Introduction to Maternal Infant Young Children Nutrition
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Lecture - 19
Session - 4

Importance of Sulfur

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Hello everyone. So today we are going to talk about sulfur, one of the very important mineral in our body. Mainly derived from sulfated amino acids, mainly derived from protein, some of the sulfated amino acids are methionine, cysteine, homocysteine, taurine. Methionine is an essential amino acid, means you need to have it in your diet on a day-to-day basis. Cysteine, homocysteine those are non-essential amino acid, which are formed in the body.

Some amount of sulfur, organic sulfur is found directly into the food, from the food, and this onion, garlic, cruciferous vegetables, any food specifically some of these vegetables, which have some smell and that have organic sulfur in it. Sulfur is also called Gandhak in Hindi, Gandhak means it smells, so sulfur gives that smell. I do not know if any of you have gone to Vajreshwari or any of your hot geezers in your country or in your, in your state… this particular hot geezers have sulfur in it, it is sulfated water.

So, when this, when you are going there to take a bath you will see that smell coming out of that water and that is sulfur and if you ask, if you find out that who are the people who are

coming to this hot geezers primarily are the people who have some joint problems, or they have some skin problem, so that means basically there is probably kind of that knowledge coming from generations that when you take bath in that hot geezers, is a sulfated water, so probably sulfur or that mineral helps with the joint pain and skin.

And I mean, if you look at it, obviously I am going to go in detail but you will understand that it does help because it produces lot of those organosulfur compounds and that has effect on your joints and skin and hair and pretty much everything. So, we will go in detail. Sulfur is also present in two vitamin B. So, which are those two vitamin B, thiamine and biotin. Now biotin if you remember a lot of people take the supplements biotin for hair. People who have hair loss they take biotin.

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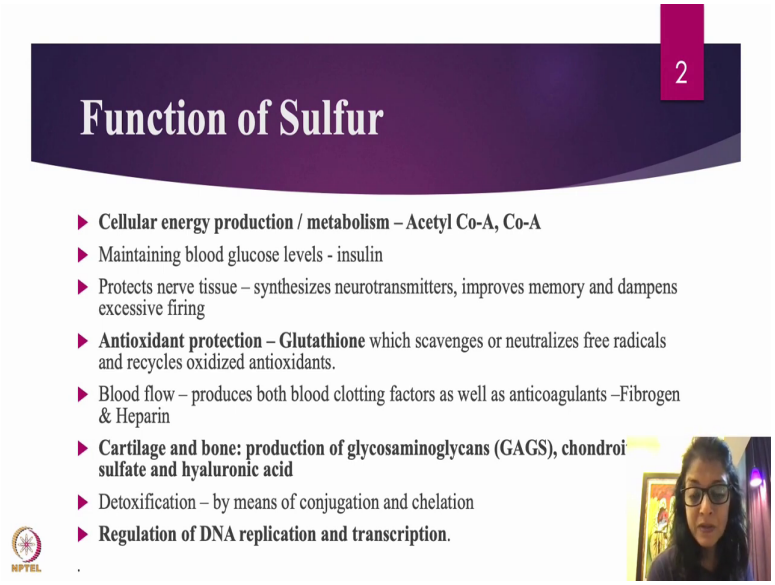

Now, what are the functions of sulfur? So, let us talk about each and every important function that sulfur has, so cellular energy production in metabolism. So, sulfur is important for you know krebs cycle, because the acetyl Co-A, and Co-A, those compounds are made from sulfur, so that is your kind of some of the products or byproducts, I could say of that krebs cycle. So, it is definitely as I said it is important for formation of energy.

It gives you energy. It also maintains blood glucose levels, so sulfur is important for maintaining blood glucose level. Why, because insulin, insulin is your hormone which requires sulfur. Sulfur also protects nerve and nerve tissue, it synthesizes neurotransmitters.

Neurotransmitters are important, of course, as you know some of them are acetylcholine, serene, your serotonin, so some of those sulfurs are ready, they are very important.

It improves memory, it dampens excessive firing, it has antioxidant protection, so glutathione. Glutathione which scavenges or neutralizes free radicals and recycle oxidized antioxidants. So, glutathione, I am sure a lot of doctors and nutritionists who are taking this course would know what glutathione is. It is basically one of the most powerful antioxidants which is present in our body, which scavenges free radical.

So free radicals are basically radicals which causes damage, it causes inflammation in the body. So, it prevents the excessive damage through free radicals by scavenging it. Then sulfur is also important for blood flow. Why it is important for blood flow, because fibrinogen and heparin, those two important, those are two important organosulfur compounds, so it produces both blood clotting factor as well as anticoagulant.

Anticoagulants mean it prevents the coagulation of blood, it prevents the clotting, and blood clotting factors are basically factors which helps with the clotting, so if you have a say nick on your skin, and if you are bleeding basically that fibrinogen will immediately clot that bleeding, it will stop that bleeding, so sulfur is required for that also. Cartilage and bone, so remember I told you that a lot of these people they go to hot geezers.

So why, because the sulfur is important for formation of glycosaminoglycan and also chondroitin sulfate and hyaluronic acid and they are part of cartilage and bones. So, to have your healthy bones and your cartilage, your joints it is important that we take enough amount of sulfur or sulfated amino acid, which is your methionine.

Detoxification, of course, by means of conjugation, chelation, sulfur is important for detoxification, means to get rid of toxins in the body and that is primarily because of glutathione. Regulation of DNA replication and transcription; so basically, to maintain your DNA that would prevent cancer actually, so you want to make sure that to maintain your DNA health you require sulfur.

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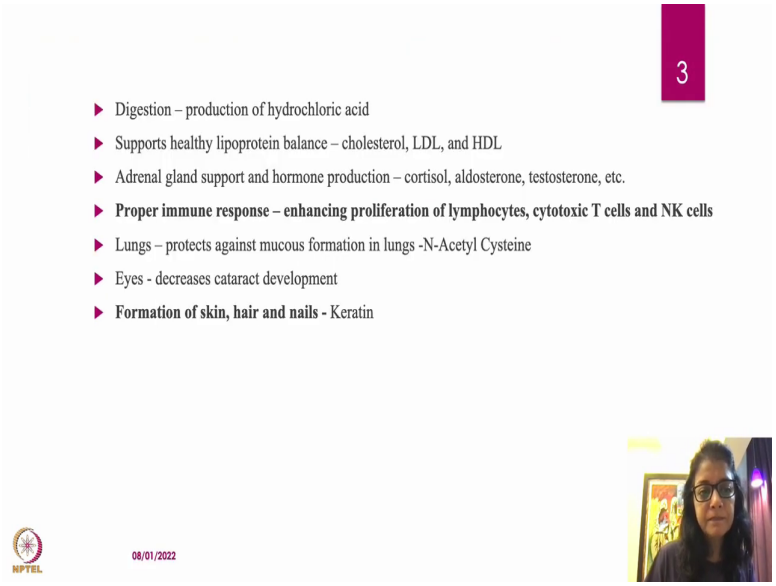

Now other effect of sulfur, it helps in digestion because it helps in production of hydrochloric acid. Now hydrochloric acid is a acid which is present in your stomach for digestion of food. It supports healthy lipoprotein balance, so you remember I am sure everybody knows about cholesterol, LDL, HDL, there is a good cholesterol, HDL is a good cholesterol and for formation of this cholesterol and to have this balance of a good cholesterol, bad cholesterol you require sulfur.

Adrenal gland support and hormone production, so there are some of these hormones which required sulfur, your cortisol, aldosterone, testosterone, those are important, you require sulfur for that. Then also imagine for proper immune response, so enhancing your infection fighting cells, so your lymphocytes, your cytotoxic t-cells, natural killer cells, these are all the very important cells which kind of prevents infection.

It enhances your immune system and for that you also require sulfur. Now one more thing which I will go a little bit more in detail is N-acetyl cysteine. Now N-acetyl cysteine has lot of function in the body. Now, one of the most important function is it protects against mucus formation in the lungs. So, a lot of time when you have bronchitis, when you have a lot of this cough, you go to doctors and doctors will write Nac prescription.

N-acetyl system is also called Nac. Now this, for Nac actually, some more, I mean all the doctors would know that when the patient comes with crocin toxicity we give Nac and what Nac does it basically increases the glutathione level, which detoxifies or which removes

crocin from the body, it helps in removal of acetaminophen from the body, so Nac is very, very important and you require sulfur for formation of Nac.

Then for eyes your sulfur is important because it decreases the cataract formation. And keratin one of the, most highly spoke about organosulfur compounds, especially among women, because obviously we always say I buy keratinized shampoo and this and that and we spend so much money on the shampoos, which has keratin, but think about if we have food which is high in sulfur which will help form the keratin. So, for formation of skin, hair, nail, keratin is present, keratin is present in skin, keratinized epithelial cells we know it. Keratin is present in your cornea, it is present in your hair, so sulfur is important for formation of keratin.

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Here we have just kind of listed all the important organosulfur compounds which we just discussed, so I am not going to go too much in detail in that.

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Some of the sulfur-rich foods, so these are self-rich food which are primarily, you get organic sulfur from this food, so here your onion, your cauliflower, of course, your beet, your drumstick leaves and drumstick, what do I say, seeds, your drumstick seeds are very high in sulfur. In fact, in U.S. we have those drumstick seeds powder available in the capsule and a lot of people with joint problems they take it.

So, I do recommend that we should have these drumsticks in our diet on a day-to-day basis. So, either you can put drumstick leaves, also called moringa leaves, you can make a powder, put moringa leaves in the food, or you can just have a drumstick vegetable or you put it in a curry, you put it in a daal that you make, so that is how you get your sulfur. Some of the other food which you can get sulfur from is your garlic, your eggs, of course, fish. So, this is some of the good source of organic sulfur, directly sulfur comes from this food.

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Cysteine, remember I told you about cysteine, cysteine is formed in the body, but you can get cysteine from food also. Some of the cysteine-rich food is primarily your garlic, again pretty much garlic, your eggs, your choli, some of the fish, seeds are high in sustain, so your black till, your sesame seed, black sesame seed, your white sesame seed, peanuts, soya, this is your soya over here, and your coconut and some of the other foods. So, cysteine can be available from food also besides being formed in the body.

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Methionine is another essential amino acid extremely important to have it in your diet, as I told you that this sulfated amino acid will release sulfur, that sulfur will be used in formation

of all these organosulfur compounds that I spoke. So, which are the food which are high in methionine? Again, remember I talked about peanuts, so you make peanut powder, put it in your food, for children food also you can put peanut powder.

For adults they can just put peanut in the dal or vegetables, make peanut curry. Sesame seeds, also your liver, your dairy products are very high in methionine. So, make sure that your children have after two years of age if mother wants to start the top milk they can start with dairy or even young children 6 months to or 2 years of age you can give them dahi, paneer, this is paneer over here on right side corner, lower corner.

And over here this is khoa, khoa is basically kind of made from milk, mawa, in Gujarati you call it mawa, khoa. So, do use khoa in your curries, very high in sulfur, actually very high methionine, which gives out sulfur. And of course, your non-veg food are high in sulfur. Children who have a good amount of non-veg food we do see that they do have a good height.

And what I have seen actually is, there is an article by Dr. Michael Golden and he has written extensively about sulfur. And he feels that basically for your linear growth sulfated amino acids are very, very important and that is why I am kind of stressing on these foods, which you must give it to children which will help with their linear growth.