

### ***Therapy with vitamin A***

- Usual therapeutic dose is 5,000 to 25,000 IU/day;
- Glaucoma, conjunctivitis, nearsightedness, crossed eyes, Betot spots (raised white patches of the white of the eyes);
- 10,000 IU of vitamin A plus 400 mg of vitamin B-2 may help reverse cataracts;
- Tinnitus; migraine headaches;
- 100,000 IU of vitamin A over 4 to 6 months lower high cholesterol, but do not alter normal cholesterol levels;
- Protection against carcinogenic agents; enhanced immunity;
- Helps treat acne & its lesions, psoriasis, dandruff, bedsores, burns, warts, eczema;
- Bronchial asthma, rhinitis, emphysema; nephritis; cirrhosis of the liver;
- Beta carotene used to enhance immune response (macrophages); and prevention of cancers, esp. lung & cervix;

### ***VITAMIN D (D-3: Cholecalciferol; D-2: Ergocalciferol)***

**General.** oil-soluble; rickets-preventive factor; sunshine vitamin; bone & tooth itamin;

- **D-3** (natural form) found in fish liver oils or produced by UV (sun) irradiation of 7-dehydrocholesterol (derivative of cholesterol obtained from lanolin) in the fatty layers of the skin; Vitamin D3 has recently been found to be up to 9 times more biologically active than the D2 form.
- **D-2** (vegetarian form) produced by UV irradiation of ergosterol, a compound derived from yeast;
- **History:** oil-soluble anti-rickets factor suggested in 1918; anti-rickets factor found present in cod liver oil (used since early 1800's) in 1920; crystallized in 1930; identified in 1937;

### ***Nutrition***

- **Sources:** fish livers, beef liver, egg yolks; sunshine on skin; milk (fortified with D);
- **Supplements:** A + D, multi-vitamin, multi-mineral-vitamin formulations;
- **Absorption:** upper part of small intestine; along with dietary fats; 80% of intake absorbed; skin-formed vitamin D absorbed into lymphatics; alpha-globulin 2 carries it in blood;
- **Improved by:** edible fats & oils; taking with meal;
- **Synergists:** Vitamins A & C prevent vitamin D oxidation; vitamins B-1 & B-3 increase tolerance for vitamin D; calcium controls bone formation;
- **Antagonized by:** cortisone, some anti-convulsants;
- **Stability:** destroyed by oxygen & light;
- **Storage:** mainly in liver; also in skin, spleen, bones;
- **Excretion:** in bile;
- **Metabolism:** D-3 & D-2 converted to calcidiol in liver; calcidiol converted to calcitriol (active form) in kidneys;
- **Interactions:** sedatives, tranquilizers, anti-convulsants turn vitamin D to inactive forms;

### ***Functions of vitamin D***

- Functions as hormone; stimulates synthesis of calcium & phosphorus binding proteins, that increase absorption of these elements; regulates absorption & metabolism of calcium & phosphorus; acts in conjunction with parathyroid hormone to stimulate release of calcium from bone into blood; stimulates re-absorption of calcium & phosphorus from kidneys;
- Especially important in infancy & childhood for bone development;
- Co-enzyme in metabolic processes in bone, kidney, liver & intestine;
- Regulates growth, hardening & repair of bone;
- Regulates eruption, growth & hardness of teeth;
- Helps synthesize mucosal enzymes used in active transport of calcium;
- Maintains stable nervous system & heart action;
- Functions antagonized by: sedatives, tranquilizers, anti-convulsants;

### ***Quantities***

- **Measurement:** µg and IU; 10 µg cholecalciferol = 400 IU of Vitamin D;
- **Optimum: (SONA)** average ranges from 10 to 24 µg /day (10 µg = 400 IU);
- **Minimum: (DRI)** average set at 5/15 µg (400/600 I.U.) /day;
- **Less than RDA:** % unknown; especially common in elderly & others living indoors;
- **Deficiency** of vitamin D results from lack of skin exposure to sunshine; lack in diet; poor intestinal absorption (bowel disease); mineral oil;
- If **early in life:** symptoms include rickets: permanent skeletal malformation (bowed legs, concave breast, beaded ribs, large head, late eruption of teeth); retarded growth; soft, decay-sensitive teeth; nervous irritability;
- **In adults:** adult rickets (osteomalacia): symptoms can manifest as bone demineralization & softening; reduced parathyroid activity; lack of vigour; diminished kidney function; muscular weakness; osteoporosis;
- **Toxicity** is unusual (requires about 3,000 IU/day in infants and 1,000 IU/day/pound of body weight in adults);
- Toxic levels of **D-2 (ergocalciferol)** may increase blood calcium levels (hypercalcaemia), that cause appetite loss, nausea, weight loss & failure to thrive; affects all tissues adversely; encourage development of atherosclerosis; bind magnesium; cause calcium deposits in soft tissues & inner organs (calciophylaxis);
- **Block toxic reaction** with large doses of vitamin E, C & choline;

### ***Therapy with vitamin D***

- Usual therapeutic range is 400 - 1,000 IU/day;
- Allergic conjunctivitis - high doses (50,000 IU/day) removed symptoms in those tested;
- Rectifies chronic calcium deficiency; helps in chronic asthma, arthritis & depression;
- Somewhat effective in treating menopausal symptoms, including irritability, depression, hot flashes, leg cramps & night sweats;
- Offsets toxic effects of lead & other heavy metals if used with pharmacological agents;
- Reduces the incidence & severity of common colds when used together with vitamin A;