ZINC

Zinc

Zinc is a essential trace elements for all forms of life.

The total content of zinc in adult body is 2 g. prostate gland is very rich in zinc (100mg/g).

Zinc is mainly an intracellular element.

Food Sources of Zinc

- Animal products
- fish
- Legumes
- RDA for women is 8 mg/day
- RDA for men is 11 mg/day

Biochemical Functions of Zinc

- Zn is an essential component of several enzymes e.g carbonic anhydrase, alcohol, dehydrogenase, alkaline phosphatase, carboxy peptidase, superoxide dismutase.
- Zn may be regarded as an **antioxidant** since the enzyme superoxide dismutase (Zn containing) protect the body against free radical damage.
- The storage and secretion of insulin from the ***β***-cells of pancreas require Zn..

Biochemical Functions of Zinc

- It is required for wound healing. Zn enhances cell growth and division.
- **Gusten**, a zinc containing protein of the saliva, is important for taste sensation
- Zn is essential for proper reproduction
- Zn is necessary to maintain the normal levels of vit A in serum , Zn promotes the synthesis of retinol binding protein

Who is at Risk for Zinc Deficiency?

- . RISK GROUPS
- 1. Infants and children
- 2. Pregnant and Lactating women.
- 3. Patients receiving total parentral nutrition.
- 4. Older adults (65 years and older)
- 5. Individuals with alcoholic liver disease.
- 6. Individuals with inflammatory bowel diseases.
- 7. Individuals with severe or persistent diarrhea.

Deficiency of Zinc

- Poor growth
- Inadequate sexual development
- Reduced sense of smell and taste
- Acne-like rash
- Mental confusion
- Lack of appetite

Serum Zn

The concentration of Zn in serum is about 100mg/dl.
Erythrocytes contains higher content of Zn (1.5mg/dl) .

Disease states

- Zn deficiency is associated with growth retardation, poor wound healing, anemia, loss of appetite, loss of taste sensation, impaired spermatogenesis etc.
- It is reported that Zn deficiency in pregnant animals causes congenital malformation of the fetus.
- Deficiency of Zn may result in depression, dementia and other psychiatric disorders.

Acrodermatitis Enteropathica

- Is a rare inherited metabolic disease of zinc deficiency caused by a defect in the absorption of Zn from the intestine which leads to growth retardation, gastrointestinal and neuropsychiatric features.

Toxicity of Zinc

- Upper Limit is 40 mg/day
- Inhibits copper absorption
- Reduces HDL
- Increases risk of heart disease
- Diarrhea, cramps
- Nausea, vomiting
- Depressed immune function
- Do not exceed 100 mg/day without medical supervision.

- Zinc toxicity is often observed in welders due to inhalation of zinc oxide fumes. Manifestations includes nausea , vomiting , abdominal cramps e.t.c.

SELENIUM

Selenium

- Selenium was originally identified as an element that causes toxicity to the animals (alkali disease). However it has shown that Se in smaller amounts is biologically important.

- Readily absorbed.
- Excretion through the urine and feces.

Food Sources of Selenium

- Fish, meat (organ meat), eggs, milk, shell fish
- Grains, seeds, nuts dependent on soil content
- RDA for adults is 55 ug/day
- Average intake exceeds RDA

Biochemical Functions of Selenium

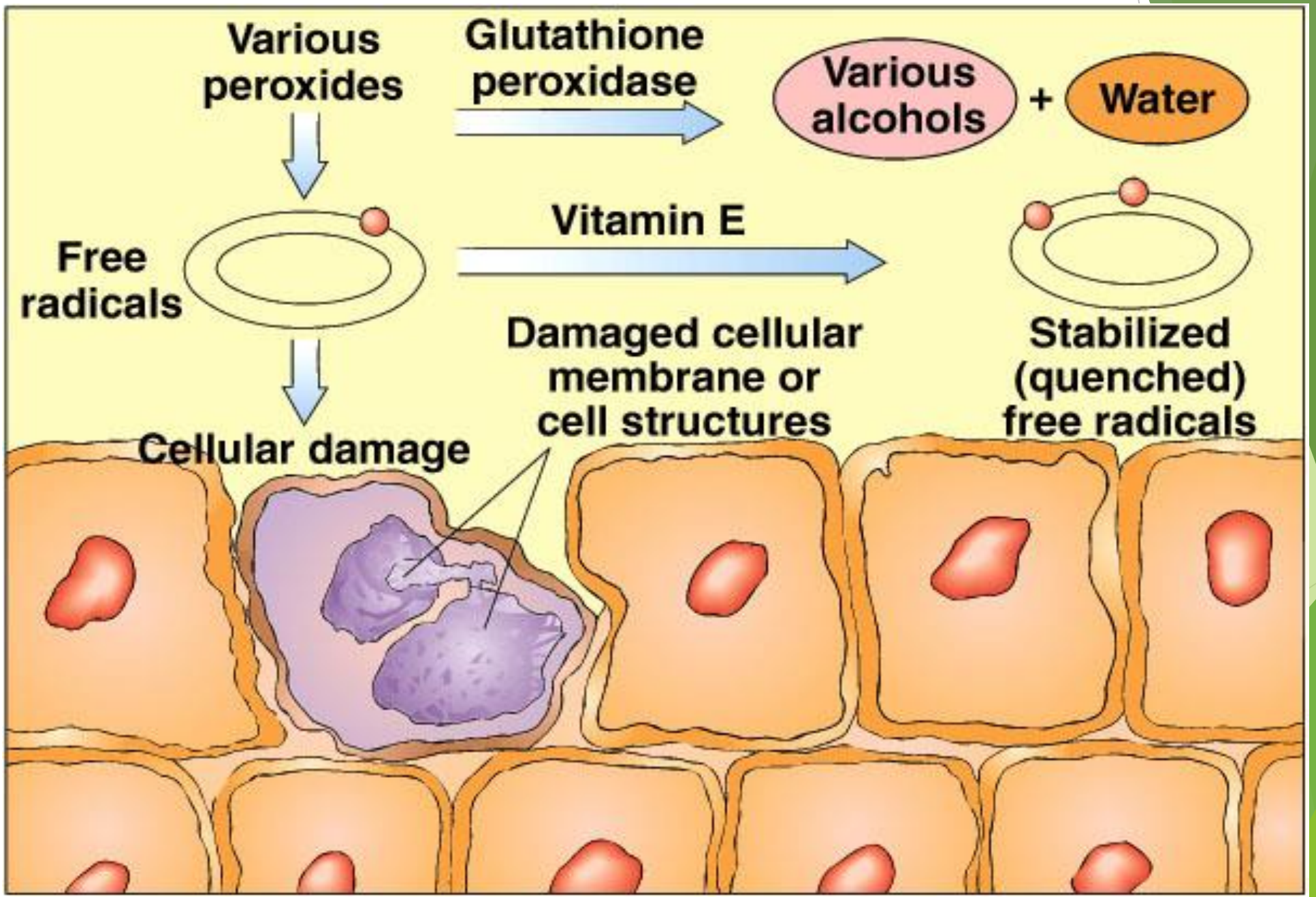
- Selenium along with vit E , prevents the development of hepatic necrosis and muscular dystrophy.
- Se is involved in maintaining structural integrity of biological membranes.
- Se as selenocysteine is an essential component of the enzyme glutathione peroxidase. This enzyme protect the cells against the demage caused by H2O2.
- Se protects animals from carcinogenic chemicals.

Biochemical Functions of Selenium

- Se binds with certain heavy metal (Hg, Cd) and protects the body from their toxic effects.
- **Thioredoxin reductase**, involved in purine nucleotide metabolism, is also a selenoprotein.

Requirements: A daily intake of 50-200 mg of Se has been recommended for adults.

Selenium as Antioxidant



Deficiency of Selenium

- Muscle pain
- Muscle wasting
- Cardiomyopathy
- Keshan disease
  - Heart disease in children
  - Accumulation of fatty acid peroxides in the heart
  - Increase blood clots
  - Irreversible

Toxicity of Selenium

- Upper Level is 400 ug/day
- Garlicky breath (**dimethyl selenide**) is responsible for **garlic odor**.
- Hair loss
- Nausea, vomiting
- Weakness
- Rashes
- Cirrhosis of the liver