Lecture title: Vitamins: Part 5

Lecturer Affiliation: Chapter tow

Summary:

Deficiency symptoms: Since vit. A is stored in liver, deficiency symptoms appear only after long-term deprivation, but vit A deficiency is quite prevalent, especially among infants and children in developing countries. Manifestations are:

1- Xerosis (dryness) of eye, 'Bitot's spots', keratomalacia(softening of cornea), corneal opacities,night blindness (nyctalopia) progressing to totalblindness.

2- Dry and rough skin with papules (phrynoderma), hyperkeratinization, atrophy of sweat glands.

3- Keratinization of bronchopulmonary epithelium, increased susceptibility to infection.

4- Unhealthy gastrointestinal mucosa, diarrhoea.

5- Increased tendency to urinary stone formation due to shedding of ureteric epithelial lining which acts as a nidus.

6- Sterility due to faulty spermatogenesis, abortions, foetal malformations

7- Growth retardation, impairment of specialsenses.

Therapeutic uses

1. Prophylaxis of vit A deficiency during infancy, pregnancy, lactation, hepatobiliary diseases, steatorrhoea: 3000–5000 IU/day.

2. Treatment of established vit A deficiency:50,000–100,000 IU i.m or orally for 1–3 days followed by intermittent supplemental doses.

3. Skin diseases like acne, psoriasis, ichthyosis. Retinoic acid and 2nd or 3rd generation retinoids are used.

Interactions

1- Vit E promotes storage and utilization of retinol and decreases its toxicity.

2- Regular use of liquid paraffin by carrying through with it vit A can result in deficiency.

3- Long-term oral neomycin induces steatorrhoea and interferes with vit A absorption.

Vitamin E

Absorption and fate: Vit. E is absorbed from intestine through lymph with the help of bile; it circulates in plasma in association with β-lipoprotein, is stored in tissues and excreted slowly in bile and urine as metabolites.

Physiological role and actions: Vit E acts as *antioxidant*, protecting unsaturated lipids in cell membranes, coenzyme Q, etc. from free radical oxidation damage and curbing generation of toxic peroxidation products. Feeding animals with polyunsaturated fats increases vit E requirement, while antioxidants like cystein, methionine, selenium, chromenols prevent some vit E deficiency symptoms in animals. However, vit E might be having some more specific action or a structural role in biological membranes because other deficiency symptoms are not relieved by these unrelated antioxidants.

Deficiency symptoms: Experimental vit E deficiency in animals produces recurrent abortion, degenerative changes in spinal cord, skeletal muscles and heart, and haemolytic anaemia. No clear-cut vit E deficiency syndrome has beendescribed in humans, but vit E deficiency has been implicated in certain neuromuscular diseases in children, neurological defects in hepatobiliary disease and some cases of haemolytic anaemia.

Therapeutic uses

1. Primary vit E deficiency does not occur clinically. Supplemental doses (10–30 mg/ day) may be given to patients at risk.

2. G-6-PD deficiency—prolonged treatment with 100 mg/day increases survival time of erythrocytes.

3. Acanthocytosis—100 mg /week i.m: normalizes oxidative fragility of erythrocytes.

4. The risk of *retrolental fibroplasia* in premature infant sex posed to high oxygen concentrations can be reduced by 100 mg/kg/day oral vitamin E.

5. Along with vit A to enhance its absorption and storage, and in hypervitaminosis A to reduce its toxicity.

6. Large doses (400–600 mg/day) have been reported to afford symptomatic improvement in intermittent claudication, fibrocystic breast disease and nocturnal muscle cramps.

For its antioxidant property, vit E has been promoted for recurrent abortion, sterility, menopausal syndrome, toxaemia of pregnancy, atherosclerosis, ischaemic heart disease, cancer prevention, several skin diseases, prevention of neurodegenerative disorders, postherpetic neuralgia, scleroderma and many other conditions, but without convincing evidence of benefit.

Toxicity Even large doses of vit E for long periods have not produced any significant toxicity, but creatinuria and impaired wound healing have been reported; abdominal cramps, loose motions and lethargy have been described as side effects of vit. E. Vit E can interfere with iron therapy.