

Vitamin C

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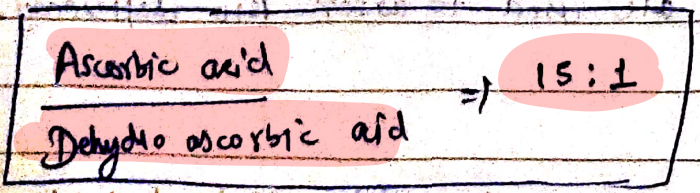
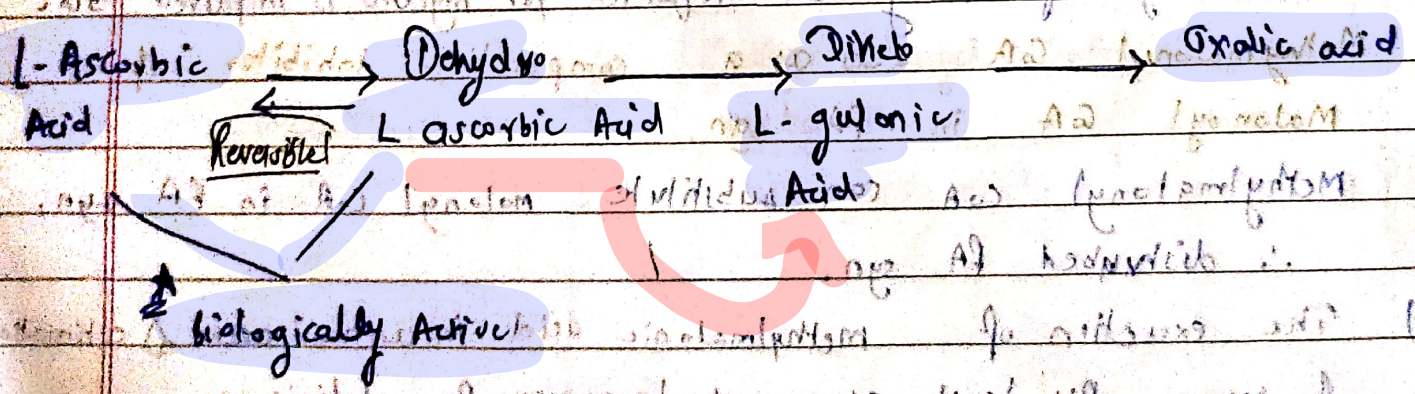
① Vitamin C (Ascorbic acid)

- Vitamin C is water soluble. ("Versatile Vitamin")
- Scurvy has known to man since centuries, it was the first disz associated with diet.
- It was the first disz which lead to death of 10,000 sailors due to lack of fresh vegetable in their diet.
- The english Navy used to carry crates of lemons, hence they were popularly known as "Limeys".

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Chemistry

- Ascorbic acid is a hexose (6 Carbon) derivative of d-glucose "resemble Monosaccharides" in structure.
- The acidic property of Vit C is due to the enolic Hydroxyl.
- It is strong Reducing agent. (D ascorbic acid is inactive).



- Oxidation of Vit C makes it deactivated (Dihydroguconic acid)
- Cu helps in oxidation. ∴ "Cooking of food"
- Cu utensils deactivate Vitamin C.

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- Many animals can synthesise ascorbic acid from glucose via uronic acid pathway.
- However man & other of primates, guinea pigs, bats etc can not synth. due to deficiency of a single enzyme namely "L-glutamate oxidase".
- Vitamin 'C' rapidly absorbed in intestine, but its storage in the body is not significant.
- Ascorbic acid is excreted as such in urine.

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Biochemical functions -

Most of the functions of vit. C are related to its property to go reversible oxidation-reduction, i.e. interconversion of Ascorbic acid & dehydroascorbic acid.

- 1) **Collagen formation** - it plays role of a coenzyme in **Hydroxylation of proline & lysine**. while Procollagen is converted to collagen. Hydroxy proline & Hydroxylysine are essential for the collagen cross-linking and strength of the fibre.
* Maintenance of Normal connective tissue & wound healing process.
- 2) **Bone formation** - contains collagen, Matrix etc.
- 3) **Iron & Haemoglobin Metabolism** :- Ascorbic acid enhances Iron absorption by keeping it in the ferrous form.
- 4) **Tryptophan Metabolism** - is essential for Hydroxylation of Tryptophan.

- 5) **Purine Metabolism** - Synthesis of catecholamines.
- 6) **folic Acid Metabolism** - The active form of B_{12} vitamin of folic acid is tetrahydrofolate (THF). Vitamin C is needed for the formation of THF of sub. B_{12} for "methyl metabolism".
- 7) **Synthesis of corticosteroid hormones**.
- 8) **Sparing action of other vitamins** - **Strong Antioxidant**. It spares Vitamin A, Vitamin E & some B complex vitamins from oxidation.
- 9) **Immunological function** - **Synthesis of immunoglobulin** of antibody.
- 10) **Preventive action on cataract**.
- 11) **Preventive action on chronic disease** - Being antioxidant reduces risk of cancer, cataract & coronary heart disease.

#) **RDA (Required Dietary Allowance)**

40-50 mg Vitamin C intake per day.
(20-40% ↑ for women)

#) **Dietary sources** - Citrus fruits, amla, green vegetables, tomato, potato are rich. High content found in Adrenal gland & gonads. Milk is poor source of Vitamin C.

- #1 Deficiency symptoms -
(Scurvy)
- Spongy & sore gums.
 - loose teeth
 - Anemia
 - swollen joints

Also related to impairment in the synthesis of collagen or Antioxidant property of Vitamin C.

Infantile Scurvy (Barlow's disease)

It occurs in infants aged 6-12 months due to Vitamin C deficiency.

#1 Megadoses of Vitamin C & its controversy -

Linus Pauling (1970) first advocated the consumption of megadoses of Vit. C upto 1g/day which is 300 times more than daily requirement, to prevent & cure common cold.

It is now clear Vit C does not prevent common cold but just reduces the severity of symptoms of common cold. Megadose (1-4g/day) are still used in common cold, wound healing, trauma etc.

Ascorbic acid - Non toxic

Dehydroascorbic acid - Toxic

Oxalate is a major Metabolite of Vitamin C.

Oxalate has been implicated in the formation of kidney stones. However there is a big controversy of Vit. C forming renal stones.