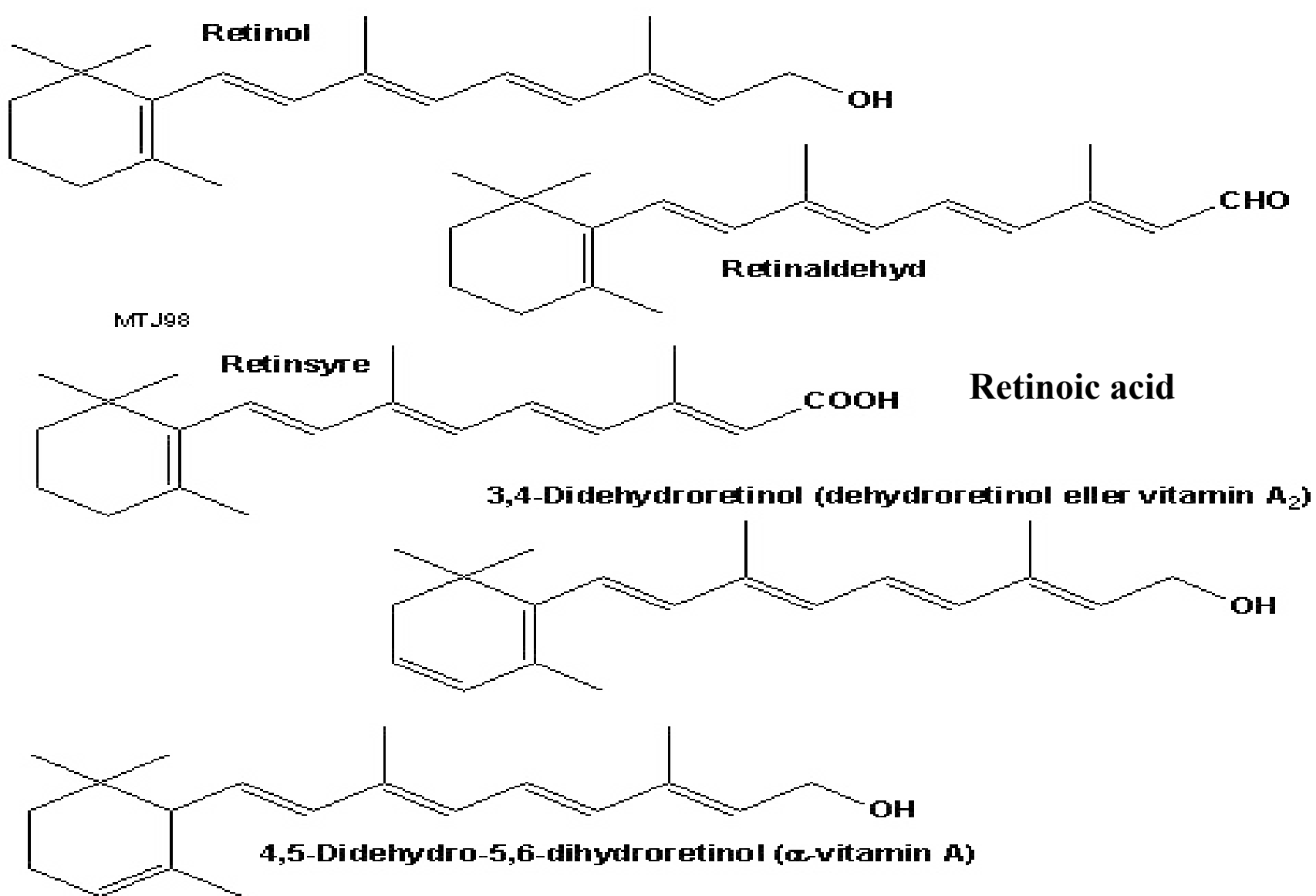


VITAMIN A

CHEMISTRY

- ▶ **Common structural unit**
- ▶ A trimethyl cyclohexenyl ring
- ▶ An all trans configured chain with four double bonds.



TYPES

- ▶ Retinol - when R is -CH₂OH
- ▶ Retinal - when R is -CHO
- ▶ Retinoic acid -when R is -COOH

FORMS OF VITAMIN A

- ▶ VITAMIN A1 - found in major species of animals.
- ▶ VITAMIN A2- found in fresh water fish.
- ▶ NEOVITAMIN A- stereoisomer of vitamin A1

COMPARISON

VIT A1	VIT A2
1. Found in major species of animals	1. Found in freshwater fish
2. Only one double bond in beta ionone ring.	2. Two double bonds in beta ionone ring
3. More potent	3. Activity 40% of A1
4. Can be obtained through carotenes	4. Carotenes can not give rise to vitamin A2

DIETARY SOURCES

- ▶ Animal sources- liver oil, butter, milk, cheese, egg- yolk,
- ▶ Plant sources- tomatoes, carrots, green yellow vegetables, spinach and fruits like mangoes, papayas, corn, sweet potatoes

Recommended Daily Allowance

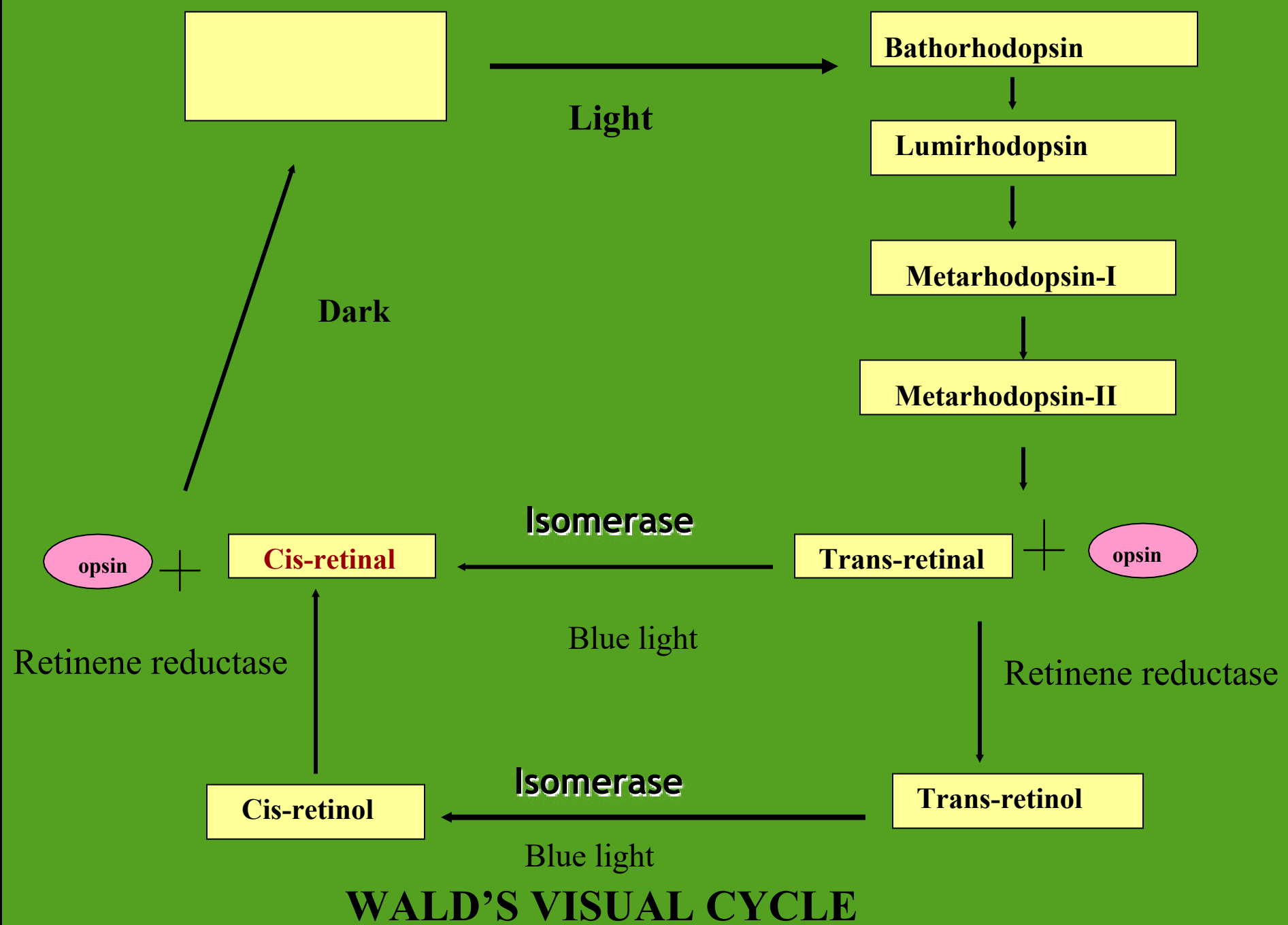
- ❖ Adult male- 3000 IU
- ❖ Adult female- 3000 IU
- ❖ Recommended daily allowance is 6000IU
- ❖ 1 IU=0.3 micro gms of Retinol

ABSORPTION, STORAGE & TRANSPORT

- ▶ ABSORBED IN SMALL INTESTINE
- ▶ FREE retinol is absorbed
- ▶ Retinol is transported in association with a specific retinol binding protein .
- ▶ Stored as retinyl ester (normally as retinyl palmitate)
- ▶ Retinoic acid is transported in association with a specific retinoic acid binding protein .

ROLE IN VISION

- ▶ Overall mechanism through which it works is known as Wald's visual cycle / rhodopsin cycle.
- ▶ Rods contain -photosensitive pigment called rhodopsin or visual purple.
- ▶ Visual purple -opsin
retinine/retinal or
retinaldehyde



EPITHELIAIZATION

- ▶ Epithelial structures show gross structural changes in deficiency
- ▶ Skin-dry, rough & scaly
- ▶ Cornea-epithelium keratinised, opaque
- ▶ Bitot's spot
- ▶ Lacrimal glands-similar changes leading to dryness of conjunctiva & cornea (xerophthalmia)
- ▶ Respiratory tract -keratinization- susceptibility to infection.

BONE AND TEETH FORMATION

- ▶ Deficiency results in slowing of endochondral bone formation and reduced osteoblastic activity.
- ▶ Thinning of enamel and deposit of chalky deposit on the surface of the teeth.

ROLE IN REPRODUCTION

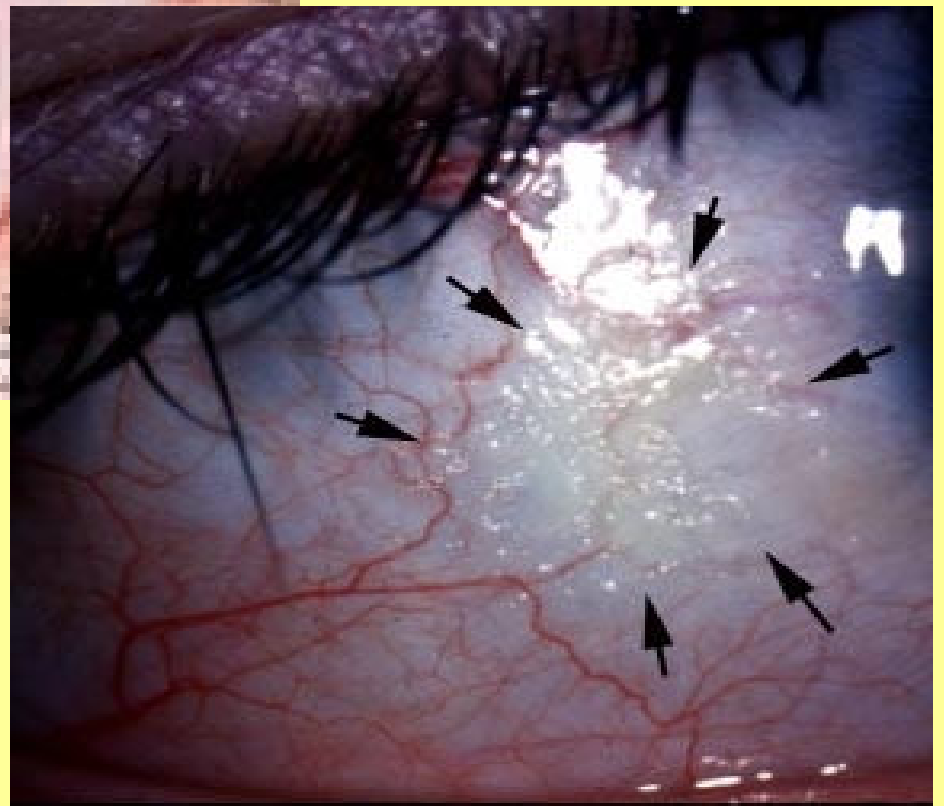
- ▶ EXPERIMENTS ON RATS-
- ▶ Deficient male-ill developed testes, immature sperms
- ▶ Deficient female-unable to carry pregnancy to full term .
- ▶ ROLE IN METABOLISM-
 - ▶ Protein synthesis
 - ▶ DNA metabolism

Beta-Carotene as an antioxidant and anticancer

- ▶ In addition to its antioxidant property, Beta- Carotene also has been shown to have anticancer action.
- ▶ It increases the number of receptors on WBC for a molecule known as “major histocompatibility complex I”.

OCULAR MANIFESTATIONS- VITAMIN A DEFICIENCY

- ▶ Night blindness/ Nyctalopia-first symptom
- ▶ Conjunctival xerosis-first clinical sign
- ▶ Bitot’s spot-frequently bilateral
- ▶ Corneal xerosis-cornea dry & nonwetable
- ▶ Keratomalacia-ulceration of cornea.



Extra ocular manifestations vitamin A deficiency

- ▶ Follicular hyperkeratosis
- ▶ Anorexia
- ▶ Growth retardation
- ▶ Increased respiratory & intestinal infection

HYPER VITAMINOSIS A

- ▶ Alteration of skin
- ▶ Hepatic dysfunction
- ▶ Headache
- ▶ Drowsiness
- ▶ CHRONIC EFFECTS-
 - ▶ Roughening of skin, desquamation
 - ▶ Irritability
 - ▶ Coarsening of skin & falling of hair
 - ▶ Anorexia
 - ▶ Wt loss

THERAPEUTIC USES OF RETINOIC ACID

- ▶ Oral leukoplakia
- ▶ Promyelocytic leukaemia

MCQ

- ▶ Worldwide, the most common vitamin
- ▶ deficiency is that of
- ▶ (A) Ascorbic acid (B) Folic acid
- ▶ (C) Vitamin A (D) Vitamin D

- ▶ Vitamin A or retinal is a
- ▶ (A) Steroid
- ▶ (B) Polyisoprenoid compound containing a
- ▶ cyclohexenyl ring
- ▶ (C) Benzoquinone derivative
- ▶ (D) 6-Hydroxychromane

- ▶ **β-Carotene, precursor of vitamin A, is**
- ▶ **oxidatively cleaved by**
- ▶ (A) β-Carotene dioxygenase
- ▶ (B) Oxygenase
- ▶ (C) Hydroxylase
- ▶ (D) Transferase

- ▶ **The international unit of vitamin A is**
- ▶ **equivalent to the activity caused by**
- ▶ (A) 0.3 μg of Vitamin A alcohol
- ▶ (B) 0.344 μg of Vitamin A alcohol
- ▶ (C) 0.6 μg of Vitamin A alcohol
- ▶ (D) 1.0 μg of Vitamin A alcohol

- ▶ **Retinol is transported in blood bound to**
- ▶ (A) Aporetinol binding protein
- ▶ (B) α 2-Globulin
- ▶ (C) β -Globulin
- ▶ (D) Albumin

- ▶ **Deficiency of Vitamin A causes**
- ▶ (A) Xerophthalmia
- ▶ (B) Hypoprothrombinemia
- ▶ (C) Megaloblastic anemia
- ▶ (D) Pernicious anemia

- ▶ **Retinal is a component of**
- ▶ (A) Iodopsin (B) Rhodopsin
- ▶ (C) Cardiolipin (D) Glycoproteins

- ▶ **An important function of vitamin A is**
- ▶ (A) To act as coenzyme for a few enzymes
- ▶ (B) To play an integral role in protein synthesis
- ▶ (C) To prevent hemorrhages
- ▶ (D) To maintain the integrity of epithelial tissue

- ▶ Conversion of all-trans-retinal into alltrans-
- ▶ retinol requires
- ▶ (A) NAD (B) NADH
- ▶ (C) NADP (D) NADPH

- ▶ Two molecules of vitamin A can be formed
- ▶ from 1 molecule of
- ▶ (A) α -Carotene (B) β -Carotene
- ▶ (C) γ -Carotene (D) All of these

Thank You

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