

Membrane Receptors

→ Ex: LDL receptors

cholesterol  
in Blood



cholesterol  
protein

\* usually integral proteins

\* Can bind to inhibitor  
or poisons.

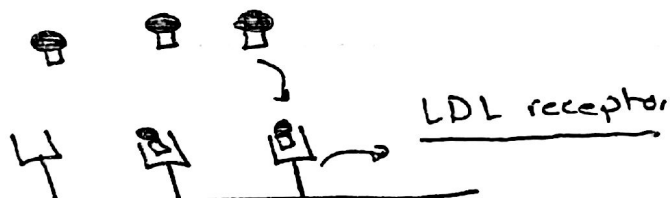
\* open to outside.

LDL: low Density Lipoprotein

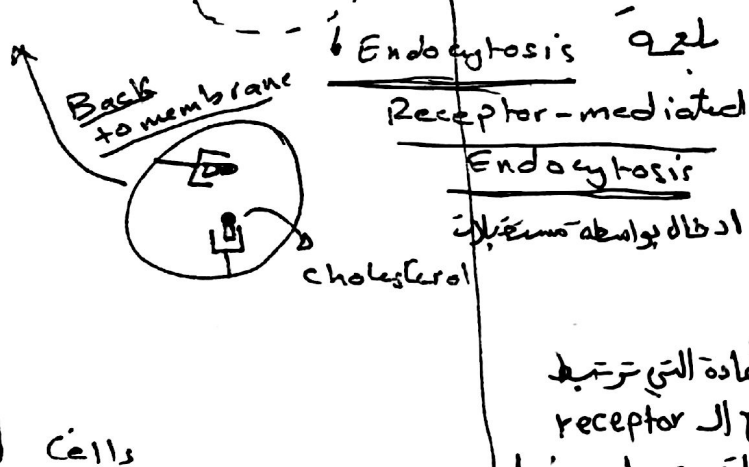
Receptors are usually  
proteins

Blood  
vessel

cholesterol + Protein

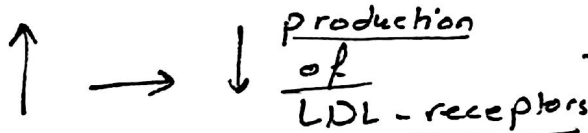


Cholesterol + Unsaturated  
\* Cholesterol F.A  
is stored in the  
cell as  
cholesteryl-ester  
which is  
highly hydrophobic



الخلايا  
ادخال المواد التي ترتبط  
مع ال receptor  
Ligand

cholesterol  
inside  
cell



LDL accumulate in Blood

MI

Myocardial Infarction  
الاحتشاء القلبي

Ans: Receptors are similar to Enzyme because they have binding site for specific molecules just like enzymes but, studying Receptors is more difficult than studying Enzymes for the following reasons:-

- ① Receptors are tightly bound integral proteins which denatured when removed from the membrane
- ② Receptors are usually Oligomeric
- ③ Receptors have high molecular weight
- ④ their number is very few in the cell.

Q: Receptor level in the cell membrane is usually remain constant

True

False

Q: which of the following is not true?

- a. Receptors are often invaginated<sup>into</sup> into the cell after Binding to their specific molecule.
- b. a given Receptor type is present at a constant level on the outside of the cell
- c. In certain disease state, the level of a given receptor is increased or decreased
- d. Binding of receptors to ligand sometimes shows hyperbolic binding curves.

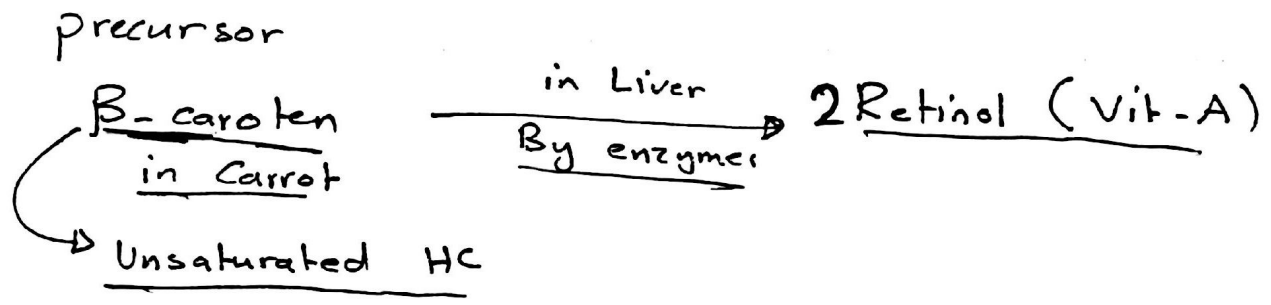
Soluble Vitamins

K E D A ك د ا  
 (High amount of these can be ~~toxic~~ dangerous)

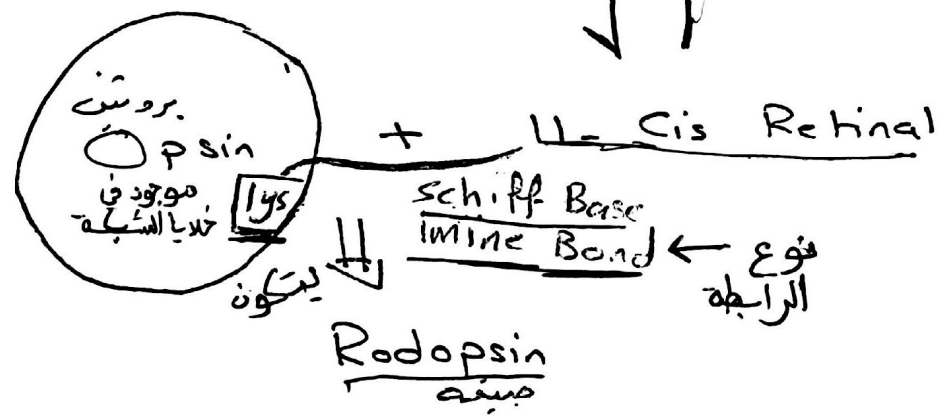
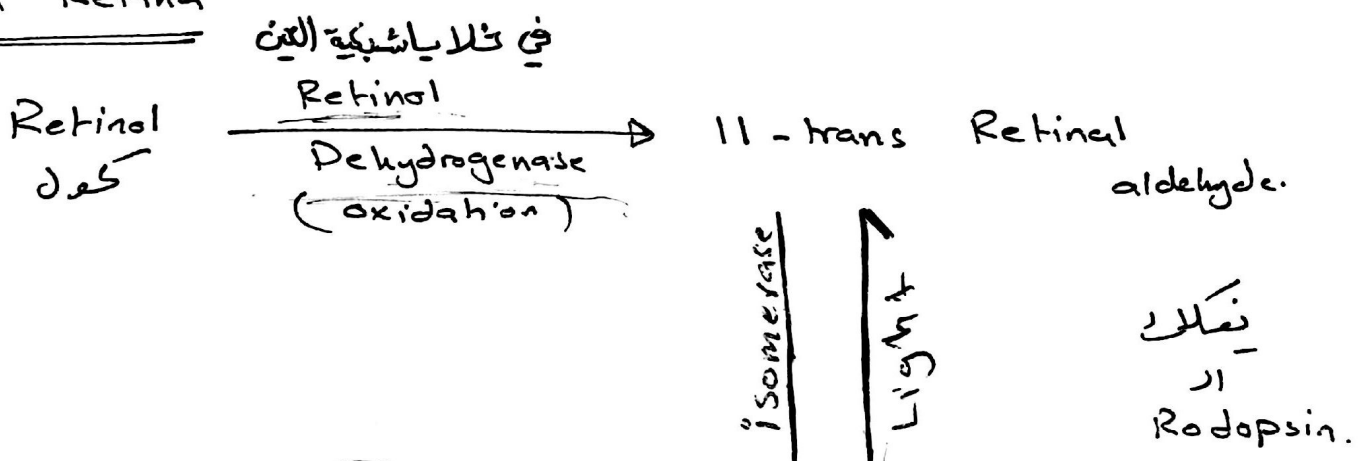
\* Can be stored in the body  
 not like water soluble vitamins.

Vitamin A (Retinol) الاسم اللطفي

↳ important for photochemical reaction in Retina الشبكة العين  
 for vision التقاسم (عينية)



In Retina



11-Cis Retinal considered as prosthetic group in Rodopsins.

\* Rodopsin is a pigment in the Retina that Break (Bleach) when exposed to light

Retina

نوعين

↓ Rods

↓  
One type of Opsin

↓  
One type of rodopsin

↓  
important for Dim Light vision  
الرؤية الليلية

↓ Cones

↓  
Several types of opsin

↓  
Several types of rodopsin

↓  
important in Bright light & color vision  
رؤية الاضواء

↓ Vit A → Night blindness or total blindness

↑ Vit A → Bone fragility.

\* Vitamin A found in the cell membrane of Retina's cells.

Q: which of the following does not belong in the list?

- a. Retinol
- b. Vitamin A
- c. betacarotene
- d. cholesterol

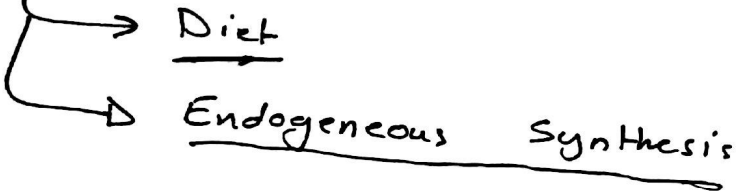
Q: The key reaction of eyesight (in dim light) involving Vitamin A is :-

- a. Reaction of protein complex called Rodopsin
- b. All cis ~~isomers~~ isomerization of a double bond
- c. Bleaching of a pigment in the retina
- d. a + b
- e. all of these

Q: This amino-acid of opsin bind to 11-trans retinal

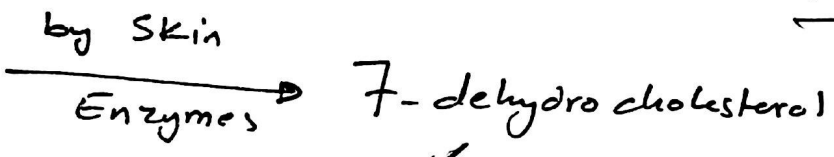
- a. lysine
- b. leucine
- c. Histidine
- d. Serine

Vitamin D



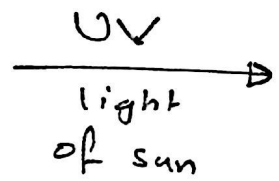
يُنتج داخل الجسم

Precursor is Cholesterol



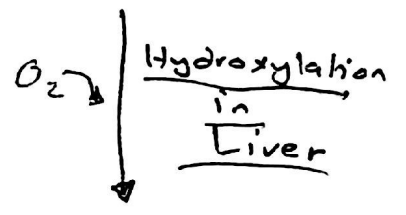
In Skin  
Epidermis  
Dermis

7-dehydrocholesterol

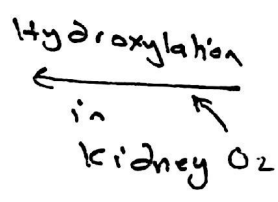


the most abundant form is Blood

Cholecalciferol (Vit D<sub>3</sub>)



more active  
25, hydroxy-cholecalciferol  
more active



1,25 dihydroxy-cholecalciferol

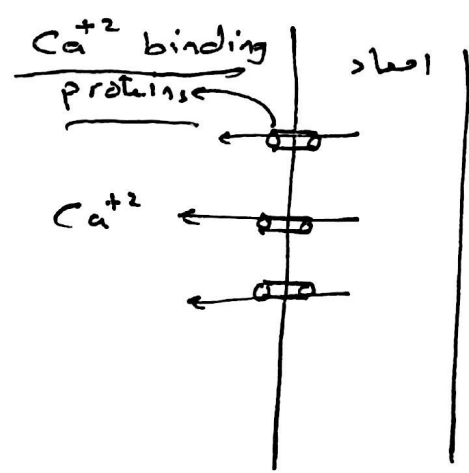
most active form of Vit D

Function of Vit D

→ control Ca<sup>+2</sup> & phosphorus concentration in our bodies

↑ Ca<sup>+2</sup> absorption in intestine

important in bone rigidity



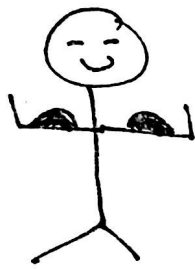
↓ Vit D → Rickets  
الكساح: أوجع العظام

Vitamin E

→ active form: α-tocopherol = vitamin E

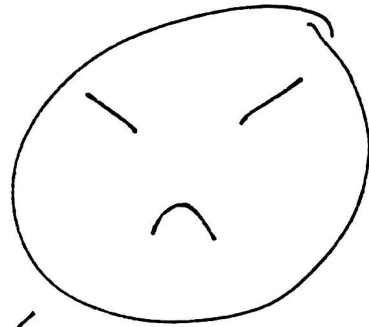
Function :- Anti-oxidant " good reducing agent "

مضاد لعوامل  
الأكسدة



Vit E

reduce  
E



Oxidizing agent

Ex:- Free-radicals

النظائر الحرة  $O^{\bullet}$  unpaired  
E

تؤكسد

oxidize  
proteins & DNA

→ Aging & Cancer

Vit E : Antiaging / Anticancer prophylaxis  
وقاية

In Rats

Vit E important for reproduction

& prevent Mascular dystrophy.  
العضلات (موت)  
ضمور

\* Vitamin E is a component of cell membrane

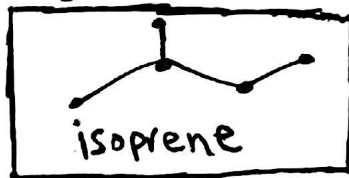
Vitamin K

Danish Koagulation

↳ important in Coagulation (blood clotting)

many forms: differ in # of degree of unsaturation of isoprene unit

5-C unit



Eg:

Vit K<sub>1</sub>: phylloquinone = has 4 isoprene units  
 ↳ 3 Sat      1 Unsat

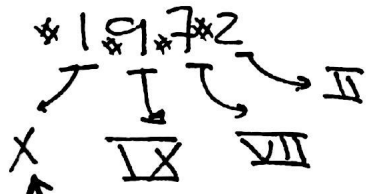
Vit-K<sub>2</sub>: Menaquinone = 8 unsaturated isoprenes.

Vit K required for Clotting

function of clotting factors

important for activation of

clotting protein ← Prothrombin

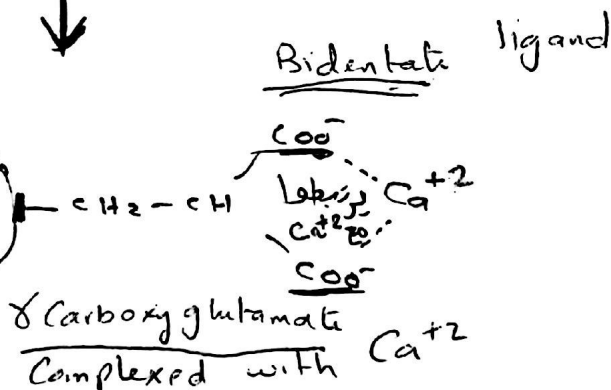
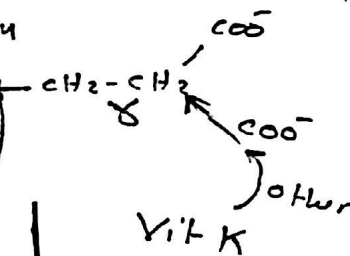
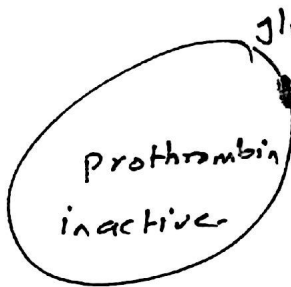


↑ means 10 here

\* ↓ Vit K → Bleeding

\* warfarin & Dicumarol  
anticoagulant

Vit-K antagonist





These two lipid vitamins are often found in membranes :-

- a. A and D
- b. A and E
- c. D and E
- d. E and K
- e. None of these is correct pair

Q:- The following lipid vitamin is often used to preserve foods from spoilage :-

- a. A
- b. K
- c. E because it is antioxidant
- d. D
- e. none of these preserves food

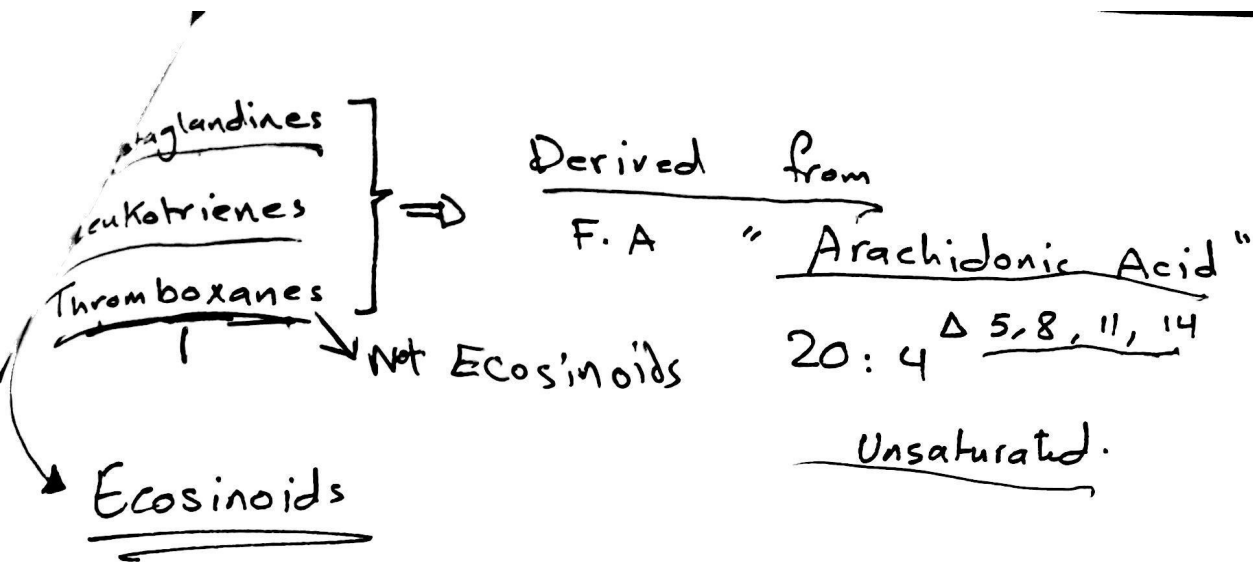
Q:- Vitamin E has all of the following properties Except :-

- a. it's an antioxidant
- b. it can be made in the sunshine
- c. it's essential for at least some mammal's fertility
- d. it's often component of membranes
- e. all are true.

Q: there are likely to be huge stores of lipid vitamins in healthy animals

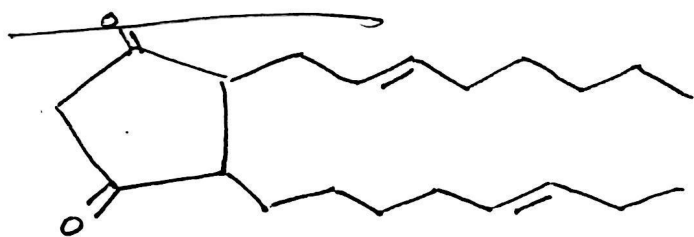
True

False



## 1] Prostaglandines (PGE)

- all types of prostaglandines have 5-membered ring, and differ from one another in number and position of double bonds



Functions of prostaglandines

- ① Control Blood Pressure
- ② Contraction of smooth muscle in blood vessels
- ③ Induction of inflammation

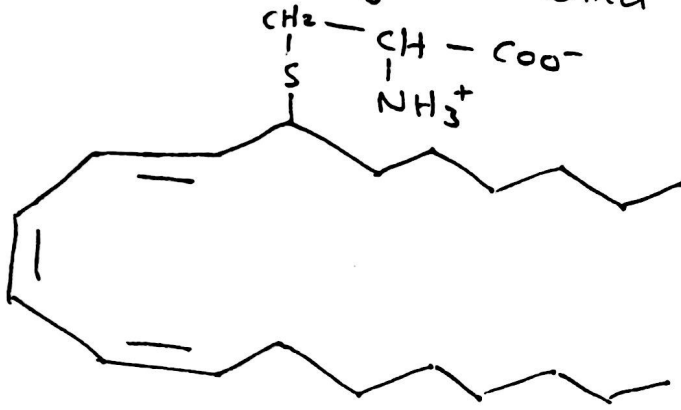
So any drug inhibit production of prostaglandines will act as anti-inflammatory agent such as

- Aspirin
- Cortison

- ④ Inhibit platelets aggregation (prevent clotting)
- ⑤ Antitumor / Antiviral

# Leukotriens

- they are found in Leukocytes (WBCs)
- Ex: leukotrien C, it has 3 conjugated double bonds and Cystein bind to it



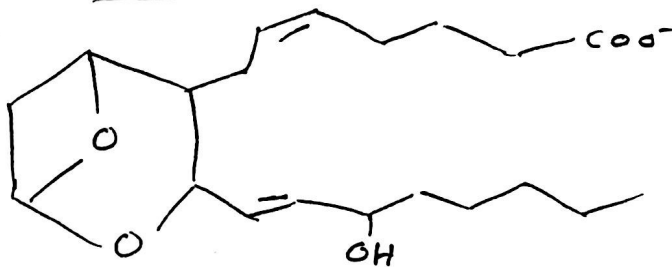
## Functions

- ① Induction of inflammation
- ② Contraction of smooth muscles in Lungs causing asthma or allergy

So, any drug inhibit the synthesis of leukotriens or block their receptor can be used to treat asthma

## [3] Thromboxanes

• Ex: Thromboxane A<sub>2</sub> (TxA<sub>2</sub>), all contain cyclic Ether



## Functions

- ① Induce inflammation
- ② Induce platelet aggregation (clotting)

③ Smooth muscle contraction