

- Vitamin D is considered **as steroid hormone**.
- Cholecalciferol (vitamin **D3**) is synthesized in the skin by the sunlight (UV) (**– 7-Dehydrocholesterol is converted to vitamin D3**), and it can be found in animal tissue.
- Ergocalciferol (vitamin **D2**) is derived from ergosterol in plants.
- The biologically active form is **1,25-dihydroxycholecalciferol (calcitriol)**.

- Circulating level of **>75 nmol/L** is required for beneficial health effects.
- Nutritional rickets:
 - demineralization of bone **in children**.
 - continued formation of collagen matrix of bone.
 - soft and pliable bones.
 - skeletal deformities including bowed legs.
 - low serum levels of vitamin D.
- **Osteomalacia**: demineralization of bones in **adults**.

Metabolism and actions of vitamin D:

- In liver: Cholecalciferol is converted to **25-hydroxycholecalciferol (calcidiol)** by the enzyme **25-hydroxylase**.
- In kidneys: the **1- α -hydroxylase enzyme** converts **25-hydroxycholecalciferol** to **1,25-dihydroxycholecalciferol (biologically active)**
 - Active vitamin D is transported in blood by **gc-globulin** protein.

- Inherited rickets:
 - Vitamin D-dependent rickets (types 1 and 2)
 - Causing vitamin D deficiency mainly because of genetic defects in:
 - Vitamin D **synthesis or receptor**.
 - Diagnosis is done by Measuring serum levels of: 25-hydroxycholecalciferol – PTH – Calcium – Phosphate – Alkaline phosphatase

- Vitamin D synthesis is tightly regulated by plasma levels of **phosphate and calcium**.
- Plasma phosphate: **– Direct effect**
- PTH: **Indirect effect**.
- Calcium homeostasis is maintained by parathyroid hormone (PTH) and calcitonin.

- Osteoporosis:
 - **Reduction** in bone mass per unit volume.
 - **primary osteoporosis: Post-menopause**.
 - Increases fragility of bones and susceptibility to fractures.
 - **Diagnosis** : • WHO standard: Serial measurement of bone mineral density.
 - **Bone formation markers**: osteocalcin , Bone-specific alkaline phosphatase and P1NP.
 - **Bone resorption markers** : CTX-1.