agMOOCs

Water Soluble Vitamins 2

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Hello everybody. Welcome back to the class today. we have started with the water-soluble vitamins in the previous class and seeing the first water-soluble vitamin about the Thiamine, how it plays an important role in the body and how the deficiency causes so much of disturbance in the body. Let us see the next water-soluble vitamin which is the Riboflavin and this is named as vitamin B2.

Riboflavin (Vitamin B_2)

Functions :

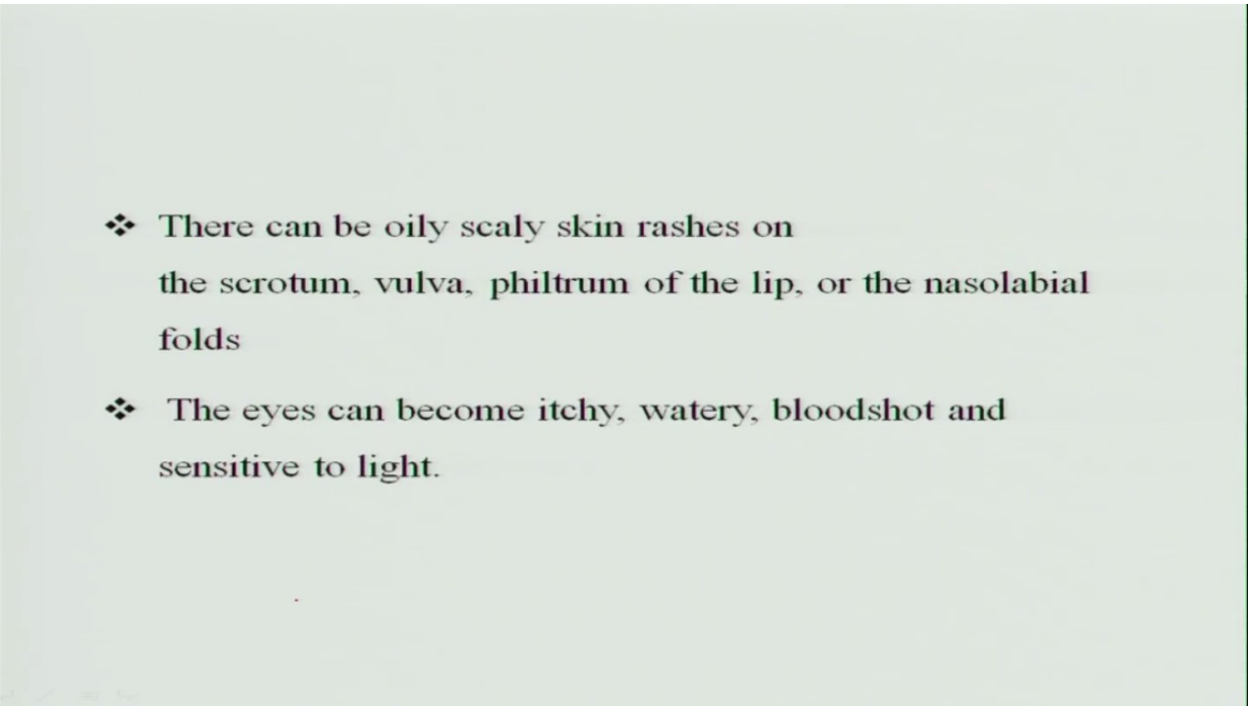
- Coenzymes
- Participate in many energy-yielding metabolic pathways
  - Fatty acids broken down and burned for energy
  - Like many other B vitamins, riboflavin helps your body metabolize carbohydrates, protein and fats.
  - Riboflavin also protects the health of the body's cells and enhances the function of some of the other B vitamins, niacin and Vitamin B_{12}.

The functions of Riboflavin is it acts again just like Thiamine it acts as a co-enzyme for metabolism. So it participates in many energy yielding metabolic pathways like the fatty acids are broken down and burn to energy. Like many other vitamin B riboflavin helps the body to metabolize carbohydrates, proteins, and fat and riboflavin also protects the health of the body cells and enhances the function of some of the other B vitamins also like niacin and vitamin B12.

Deficiency of Riboflavin

- stomatitis: including
- Riboflavin deficiency (also called ariboflavinosis)
  - painful red tongue with sore throat,
  - chapped and fissured lips (cheilosis), and
  - inflammation of the corners of the mouth (angular stomatitis).

Now deficiency of riboflavin causes stomatitis and this is also called as the ariboflavinosis that means there is no riboflavin in the diet. So this causes painful red tongue and sore throat chapped with the fishered lips which is called as cheilosis and inflammation of the corners of the mouth which is called as the angular stomatitis. You can find scars in the corners of the lips.



And there can be only scaly skin rashes in the scrotum, vulva, philtrum of the lip and the nasolabial folds. So the eyes can become itchy, watery, bloodshot, and sensitive to light.

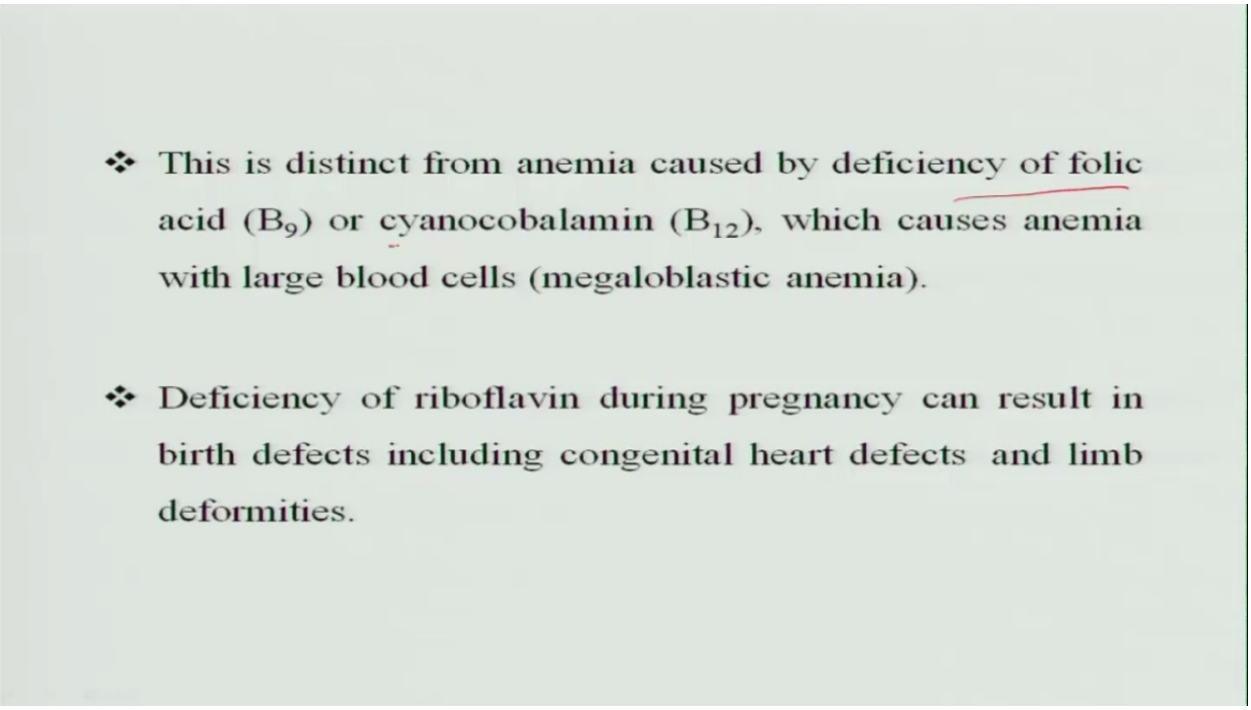
Cheilosis and angular stomatitis

So this is how the cracked lips look like which is called as cheilosis and you can see all these cracks and the tongue also there is crack and it starts bleeding and you can see the corners of the lips being cracked and becoming ulcerative which is called as angular stomatitis.

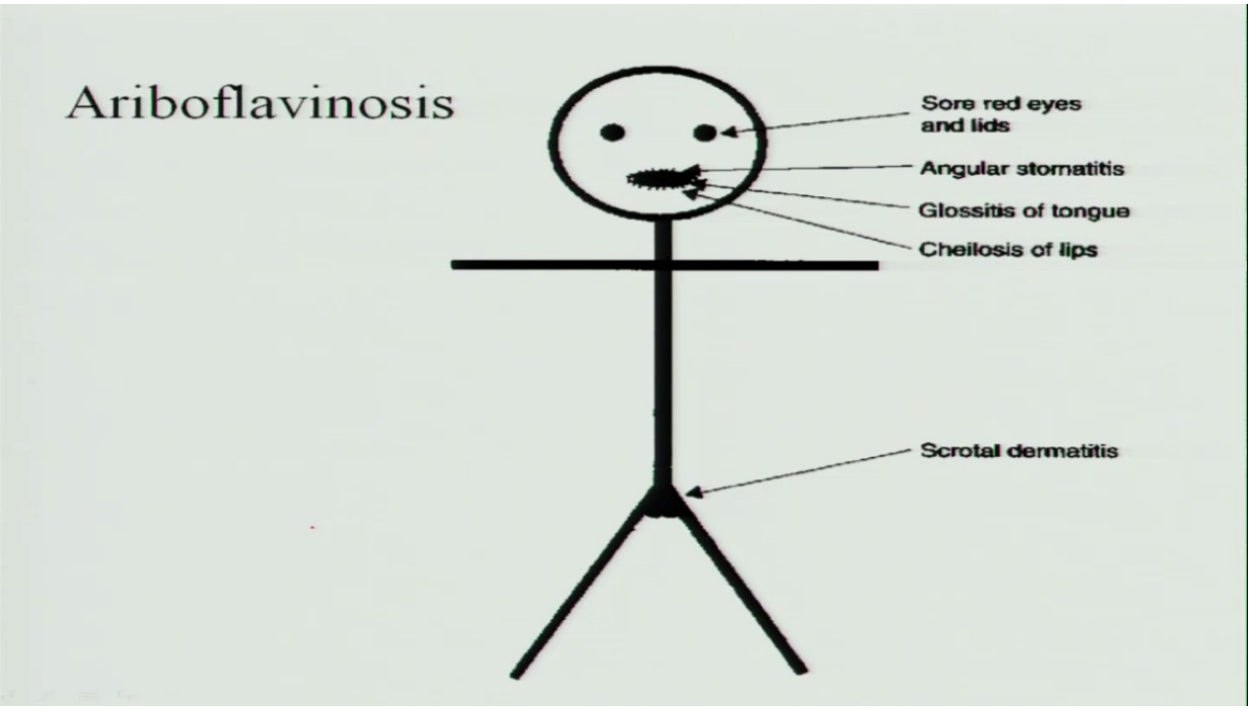
Deficiency of Riboflavin

- Due to interference with iron absorption, riboflavin deficiency results in an anemia with normal cell size and normal hemoglobin content (i.e. normochromic normocyticanemia).

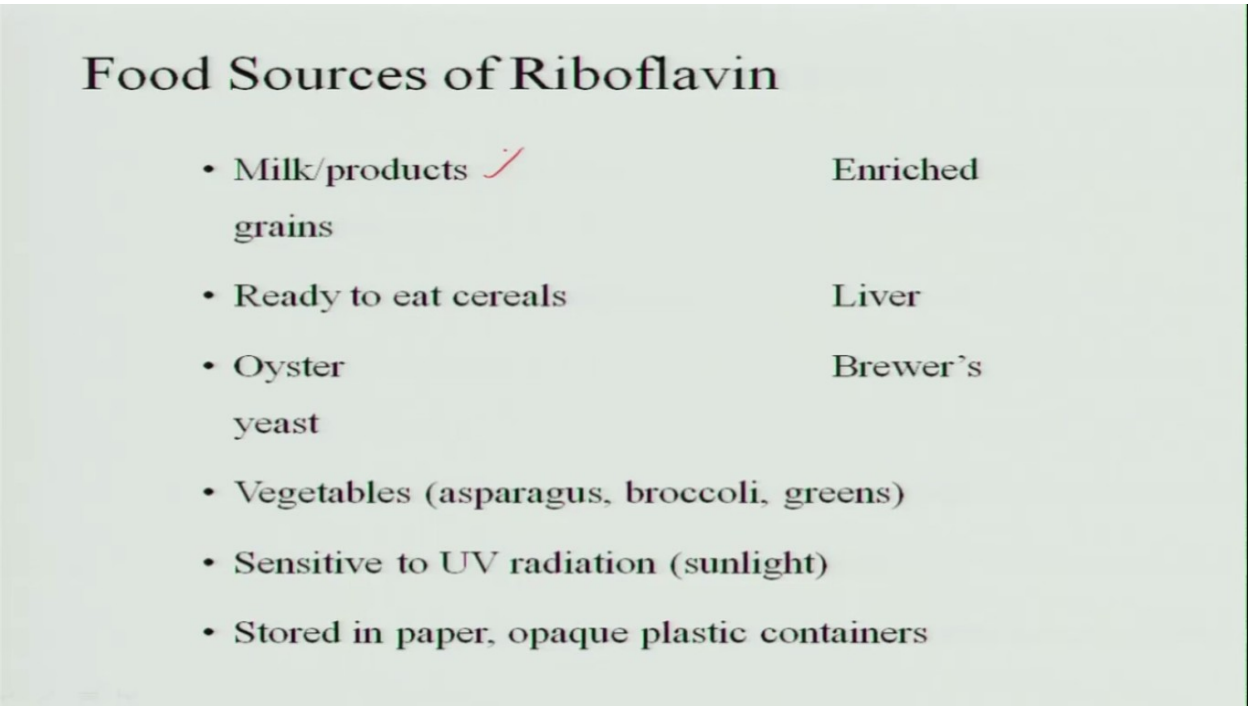
Now deficiency of riboflavin. Due to interference with iron absorption riboflavin deficiency results in anemia. So if these cells when there is riboflavin deficient they look normal cell size and normal hemoglobin but they are normocytic. So that means the volume of the RBC cell is decreased.



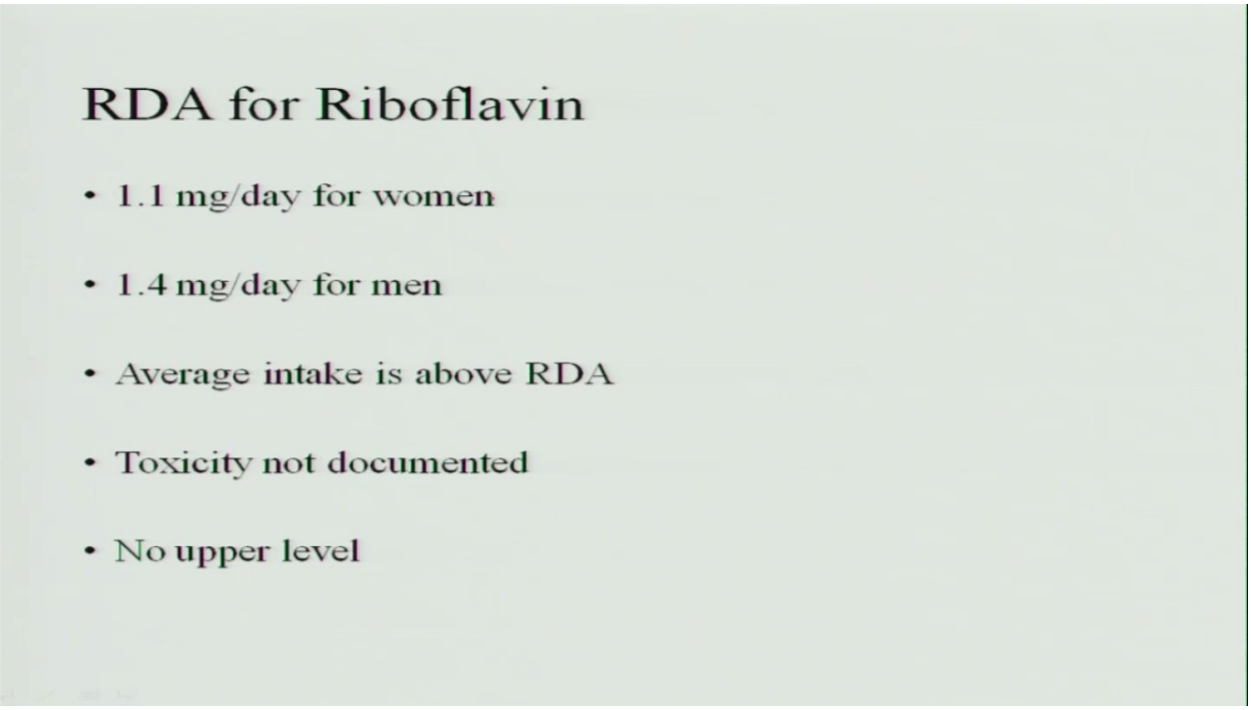
So this is distinct from anemia which is caused by deficiency of folic acid or cyanocobalamin or vitamin B12. These two vitamins also cause anemia where the RBC does not mature and it remains as a megaloblast. So the size of the RBC is increase in its volume and deficiency of riboflavin during pregnancy it can result in birth defects including congenital heart defects and limb deformities.



The various symptoms of the deficiency of riboflavin you can see that you have sore red eyes and angular stomatitis in the mouth, the glossitis of tongue. Then cheliosis of lips. There are [Indiscernible] [00:03:35] start bleeding and scrotal dermatitis.

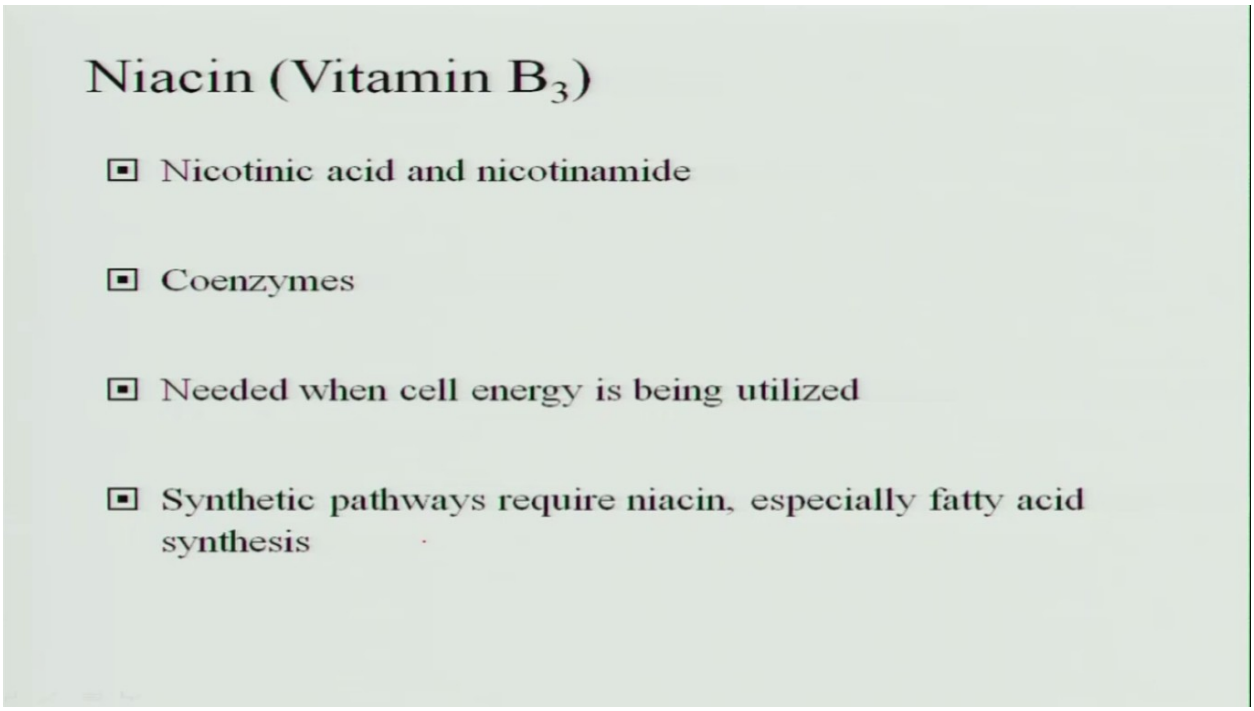


Now food sources of riboflavin. The rich source is milk but it has to be stored in a dark bottle. When it is exposed to sunlight riboflavin gets oxidized. Then they are present in ready to eat cereals. Then oyster, yeast, vegetables like green leafy vegetables. Then – so it is very sensitive to sunlight and it should be always stored in an opaque plastic container or in a dark container or it can be wrapped with a paper so that sunlight does not affect the riboflavin in the bottle.

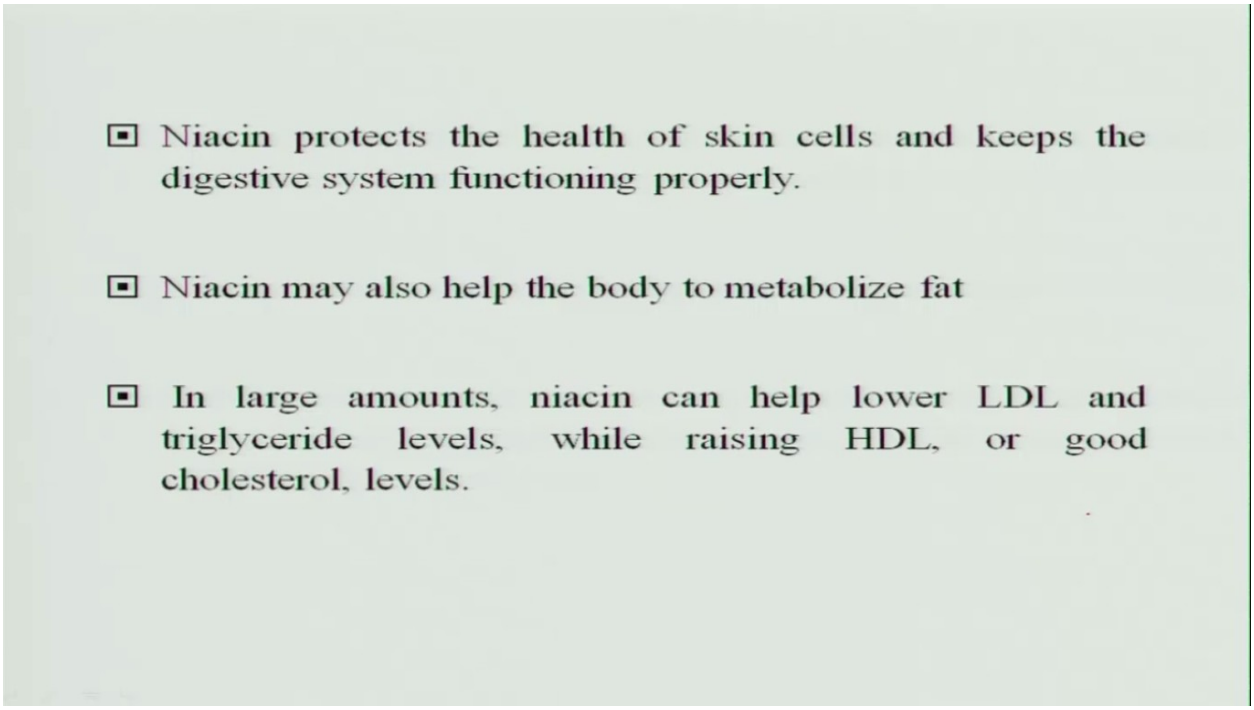


Then food sources you can see.

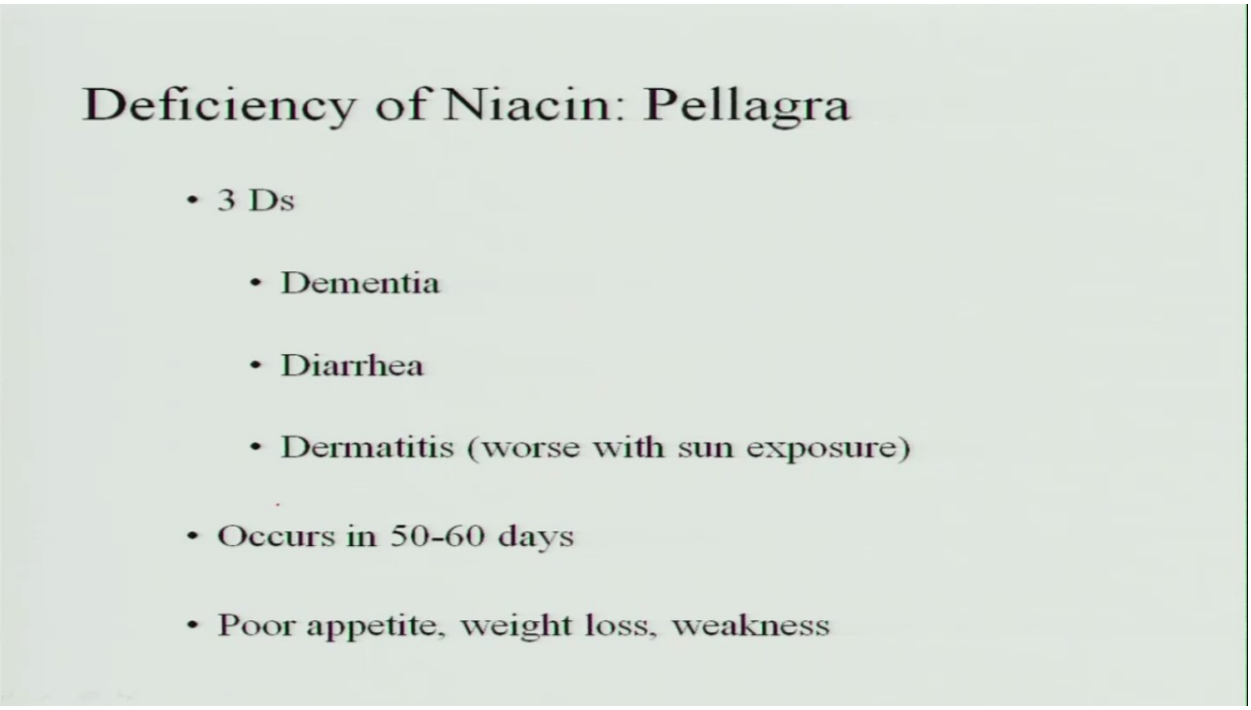
Recommended dietary elements for riboflavin again 1.1 milligram for women. 1.4 milligrams per day for men. Average intake generally is above recommended dietary allowance for a person who takes balance diet and toxicity is not documented. No upper level.



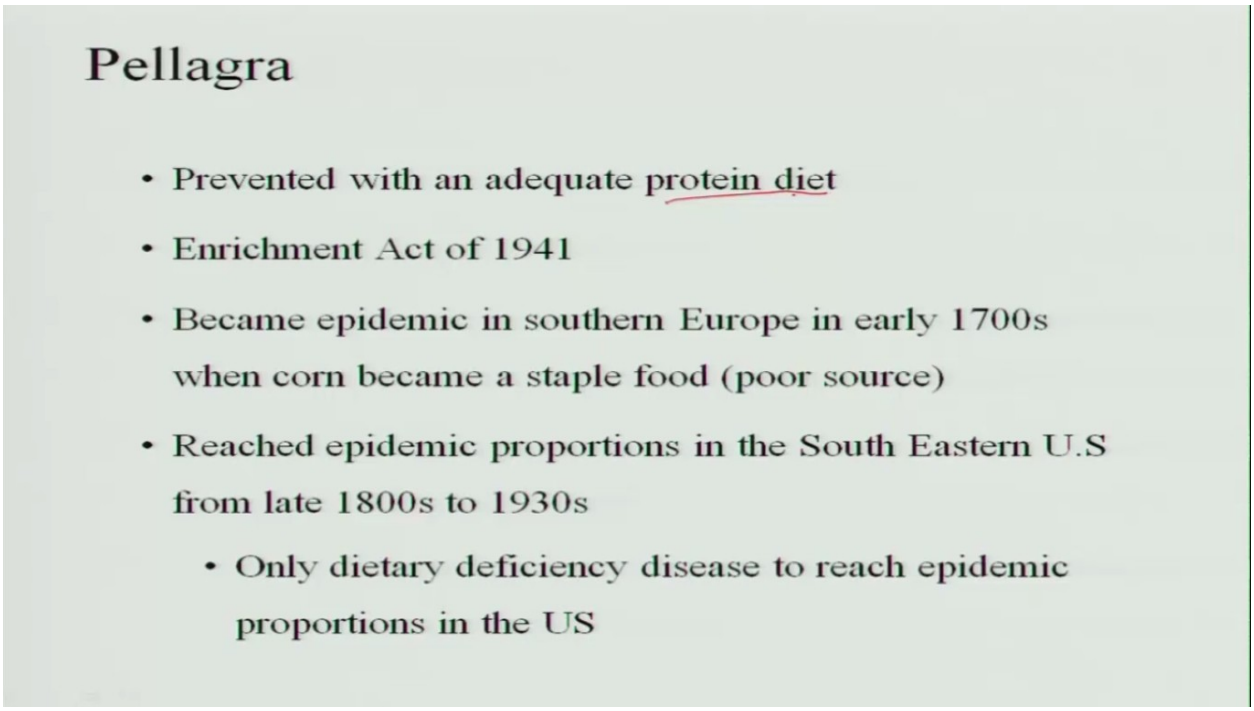
So the third vitamin is niacin which is called as vitamin B3. So this is also called as nicotinic acid or nicotinamide and this again acts as a coenzyme and needed when the energy is being utilized. So synthetic pathways require niacin especially for the fatty acid synthesis just like the riboflavin.



Now this riboflavin it protects the health of the skin cells and keeps the digestive system functioning normally and it is also required for metabolism of fat. So the large amounts of niacin can help to lower the LDL and raise the HDL. LDL is supposed to be the bad cholesterol and HDL is supposed to be good cholesterol. And also the triglyceride levels and cholesterol levels increase in the niacin deficiency.



The deficiency of niacin leads to a disease called pellagra. We also call this disease has a 3 Ds disease or sometimes 4 Ds disease but generally the 4 D is not very common. So 3 Ds are dementia, diarrhea, and dermatitis and this dermatitis is the skin rashes which becomes worse when the body is exposed to sun. Whatever part of the body is exposed to Sun. And this occurs in 50 to 60 days and occurs because of the symptoms will be poor appetite, weight loss, and weakness. And the 4th D which I was mentioning is death. When the niacin deficiency is not taken proper care then the ultimate result is the death.



Now pellagra it can be prevented by adequate amount of protein intake. Why protein intake is because the protein the tryptophan is an amino acid which is an essential amino acid from protein and every 60 milligrams of tryptophan is converted into one milligram of niacin. Therefore if you give a protein-rich diet naturally you get niacin the tryptophan. Then Enrichment Act of 1941 says you have to give them good protein diet. Then reached epidemic proportions of the deficiency have reached the southeastern U.S. it was in 180o 1930s. Then they have found that when you give protein rich diet niacin deficiency is decreased.

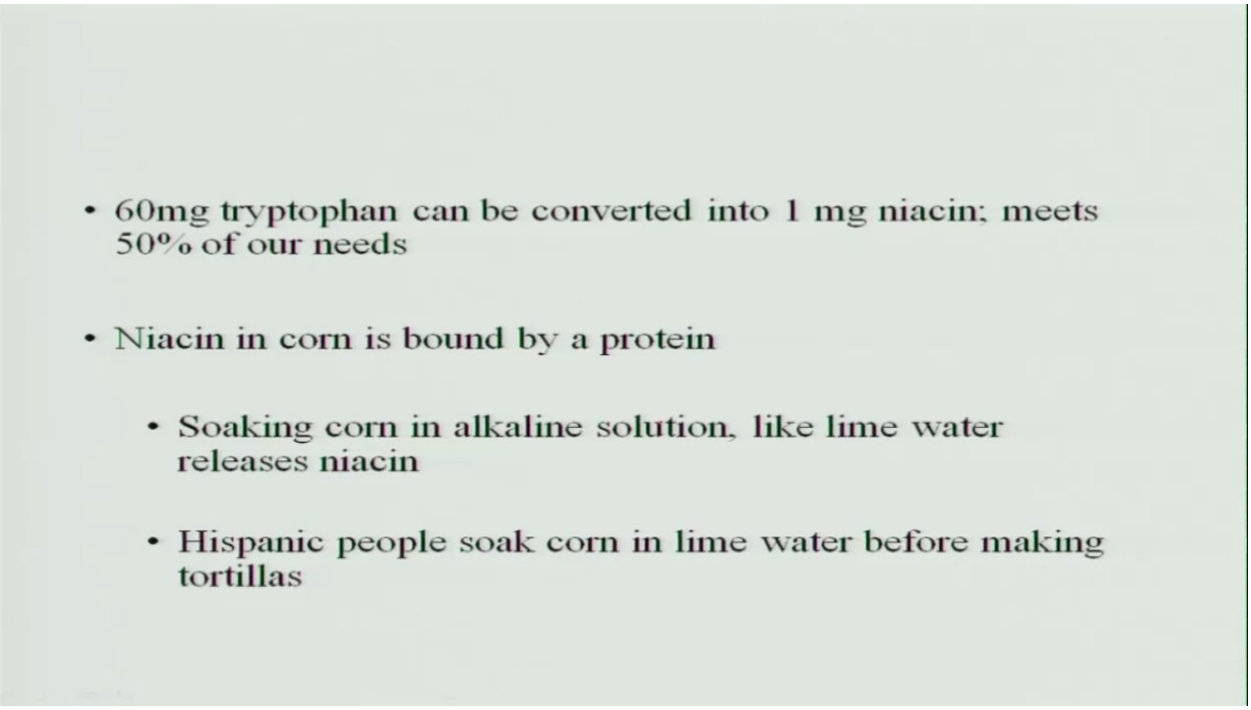
Pellagra

Pellagra looks like this all this area this which is exposed to the Sun is the dermatitis you can see it becomes very dark and there is symmetric appearance of the dermatitis on both sides. So it looks like a necklace here and you can see both the hands which are affected by the dermatitis.

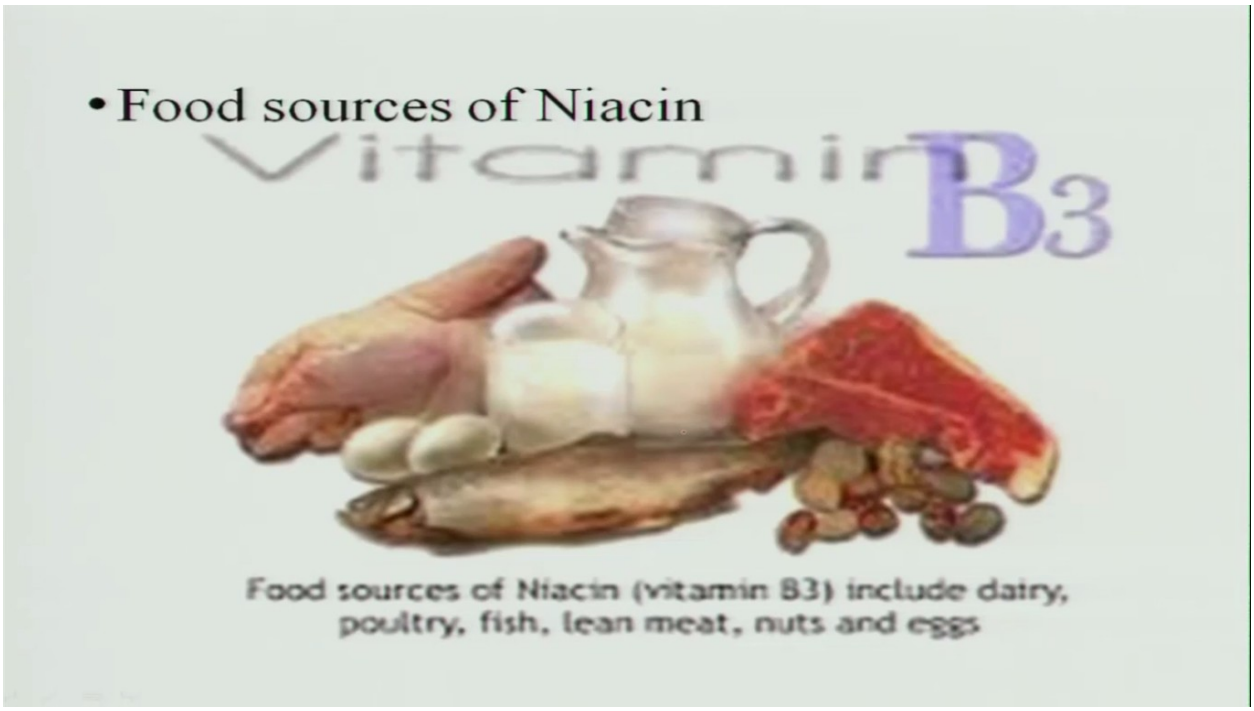
Food Sources of Niacin

- Enriched grains, ready to eat cereals
- Beef, chicken, turkey, fish
- Asparagus, peanuts
- Heat stable; little cooking loss

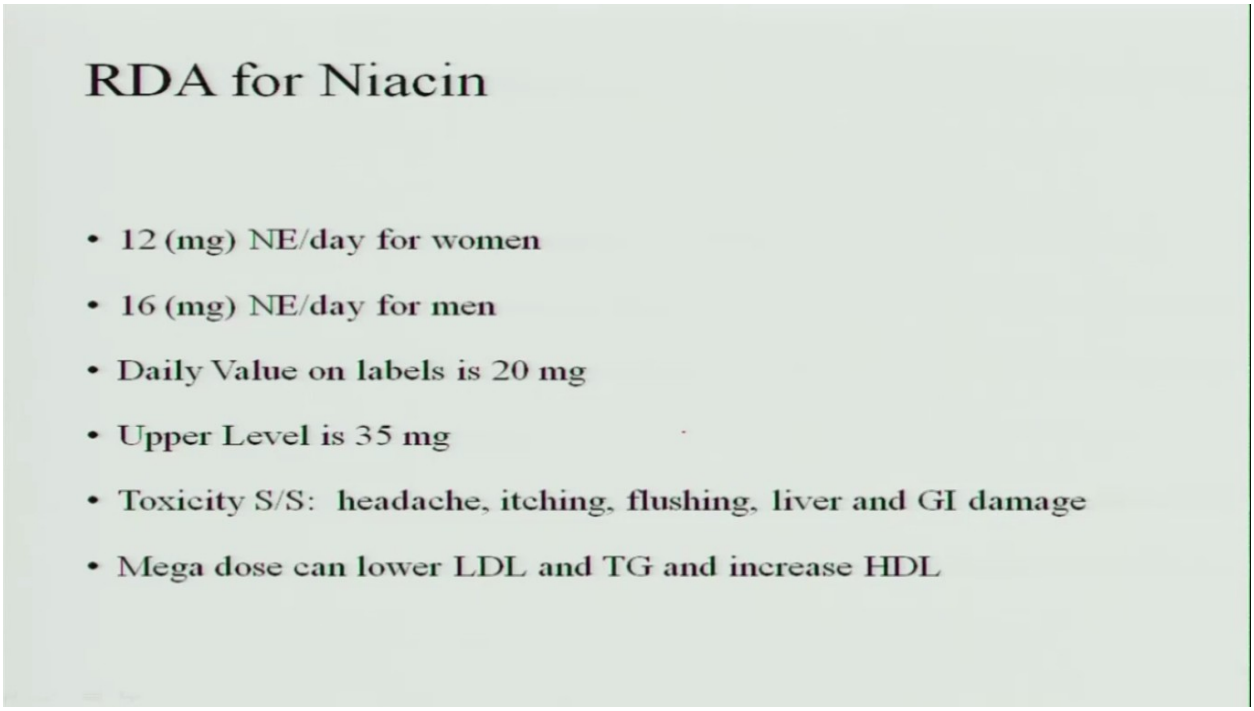
Food sources of niacin are enriched grains, ready to eat cereals. Then you have niacin in beef, chicken, turkey, and fish, asparagus, peanuts but it is heat stable so very little cooking losses occur.



60 milligrams of tryptophan can be converted into one milligram of niacin. So from this we can meet about 50% percent of our needs. Therefore you give them a proper protein diet 50% of niacin requirement is met and niacin in corn is bound by the protein. So soaking the corn whenever corn is eaten in large amounts niacin is not available because it is blocked. So soaking the corn in alkaline solution like lime water will release niacin.



Food sources of niacin. You have the meat, fish, poultry, all the non vegetarian foods have very good amount of niacin. Then nuts and eggs, and milk.



Now recommended dietary allowance for niacin. Again niacin is related to energy metabolism just like the Thiamine and riboflavin therefore the requirement of niacin is again dependent upon the energy requirements. According to that for women it is recommended as 12 milligrams. Men it is 16 milligrams. So about 20 milligrams on an average will be sufficient and upper limit is 35 milligrams and there is some toxicity with niacin which results in a headache, itching, flushing, liver and gastrointestinal damage. Now mega dose can lower the LDL and triglyceride and increase the HDL. So whenever an individual has increased levels of LDL and triglycerides and low levels of HDL niacin supplementation can improve the condition in the individual.

So this is about the riboflavin and niacin, the food sources and recommended dietary allowances what happens when the riboflavin deficiency occurs, what happens when niacin deficiency occurs, and what about the excess. Excess generally does not cause any symptoms because all these are water-soluble vitamins.

Thank you.