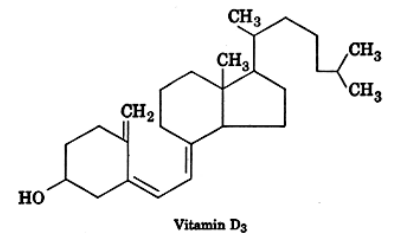
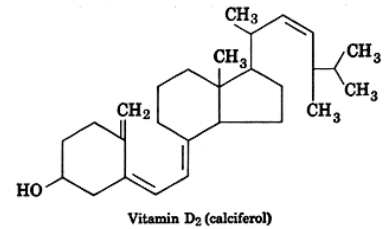


# Vitamin D

## Chemical Structure

- Structurally derived from a steroid
- Contains 3 intact rings (A, C, D) with a break between carbons 9 and 10 in the B ring (see picture)
- Two main forms: D<sub>2</sub> (ergocalciferol) and D<sub>3</sub> (cholecalciferol) – differ by side chains but not in general metabolism or functions



## DRIs

Age Group	1997 AI	2010 RDA
1-50 yr.	200 IU	600 IU (15ug)
51-70 yr.	400 IU	600 IU (15ug)
> 70 yr.	600 IU	800 IU (20ug)
Preg/lactating	200 IU	600 IU (15ug)
UL	2000 IU	4000 IU (100ug)

UL – Vitamin D, when ingested in large amounts, is one of the most likely of all vitamins to cause overt toxicity. Because so many foods are now fortified with vitamin D and many OTC products also contain in, need to consider all sources the ensure intake is not excessive.

## Food Sources

- Provided primarily by a small number of foods of animal origin.
- Liver, eggs, fatty fish, cheese, and butter
- Plant source: shitake mushrooms
- Many foods fortified (milk, yogurt, cheese, butter, margarine, cereals, OJ)

## Other Sources

- Another major source of vitamin D<sub>3</sub> is made in the body from sunlight exposure

## Functions

- Serum calcium homeostasis – actions to increase/decrease serum calcium
- Phosphorus homeostasis
- Cell differentiation, proliferation, and growth
- Calcitriol and muscle

## Deficiency: Rickets and Osteomalacia

- Rickets: infants and children; symptoms: seizures, growth retardation, failure of bone to mineralize
- Osteomalacia: adults; symptoms: bone pain, soft bone, muscle weakness and pain. Results from prolonged elevations in blood PTH.
- People with insufficient sun exposure, older individuals, certain diseases may be at risk

## Toxicity

- Toxicity especially seen with intakes of 10,000 IU (or more)
- Symptoms: hypercalcemia and calcinosis, calcification of soft tissues including organs such as kidneys, heart, and lungs, along with blood vessels. Hyperphosphatemia, hypertension, anorexia, nausea, weakness, headache, renal dysfunction, death.

