

# Minerals & Trace elements

(Cont.)

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# Zinc

- Next to iron, zinc is the most abundant trace element in the body.
- It is a constituent of, or a cofactor to, many enzymes.
- These metalloenzymes participate in the metabolism of carbohydrates, proteins, lipids, and nucleic acids.
- Zinc is possibly influencing the following actions:
  - 1- Tissue growth and repair.
  - 2- Cell membrane stabilization.
  - 3- Bone collagenase activity and collagen turnover.
  - 4- Immune response, especially T cell mediated response.
  - 5- Sensory control of food intake.
  - 6- Spermatogenesis and gonadal maturation.
  - 7- Normal testicular function.

- The normal adult body contains 1.5–2.5 g of zinc.

## **Sources of zinc**

- Food sources of zinc include meat products, oysters, and legumes, usually bound to proteins.
- Dietary supplements.
- Body zinc stores determine, to some extent, the percentage of zinc that is absorbed from food and mineral supplements.
- Foods rich in calcium, dietary fiber, or folate supplements may interfere with zinc absorption.

- Zinc is absorbed from small intestine and transported in the blood bounds to proteins.
- It is found in many organ.
- High levels are found in liver, pancreas, spleen, eyes, prostate, skeletal muscles and bone.
- Zinc is primarily excreted in feces with certain percentages through dermal cells.

## **Recommended Daily Allowance (RDA)**

- 11 mg/day for men age 19 and older.
- 8 mg/day for women 19 and older.

## **Zinc deficiency**

- It can occur due to the following:
  - a. Low intake.
  - b. Decreased absorption.
  - c. Increased utilization.
  - d. Increased loss.

- The most likely candidates for zinc deficiency are infants; rapidly growing adolescents; menstruating, lactating, or pregnant women; individuals with low meat intake; chronically ill patients.
- Acrodermatitis enteropathica is an autosomal, recessive disorder involving zinc malabsorption that occurs in infants of Italian, Armenian, and Iranian heritage.
- It is characterized by severe dermatitis, chronic diarrhea, emotional disturbances, and growth retardation.
- Patients with Crohn disease, celiac sprue (gluten enteropathy), and short-bowel syndrome.

- Since zinc is involved in a diverse group of enzymes, the symptoms of its deficiency are varied and the common ones are dysgeusia (lack of taste) and hyposmia (diminished smell acuity).
- It is treated by zinc supplements.
- A number of zinc supplements are available, including:
  - zinc acetate, zinc gluconate, zinc picolinate, and zinc sulfate.
  - Zinc picolinate has been promoted as a more absorbable form of zinc, but there are few data to support this idea in humans.

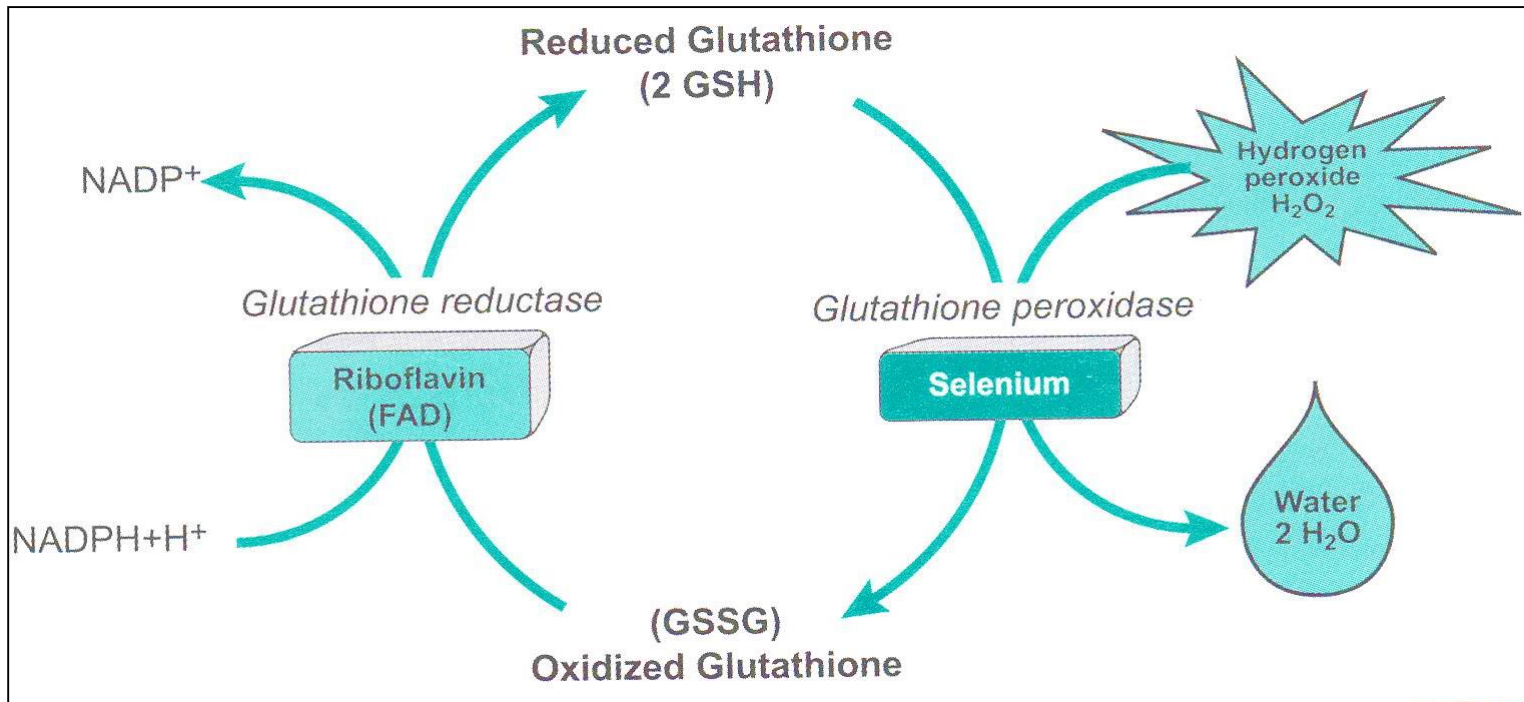
## Zinc toxicity

- Zinc is one of the least toxic trace elements.
- The major consequence of long-term consumption of excessive zinc is copper deficiency.
- Taken of 12 g of zinc sulfate (~2700 mg of elemental zinc) for 2 days causes drowsiness, lethargy, and increased serum lipase and amylase concentrations.



## Selenium (Se)

- Selenium is a trace element.
- It is required only in small amount.
- Selenium is bound to many proteins to form what is called selenoproteins.
- It works as antioxidant (one component of the enzyme glutathione peroxidase).
- Selenium regulates thyroid function (is necessary for the production and conversion of thyroid hormones).
- Selenium is also important for immune system (stimulates the production of antibodies).



## Source of selenium

- Selenium quantity in foods is varied from region to region.
- The amount of selenium in soils varies a lot around the world.
- Selenium is available in plants and animals foods.
- Tuna, sea foods, liver and poultry are good sources of selenium.

## Recommended Daily Allowance (RDA)

- 55 ug/day for men and women age 19 and up.

## Selenium deficiency

- Selenium deficiency is rare except:
- In China, Finland, New Zealand and countries with low selenium diet.
- There is an evidence that selenium deficiency does not usually cause illness by itself.
- Rather, it can make the body more susceptible to illnesses caused by other nutritional, biochemical or infectious stresses.
- Researchers believe that selenium deficiency may worsen the effects of iodine deficiency on thyroid function.

## Selenium supplements

- Staple food, where it is found as selenomethionine.
- In commercial supplements as sodium selenite and sodium selenate.
- People with GIT problems such as Crohn's disease, or with surgical removal of part of the stomach.
- Individuals with iodine deficiency may also benefit from selenium supplementation.
- Adequate selenium may help protect against some of the neurological effects of iodine deficiency.

## Selenium toxicity

- It is rare.
- It is safe for most people up to 400 ug/day for short period of time.
- High doses for long time can cause nausea, vomiting, nail changes, loss of energy, and irritability.
- Selenium increases the affect of anticoagulants, reduces niacin effect and its absorption is reduced by zinc.



*Thank You*