Water and minerals metabolism 304 Biochen

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lodine (l₂)

Adult male body weighing 60-70 kg contain about 0.02 – 0.05 g of iodine

• Distribution of iodine in the body:

About 33% is in the thyroid gland. About 66% is distributed in all tissues particularly ovary, muscles and blood.

- Iodine in blood: most of iodine in blood is bound to protein at levels of 4 – 8 microgram/dl.
- Food sources: world's seas fish, seaweeds and iodized salt are best sources
- RDA
 - adults: 0.1-0.2 mg/day
 - Pregnant and lactating women: 25-30 mg/day

locline (I₂)

- Absorption:
- Organic iodine is partly converted to inorganic iodide. Iodide and inorganic iodine are absorbed via the small intestine, lung and skin
- **Excretion:** inorganic iodine is excreted mainly in urine. Smaller amounts in saliva, bile, feces.
- Functions:
 - essential component of thyroid hormones
- Deficiency :
 - Prolonged deficiency results in **Goiter**: enlarged thyroid gland (thyroid gland hypertrophy)

Fluorine (F₂)

• Adult male body weighing 60-70 kg contain about **0.02** g of fluorine

• Distribution of fluorine in the body:

Fluoride is normally accumulated in small quantities only in the <u>bone</u> and <u>teeth</u>.

Its amount in soft tissues are generally very low .

It is distributed as chloride in the extracellular fluid.

- Food sources: Main sources include drinking water and plants (spinach, lettuce, onions).
- RDA
 - adults: 1-2 mg/day

Fluorine (F₂)

- **Absorption:** soluble fluorides in drinking water are absorbed readily from the intestine
- **Excretion:** mainly in urine
- Functions:
 - Fluoride makes:
 - bones stronger and decrease the incidence of osteoporosis
 - teeth more resistant to tooth decay
- Fluorosis:
 - Excess intake of fluoride during childhood causes mottling (ينقيط) and discoloration (بالوان مختلفة) and tiscoloration (بالوان مختلفة
 - Fluoride intake in very large quantities also causes changes in bone including increased bone density, calcification at points of muscle insertion and bony exostoses (تكوين تكوينات عظمية خارجية)

• Adult male body weighing 60-70 kg contain about **0.02** g of selenium

Distribution of selenium in the body:

It is widely distributed in the tissues. It is found in highest concentrations in the <u>kidney</u>, <u>pancreas</u>, <u>pituitary</u> and <u>liver</u>

- Food sources: the main sources are seafood, meats, whole grains and milk products.
- RDA
 - adults: 0.055-0.07 mg/day

• Functions:

- It plays a role in:
 - Reproduction,
 - Immune functions,
 - Regulation of iodinated thyroid hormones,
 - Antioxidant activity,
 - Pathogenesis of muscular degeneration seen in combined selenium and vit E deficiencies
- It is a constituent of:
 - glutathione peroxidase, which destroys peroxides in the cytosol,
 - Iodothyronine deiodinase, that remove iodine from thyroid hormones. This process activates T4 and inactivates T3

Glutathione peroxidase (GPx):

It is a metalloenzyme contain <u>0.34% of selenium</u>, it contain <u>4 selenium</u> atoms in the form of selenocysteine

It catalyzes the oxidation of reduced glutathione (GSH) to oxidized glutathione (GSSG).

✤li is important for efficient scavenging (getting rid off) of peroxides.

2GSH + H2O2 GSSG + 2H2O

GSSG is regenerated by the activity of glutathione reductase enzyme (**GR**)

 $\frac{GR}{GSSG + NADPH+H} \rightarrow 2GSH + NADP$

