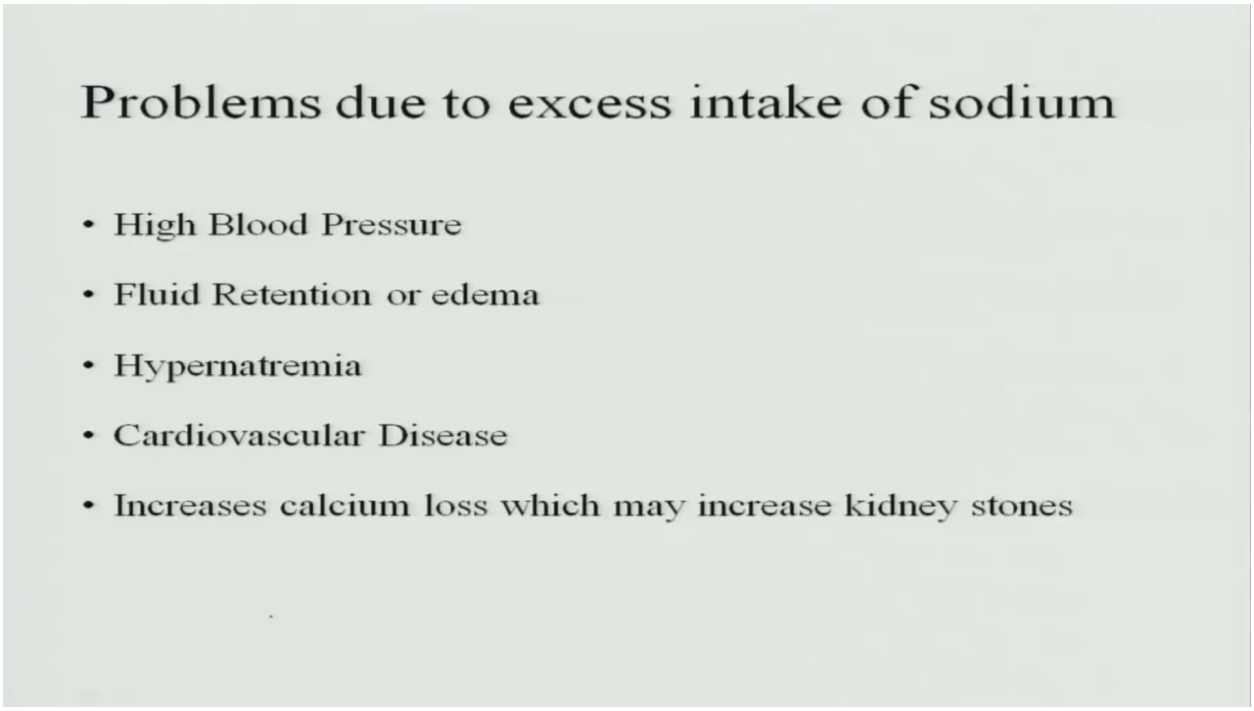
So the function of the sodium is it is important for retaining the body fluids. Whenever there is excess sodium in the body it attracts more amount of water and the amount of water that is present in the body in the tissues is increased leading to a condition called edema. So this regulates the acid-base balance and it participates in the absorption of other nutrients, and it also participates in the nerve impulse conduction and muscle contraction. You see so many minerals are involved in the contraction of muscles and the nerve impulses.



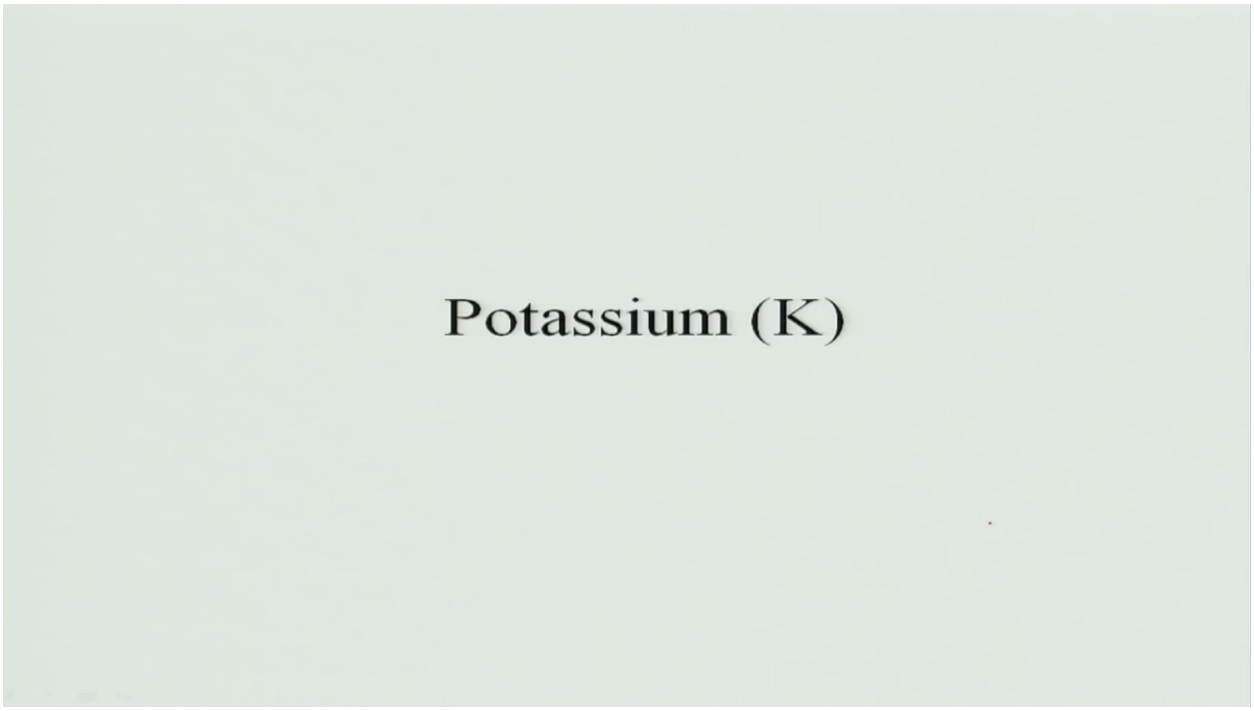
Now food sources of sodium, sodium is found in table salt. Table salt is a pure source of sodium. Every 100 grams of salt contains about 40 grams of sodium in it, because it is a combination of sodium and chloride. Then baking soda also contains sodium, monosodium glutamate, which is the MSC or the Chinese salt we called which is used for flavoring also contains sodium, and various seasonings, additives, condiments, then meat, fish, poultry, dairy force, then smoked meats, and olives and pickled foods. Pickled foods, we generally add more salt, the salt is a preservative for the pickle force, therefore all these are very high in sodium content. So these are the various food sources.



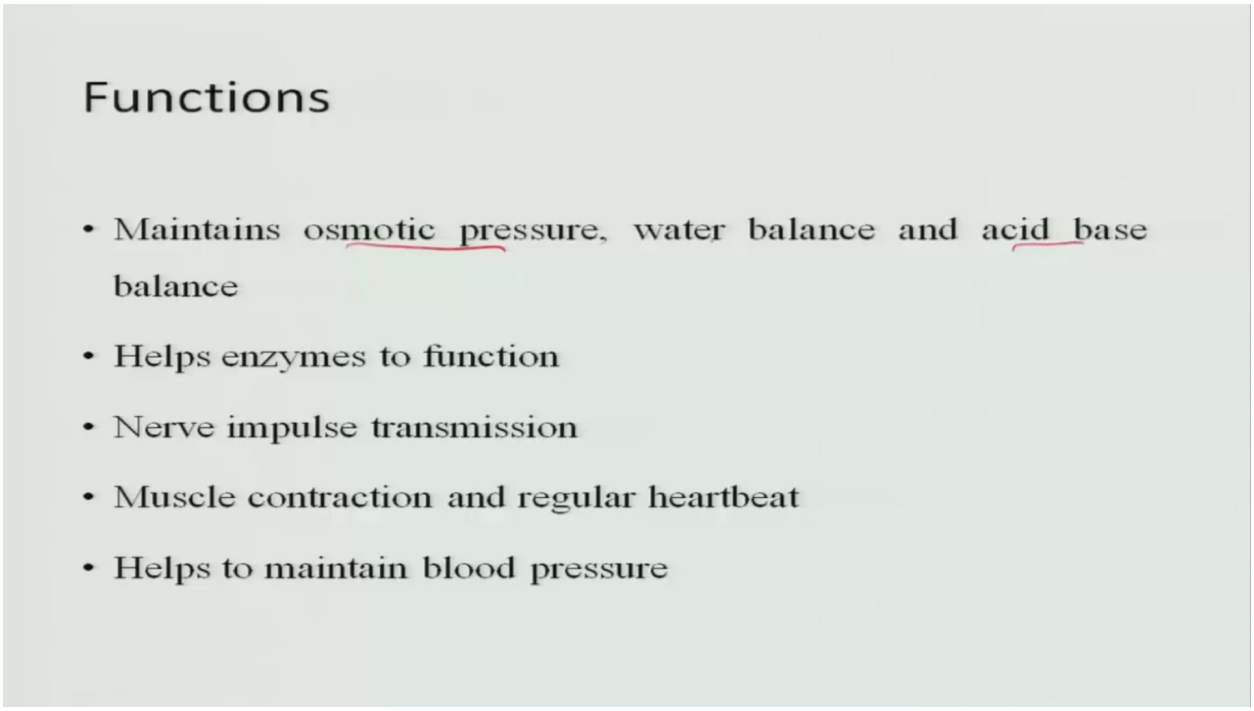
Now problems due to deficiency of sodium, deficiency of sodium is called as hyponatremia. So here the symptoms are, there is a low blood serum sodium concentration, which results in symptoms called headache then nausea, vomiting, muscle cramps and fatigue, disorientation and fainting. So whenever during summer when a person perspires a lot, especially people who are working on in mines, they perspire a lot and lose a lot of sodium through their body. So such people are prone to having the symptom immediately shown is muscle cramp and disorientation and then fainting. So when people are seen like that, you just mix salt in water and give them, they recover very fast. Then complication of severe and rapidly developing hyponatremia, it may include swelling of brain, so cerebral edema, which may result in seizures, coma and brain damage.



Now problem due to excess consumption of sodium, some people are habituated to take excess of sodium. So what is the problem? It results in high blood pressure, because I told you high sodium retains more amount of water, so the volume of blood will increase and create high blood pressure. Then it retains fluid and causes edema and hypernatremia, there is increase in the sodium levels in the blood, which leads to cardiovascular disease, and since there is edema, this edema may occur in all parts of the body, so including the heart leading to cardiovascular disease, and increase in calcium loss, which may increase – I mean when there is excess amount of sodium, it helps in excretion of calcium. So this may form the kidney stones.

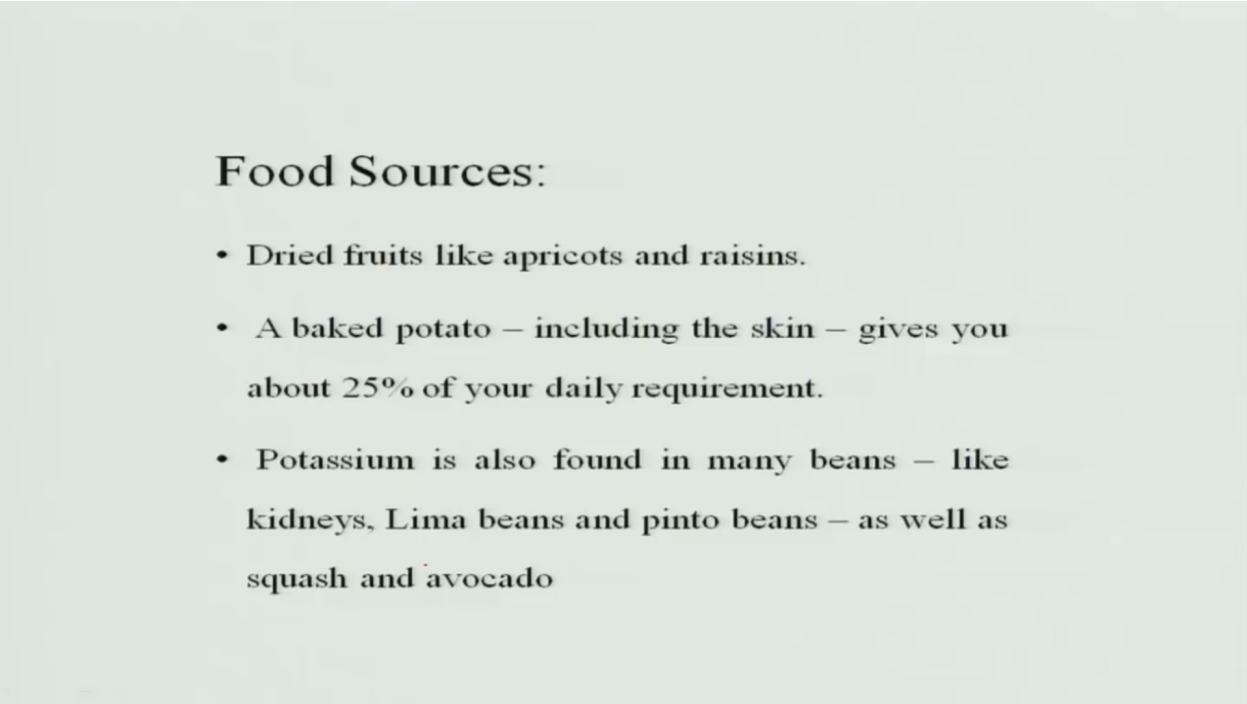


Now along with sodium the other important mineral is potassium, so sodium and potassium maintain the fluid balance and electrolyte balance in the body.



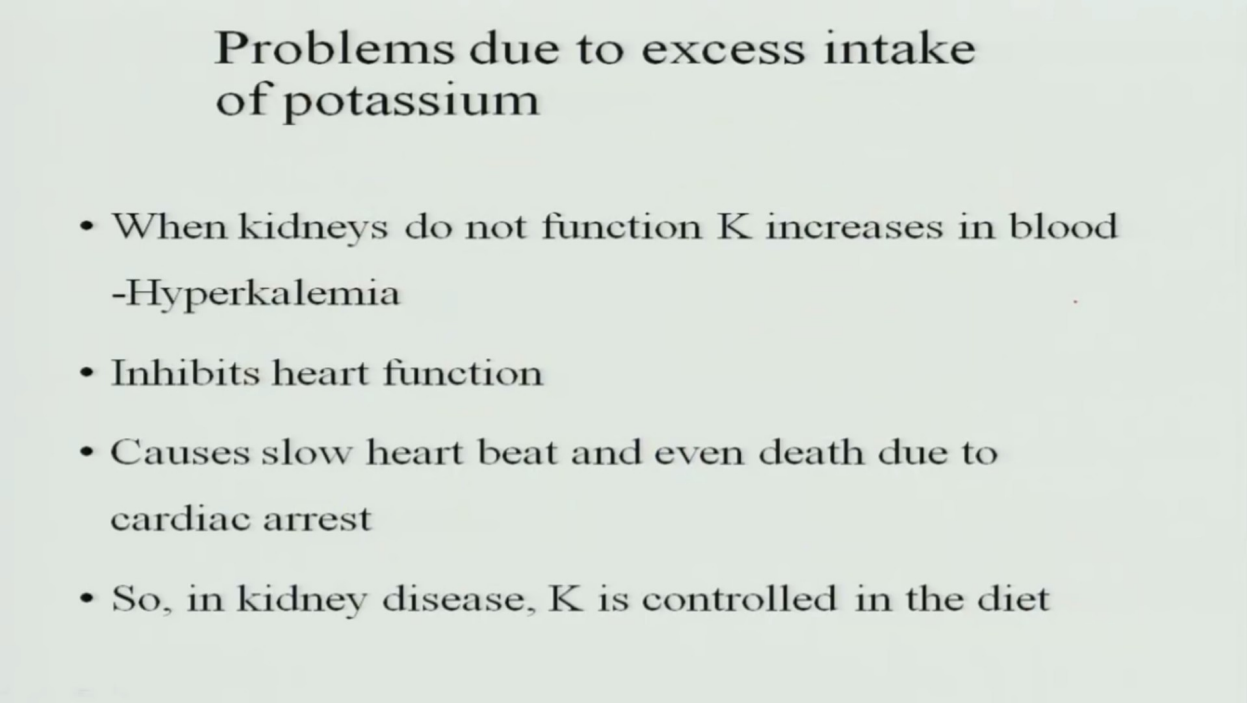
So potassium, it maintains the osmotic pressure, water balance and acid-base balance. So it helps all the enzymes to function properly and nerve impulse transmission, and there is muscle contraction and regular heartbeat and, and it helps to maintain the blood pressure. So

whenever there is increase in potassium, the heartbeat decreases; and when there is a decrease in potassium, it slowly relaxes.



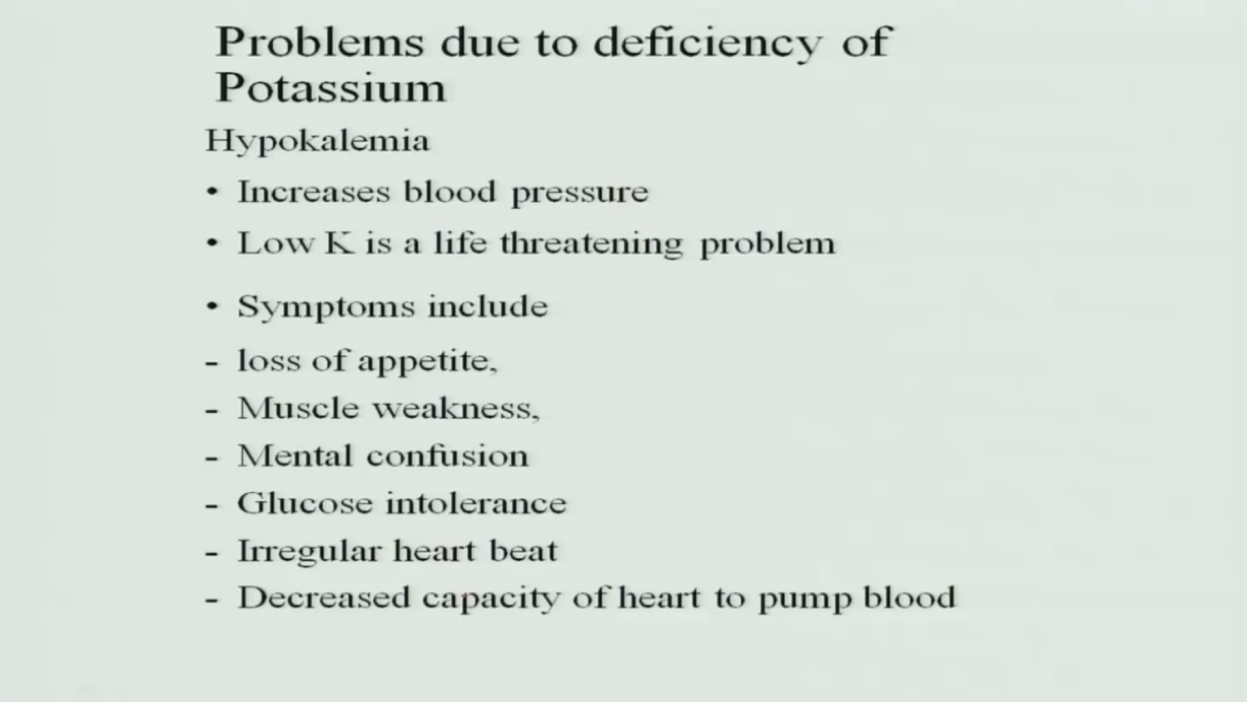
So food sources of potassium are dried fruits like apricots and raisins and a baked potato with the skin. So it gives you about 25% of the total daily requirement, if you have baked potato along with the skin. Then potassium is also found in many beans like kidney beans, lima beans, pinto beans and so on and as well as in avocado and squash.

These are the sources. You can see pumpkin also is a very good source of potassium.



Now what happens if we take excess of potassium, so when the kidneys do not function, the potassium increases the level in the blood. So this is called as hyperkalemia. So whenever there is increase in the potassium, it inhibits the heart function, so it causes slow heartbeat and if it is still increasing in the quantity, the heartbeat may become so slow that it may stop and result in

cardiac arrest. So increase in potassium is so dangerous and there is kidney disease also, whenever there is kidney disease and when the potassium levels are high so it may have an impact on the heart, therefore when there is kidney disease, better to stop the potassium in the diet.



Now deficiency of potassium leads to hypokalemia. This has the opposite effect like the hyperkalemia. So it increases the blood pressure, again, it helps in retaining the fluid, so it increases the blood pressure. Then low potassium is a life-threatening problem, because it includes the loss of appetite, then as it is the person becomes weak and when there is loss of appetite, he does not take any food so there is muscle weakness, loss of protein occurs, and mental confusion occurs, and there is glucose intolerance. Glucose intolerance may lead to diabetes, and irregular heartbeat and decreased capacity of the heart to pump blood again. So here muscle weakness is an important part where, because the protein excretion and synthesis of protein involves potassium along with it. When there is excretion of protein, potassium is lost from the body; when there is synthesis, it requires potassium for the synthesis of protein. Therefore, muscle weakness also causes, whenever there is muscle wastage, there is loss of potassium and causes the deficiency.

So this is the important part of the sodium and potassium, how they maintain the electrolyte balance in the body and this acid-base balance in the body and the fluid balance. All these three are very important for maintaining the balance of the body and homeostasis of the body. So when these are in proper amounts, all the other nutrients can be circulated properly into the body and supplied to the various cells. So therefore, these nutrients are very important and minerals they cause, even with in very small quantities, they create a great effect on the body and they help in the proper body function. Thank you.