

STUDY MATERIAL :- M.Sc 2 semester

DEPARTMENT :- Home Science

COURSE :- Food & Nutrition

SUBJECT :- Advanced Nutrition

NAME OF THE FACULTY :- DR. Nidhi Chaudhary

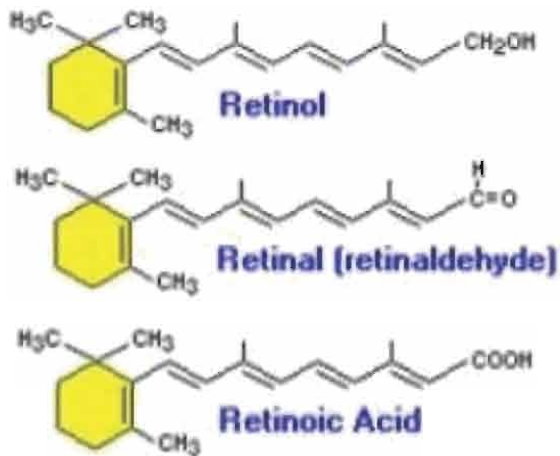
TOPIC NAME :- Unit -5

Vitamin A ( Bioavailability, analysis,& interaction with other nutrients)

### VITAMIN-A:-

Vitamin A is a group of unsaturated nutritional organic compounds, that includes **retinol**, **retinal**, **retinoic acid**, and several provitamin A carotenoids, among which **Betacarotene** is the most important. Its active form is present only in Animal Tissue.





\* DAILY REQUIREMENT:-

- Men & Women = 600 mcg.
- Pregnancy = 800 & 950 mcg.
- Infants = 350 mcg.
- Children = 400 mcg/7-9 age=600 mcg.
- Adolescents = 600 mcg.

Recommended Dietary Allowance (RDA) for Vitamin A as Preformed Vitamin A (Retinol Activity Equivalents)			
Life Stage	Age	Males: mcg/day (IU/day)	Females: mcg/day (IU/day)
Infants (Δ)	0-6 months	400 (1,333 IU)	400 (1,333 IU)
Infants (Δ)	7-12 months	500 (1,667 IU)	500 (1,667 IU)
Children	1-3 years	300 (1,000 IU)	300 (1,000 IU)
Children	4-8 years	400 (1,333 IU)	400 (1,333 IU)
Children	9-13 years	600 (2,000 IU)	600 (2,000 IU)
Adolescents	14-18 years	900 (3,000 IU)	700 (2,333 IU)
Adults	19 years and older	900 (3,000 IU)	700 (2,333 IU)
Pregnancy	18 years and younger	-	750 (2,500 IU)
Pregnancy	19 years and older	-	770 (2,567 IU)
Breast-feeding	18 years and younger	-	1,200 (4,000 IU)
Breast-feeding	19 years and older	-	1,300 (4,333 IU)



### BEST FOOD SOURCES OF VITAMIN C

1. YELLOW BELL PEPPERS		341.3 mg for a large pepper
2. GUAVA		125.6 mg per cup
3. LEMON/LIME		112.4 mg per cup
4. STRAWBERRIES		97.6 mg per cup
5. PAPAYA		88.3 mg per cup
6. BROCCOLI		81.2 mg per cup
7. KALE		80.4 mg per cup
8. GRAPEFRUIT		71.8 mg per cup
9. ORANGE		51.1 mg per cup
10. KIWI		64 mg per cup

#### \* ABSORPTION & BIOAVAILABILITY:-

- Retinol are absorbed effectively except under condition in which malabsorption of fat occurs.
- Betacarotene is an important dietary source of vitamin A for humans. However, the bioavailability and vitaminA equivalency of betacarotene are highly variable and can be affected.
- For the bioavailability of dietary carotenoids, they must be released from the food matrix and incorporated into mixed micelles.
- Food Processing & cooking help release carotenoids embedded in the food matrix and increase intestinal absorption.
- Moreover carotenoids requires the presence of fat in a meal for absorption.
- Carotenoids supplements are more efficiently absorbed than carotenoids in food because they don't need to be released from the plant matrix.
- The absorption of betacarotene from plant sources ranges from 5% - 65% in humans.

#### \* INTERACTION OF VITAMIN- A WITH OTHER NUTRIENTS :-

- The transport & utilization of vitamin a is dependent upon several Vitamin A binding proteins.
- Sufficient dietary intake of protein is required for the manufacture of these binding proteins.
- Adequate intake of dietary fat & zinc is necessary for the absorption & utilization of vitamin a.
- It impacts the metabolism of iron as it's deficiency causes anaemia.
- Excess vitamin a interferes with the absorption of vitamin K, fat soluble vitamins are necessary for blood clotting.

#### \* ANALYSIS:-

- Vitamin A is a fat soluble vitamin. It is determined by using high performance liquid chromatography

(HPLC) method. Detection is carried out using fluorescence detector (FLD).

• It is not always straight forward, they are a very desperate group of chemical & a thorough knowledge of their chemistry is needed in order to use the correct method for their determination.

• Vitamin Analysis can be an important part of =

> Product Development.

> Nutritional Analysis.

> Understanding the effects of food processor on vitamin content.



#### \* FUNCTIONS OF VITAMIN - A:-



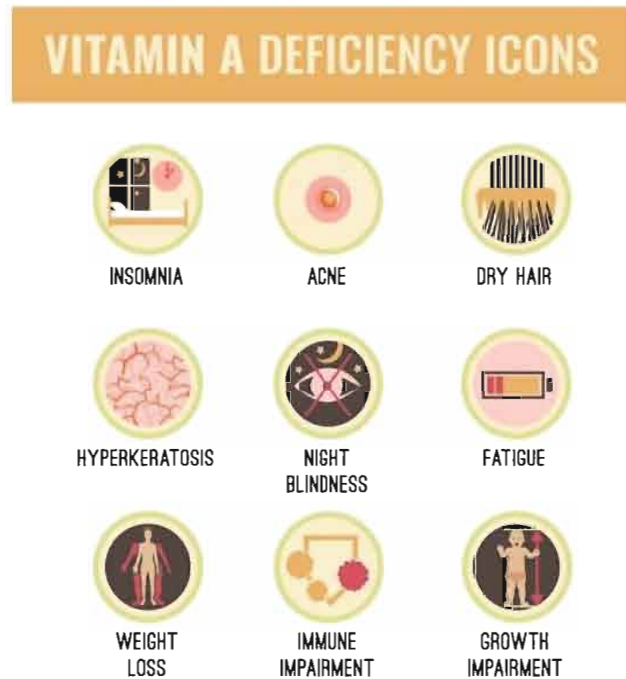
• For normal vision.

• For good health of epithelial tissue.

• Promote physical development.

- Assist in maintaining good health for reproductive organs.
- For healthy skin.
- For keeping healthy teeth.
- Resistant of infection.
- For good health of White Blood Cells

\* DEFICIENCY OF VITAMIN-A:-



- Stones in kidney.
- Phrynoderma.
- Decreasing reproductive power.
- Inactive mucous membrane.
- Nightblindness.
- Xerophthalmia.
- Bitot's spot.
- Xerosis conjunctiva.
- Xerosis cornea.

• Kertomalacia.