

Zydus

Medical College and Hospital



VITAMINS LECTURE-5

(DATE: 27-12-2018)

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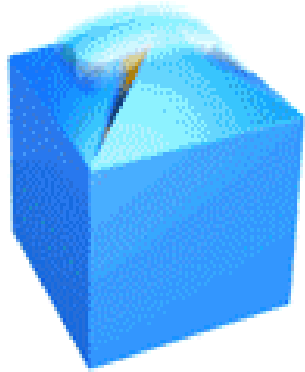
CURIOSITY ?????

WHAT ?

WHERE ?

WHY ?

DISORDES ?



CURIOSITY = ANSWER TO FIND




- **WHAT** ARE VITAMINS AND THERE REQUIREMENTS ?
- **WHERE** THEY ARE SYNTHESISED, ABSORPED, TRANSPORTED, STORED, EXCRETED (METABOLISED)
- **WHY**- ITS NORMAL VALUE AND FUNCTIONS
- **DISORDERS** – DEFICIENCY AND TOXICITY

VITAMINS

A red starburst graphic with multiple points, centered behind the text box.

Vitamins are organic components in food that are needed in very small amounts for growth and for maintaining good health of the organism.

A red starburst graphic with multiple points, centered behind the text box.

COMPARISON OF TWO TYPES OF

- Solubility in fat (soluble)
- Water solubility (not soluble)
- Excretion (not excreted)
- Carrier proteins (present)
- Storage (stored in liver)
- Needed in periodic doses (weekly or monthly)
- A, D, E & K
- Not soluble
- Soluble
- Excreted
- No carrier proteins
- No storage
- Needed in frequent doses (1 to 3 days)
- B-complex, Non-B complex (Vit-C)

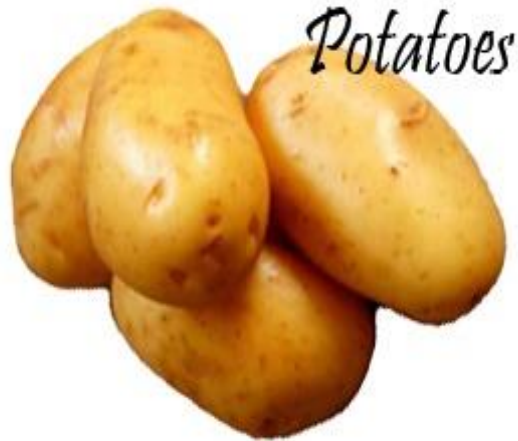
VITAMIN - C



VITAMIN - C



- **Other name: Ascorbic acid**
- **RDA**
 - **Men: 90 mg/day**
 - **Women: 75 mg/day**
 - **100mg/day - pregnancy, lactation, aged people**
- **Upper level for adults: 2000 mg/day**



Potatoes



Cherries



Kale



Pineapple



Strawberries



Citrus Fruits



Kiwi



Blackcurrants



Cauliflower

FACTS



- Sensitive to light, air, heat
- It is not stored in the body
- All Plants can synthesize Vitamin C
- Most animals can synthesize vitamin C except : Humans, Guinea pigs, etc.
- They lack: *L-gulonolactone oxidase*
- Active form= **L-ascorbic acid and dehydroascorbic acid**
- Inactive= ***D-ascorbic acid***

ABSORPTION, STORAGE, TRANSPORT AND EXCRETION



❖ ABSORPTION

- Readily absorbed from gastrointestinal tract (GIT)

❖ STORAGE

- NOT STORED (WATER SOLUBLE)

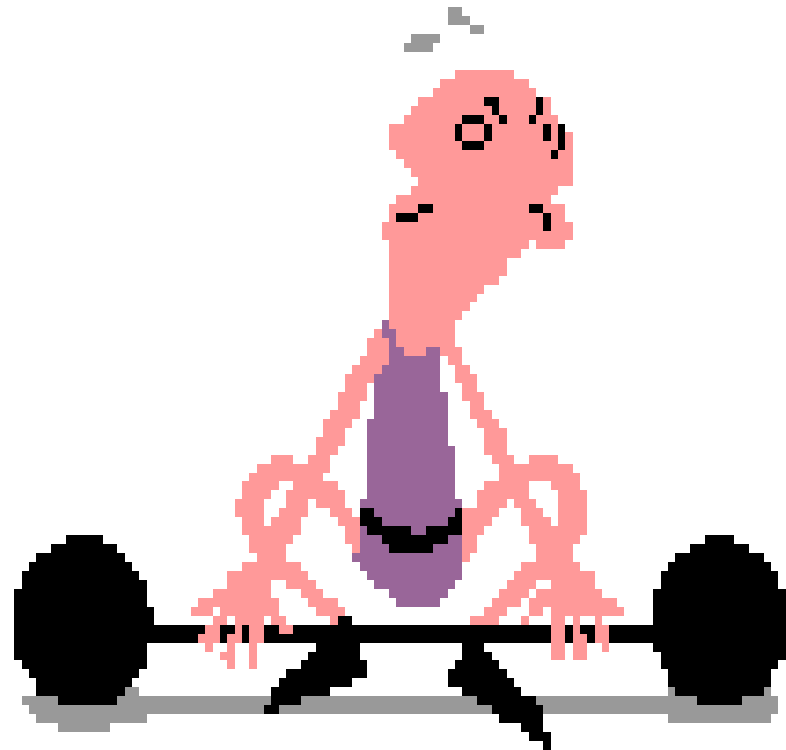
❖ TRANSPORT

- Along with active transport, Na and ATP depend.

❖ EXCRETION

- URINE (OXALATE OR SULPHATE)

BIOCHEMICAL FUNCTIONS



VITAMIN C - FUNCTIONS



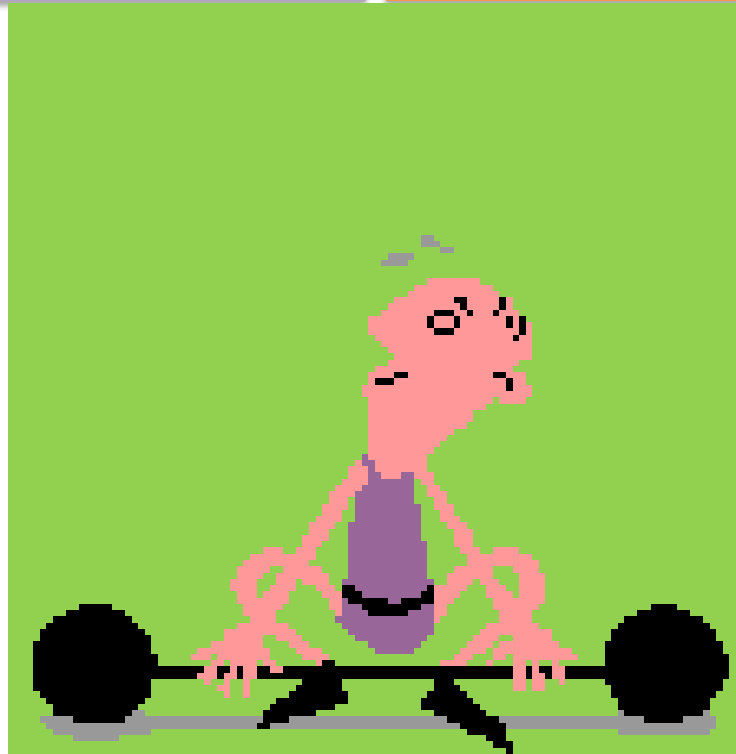
**Antioxidant
(atherosclerosis,
cancer)**

**Hydroxylation of
proline and lysine
(collagen)**

**Catecholamine
synthesis from
tyrosine (nor-
epinephrine)**

**Bile acid
synthesis**

**Phagocytosis
(antibodies)**



VITAMIN C - FUNCTIONS



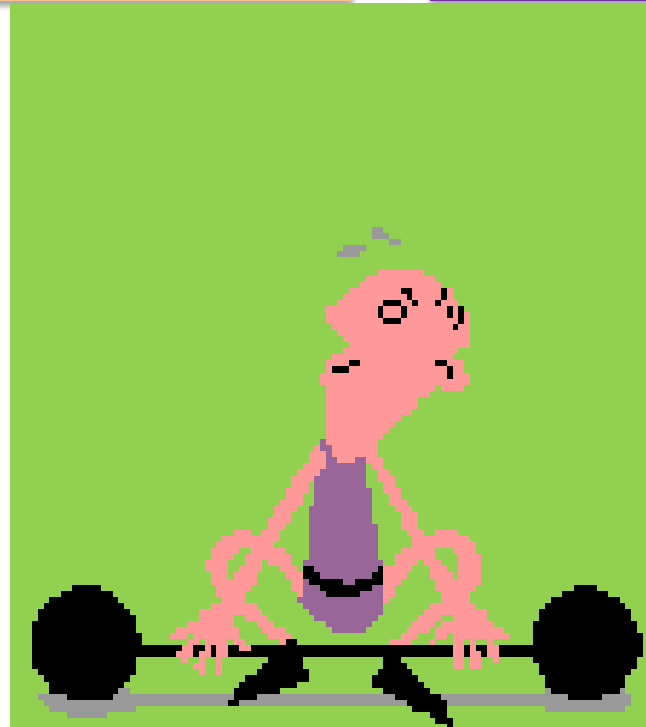
**Prevention of
Cataract**

**Absorption of iron
(intestine)**

**Catabolism of
tyrosine
(homogentisic
acid)**

**Folate
metabolism
(THFA)**

**Hemoglobin
(met-hemoglobin)**



VITAMIN C - FUNCTIONS



- *Proline hydroxylase:*
- Proline hydroxylase catalyzes the hydroxylation of proline on collagen
- Ascorbic acid & ferrous iron are cofactors
- Ascorbic acid is essential to keep the iron in ferrous form
- Helps in cross-linking of collagen

VITAMIN C - FUNCTIONS



- **Iron metabolism:**
- **Ascorbic acid increases the iron absorption from the intestine**
- **Ascorbic acid reduces ferric iron to ferrous state, which is commonly absorbed**

VITAMIN C - FUNCTIONS



- **Folic acid metabolism:**
- **Vitamin C needed for the formation of FH_4**
- **In association with FH_4 , it is involved in maturation of RBC**

VITAMIN C - FUNCTIONS



- ***Immunological function:***
- **Vitamin C increases the synthesis of immunoglobulins & increases the phagocytic action of leucocytes**

VITAMIN C - FUNCTIONS



- **Iron and Heme Metaboism**
- **Ferrochelatase catalyzes the formation of heme from protoporphyrin IX**
- **Vitamin C is necessary for the incorporation of Fe^{++} into protoporphyrin IX to form heme**
- **Vitamin C keeps the iron in ferrous form**

VITAMIN C - FUNCTIONS



- **Sparing action of other vitamins:**
- Ascorbic acid is a strong antioxidant
- It spares vitamin A, E and some B-complex vitamins from oxidation
- **Anti-oxidant property:**
- Vitamin C is an antioxidant
- It reduces the risk of cancer, coronary heart diseases

VITAMIN C - FUNCTIONS



- **Cataract:**
- **Vitamin C is concentrated in the lens of eye**
- **Regular intake of ascorbic acid reduces the risk of cataract formation**

BLOOD LEVEL



- **Plasma ascorbic level is 0.4 - 1.5 mg/dl**
- **Low level is found in women taking oral contraceptive pills and in chronic alcoholics.**
- **High concentration is seen in healing wound**

VITAMIN – C DEFICIENCY



- Deficiency disease: **SCURVY**
- Deficiency symptoms
 - Anemia (small-cell type)
 - Atherosclerotic plaques
 - Pinpoint hemorrhages, bone fragility, joint pain
 - Poor wound healing, frequent infections, bleeding gums, loosened teeth

VITAMIN – C DEFICIENCY



- **Scurvy** developing to small infants is called *Infantile scurvy (Barlow Scurvy)*

VITAMIN - C DEFICIENCY



Gum changes in infant scurvy:

The swelling and hemorrhages are confined to the areas of the gum surrounding the erupting teeth.

VITAMIN C - DEFICIENCY



Orbital hemorrhage:

This is a dramatic but infrequent sign of scurvy. There is complete clearing with treatment.

VITAMIN C DEFICIENCY

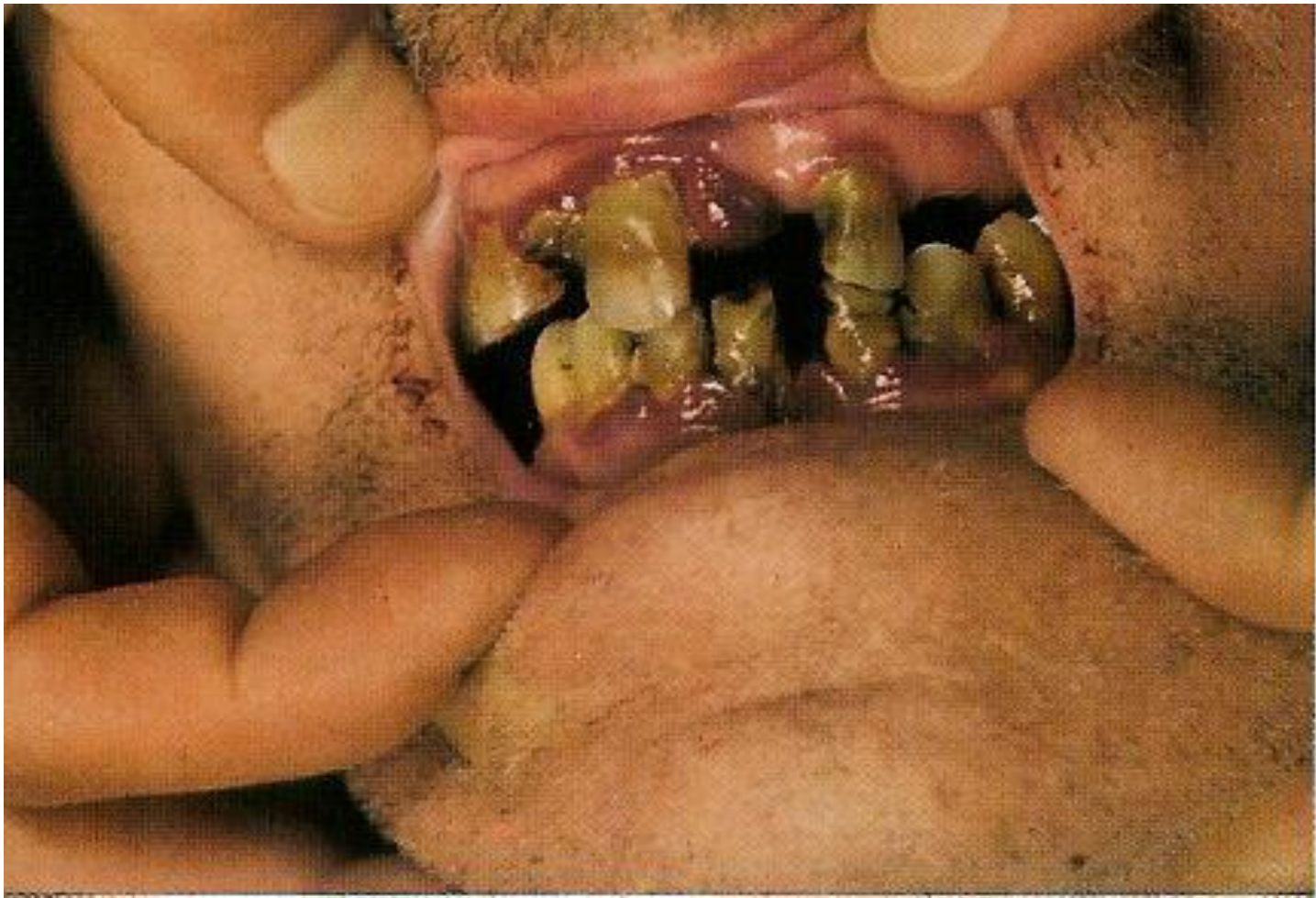


Scurvy

VITAMIN C DEFICIENCY



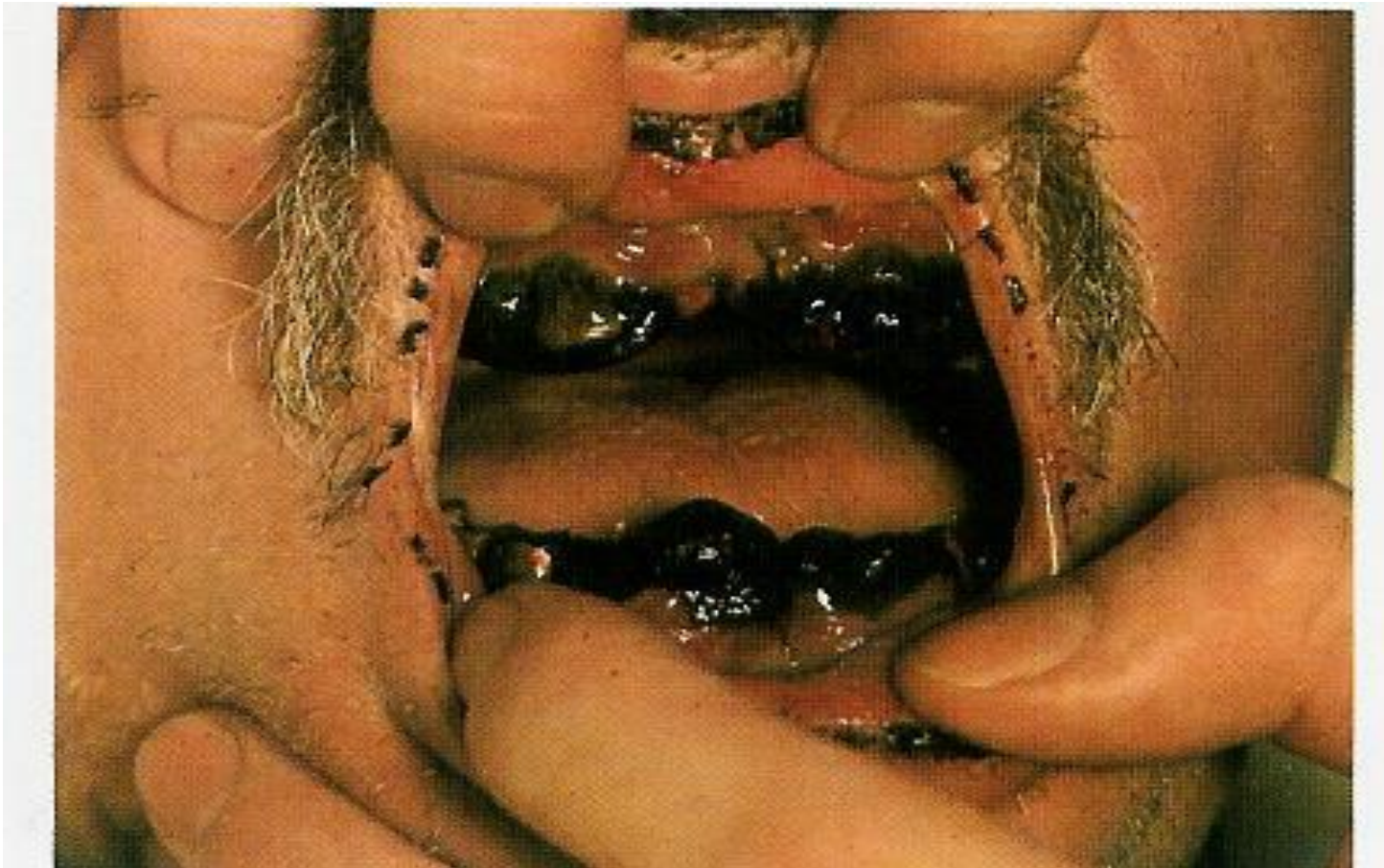
SCURVY



VITAMIN - C DEFICIENCY



Very advanced gum lesions in scurvy



VITAMIN - C DEFICIENCY



Splinter hemorrhage:

In this unusual sign in scurvy the hemorrhages are arranged in a semicircular lattice involving nail beds.

TOXICITY VITAMIN - C



- Toxicity is rare
- Chronic high doses of vitamin C may be unsafe for those unable to regulate absorption of iron
 - *Hemochromatosis (Iron overload in body)*
- May interfere with clinical tests
 - Tests for glucose in urine
- Decrease intake gradually to avoid scurvy-like symptoms



THERAPEUTIC USES



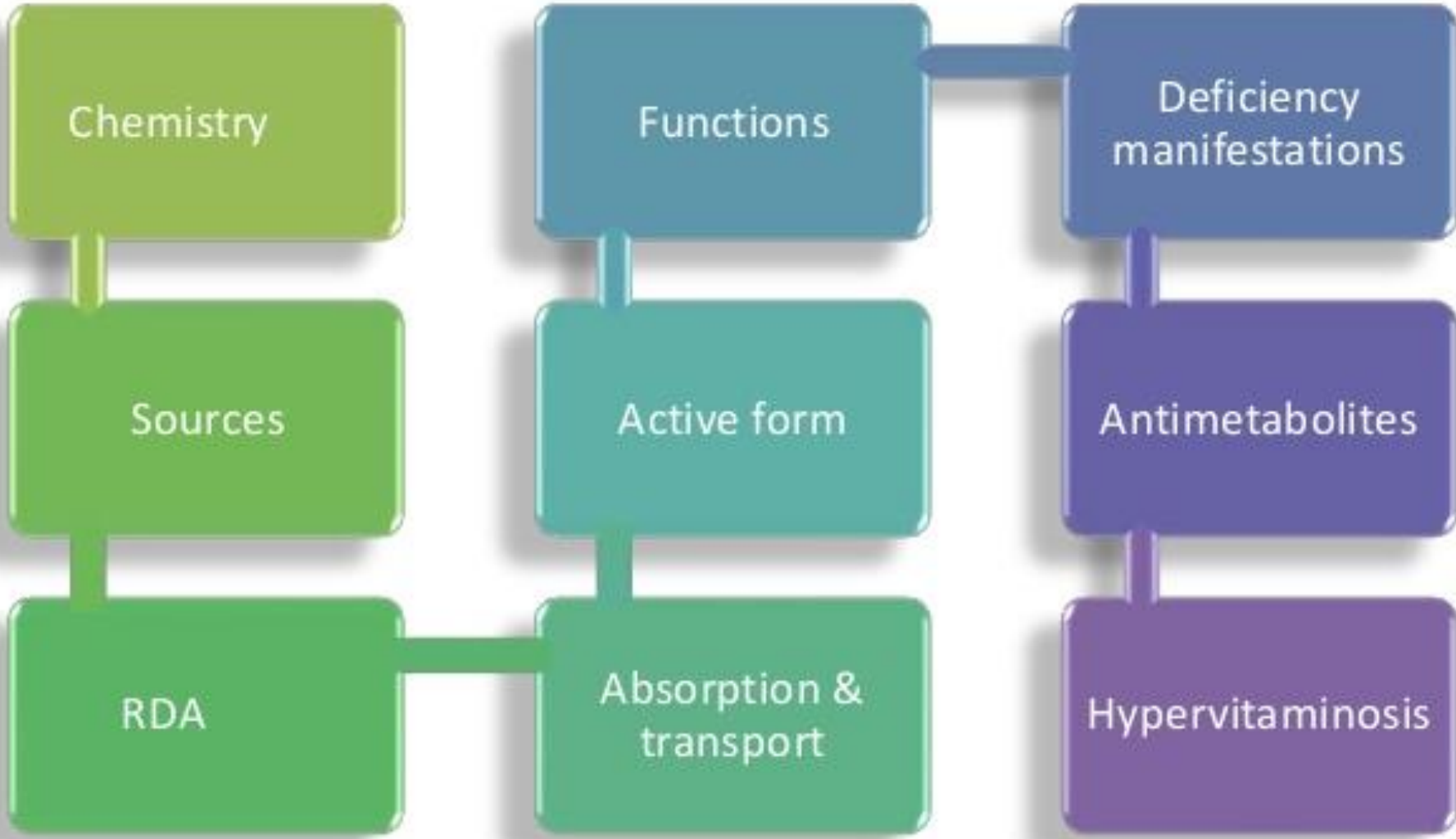
- **CARDIOVASCULAR DISEASES**
- **CATARACTS**
- **DIABETES MELLITUS**
- **CANCER PREVENTION**
- **LEAD TOXICITY**
- **COMMON COLD**
- **TUBERCULOSIS**

QUESTIONS (?)



- **FUNCTIONS OF VIT-C**
- **DEFINE VITAMINS. GIVE RDA, SOURCES, FUNCTIONS AND DISORDER OF VIT-C.**
- **SN ON VITAMIN – C**
- **SN ON SCURVY**

VITAMINS



THANK YOU



QUESTION TIME



- **1-IS VIT-C SYNTHESIZED IN BODY? True or False**
- **2- WHERE DOES THE ABSORPTION OF VIT-C TAKE PLACE?**
 - **A) lungs B) stomach C) intestine D) GIT**
- **3-WHICH ONE IS THE DEFICIENCY OF VIT- C**
 - **A) beriberi B) scurvy C) pellagra D) all of above**
- **4- RDA OF VIT-C IN DURING PREGNANCY DAILY**
 - **A) 10 MG B) 100 MG C) 1000 MG D) None**
- **5) WHAT IS THE BLOOD LEVELS OF VIT-C IN BODY?**
 - **A) 1.0-10 MG B) 0.1-10 MG C) 0.4-1.5 MG D) None**

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