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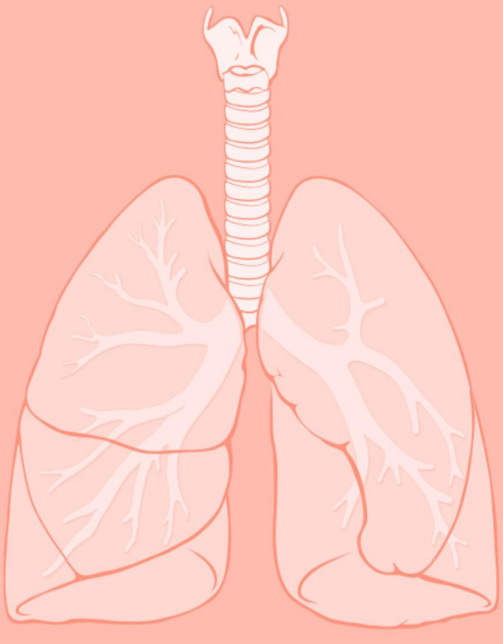
SAQs Revision



- This file for revision and some possible SAQs questions
- Beware the this file anly for revision , you should study all the lectures

Respiratory Block - Biochemistry Team

Globular proteins

Give examples of globular proteins and enumerate their functions?

1) Hemoglobin. gas transportation (O2 and CO2)
2) Myoglobin, O2 storage and supply in skeletal and cardiac muscles
3) **γ-globulins (immunoglobulins) , Immune function**
4) Enzymes, catalysis (speed up) of biochemical reactions

Enumerate normal and abnormal hemoglobins?

Normal	Abnormal
1- HbA (Most abundant) 2- HbA2 3-HbA1c 4-HbF	1- Carboxy Hb (not carbaminohemoglobin) 2- Met Hb 3-Sulf Hb

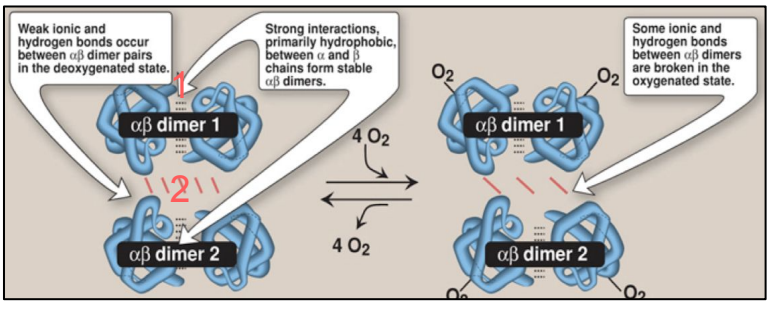
Briefly describe the structure of Hb regarding the picture below

There are 2 bonds in the HbA structure

1) Strong hydrophobic bonds between the subunits (called a dimer)

2) Weak ionic and hydrogen bonds between the two dimers

Two subunits → dimer → strong hydrophobic bond
Two dimers → weak ionic hydrogen bond



Which enzyme might lead to Met-Hb when it's deficient?

NADH-cytochrome B5 reductase

Enumerate the types of Immunoglobulins?

IgM, IgA, IgG, IgE, IgD

What are globular proteins ?

Amino acid chains folding into shapes resembles the spheres

What are fibrous proteins and give one example of them ?

Insoluble structural proteins, Collagen

What is the difference Between the Taut (T) and Relaxed(R) Hemoglobin structures ?

Taur- represents deoxyhemoglobin

Relaxed- Represents Oxyhemoglobin

Explain why is the Oxyhemoglobin called Relaxed?

when O2 bind to the HbA will break some ionic & dimer pairs in the deoxygenated state

Define Hemoglobinopathies?

Disorders of Hb are caused by Synthesis of structurally abnormal Hb and/or Synthesis of insufficient quantities of normal Hb

Globular proteins

Compare between hemoglobin and myoglobin?

	Hemoglobin	Myoglobin
Structure	4 Subunits Carries 4 molecules of O_2 (8 atoms)	1 Subunit Carries 1 molecule of O_2 (2 atoms)
Location	Blood	Cardiac & Skeletal muscle
Function	Gas transportation (O_2 & CO_2)	Storage & Supplying of O_2
Heme molecules	Four	One
Affinity for O_2	Lower	Higher

You have to memorize this table

Disease	Mutation	Causes
Sickle cell (HbS) disease	1-single mutation in β -globin gene 2-Glutamic acid replaced by valine	Sickle cell anemia
Hemoglobin C disease	1- single mutation in β-globin gene 2- Glutamic acid replaced by **lysine**	mild form of hemolytic anemia
Methemogl-obinemia	oxidation of Hb to ferric (Fe3+) state	Chocolate cyanosis
α- Thalassemia	Synthesis of α-globin chain is decreased or absent	mild to moderate hemolytic anemia
β - Thalassemia	Synthesis of β-globin chain is decreased or absent	Severe anemia

Phospholipids of clinical significance

Define phospholipids in a simple way and classify them accordingly

Amphipathic compounds that contain an alcohol group attached to either Diacylglycerol or Sphingosine

Classified into : 1) Glycerophospholipids (The backbone is glycerol) 2) Sphingophospholipids (the backbone is sphingosine)

What's the role of phosphatidylcholine (PC) in lung surfactant?

Secrete DPPC & proteins which make up surfactant thus reducing surface tension, prevent lungs from collapsing and reduces pressure needed to re-inflate alveoli

What's the role of Phosphatidylinositol (PI)?

Cell signaling

What's the role of Phospholipase C in cell signaling?

Cleaves PIP2 into DAG & IP3

Phospholipids are degraded by?

Phospholipases

What are the types of phospholipase and list down some of their features

Phospholipases A1: Present in **all** mammalian tissues
Phospholipases A2: Present in **many** mammalian tissues, **releases arachidonic acid**
Activated by) Trypsin
Inhibited by) Glucocorticoids
Phospholipases C: Present in liver and some bacteria, cleaves PIP2 into DAG & IP3 to produce cell signal
Phospholipases D: found in plant tissues

Give some glycerophospholipids examples ?

Remember : Getting Early Calls Is Sweet

Glycerol + PA →	Phosphatidylglycerol (PG)	Lung surfactant
Ethanolamine + PA →	Phosphatidylethanolamine (PE) (cephalin)	membrane fusion during cell division
Choline + PA →	Phosphatidylcholine (PC) (lecithin)	Lung surfactant
Inositol + PA →	Phosphatidylinositol (PI)	Cell signaling
Serine + PA →	Phosphatidylserine (PS)	Cell signaling & blood clotting
Cardiolipin →	maintenance of respiratory complexes of electron transport chain	
Platelet activating factor (PAF) →	Triggers thrombotic and acute inflammatory reaction	

Mention the structure of Lipoprotein particles and what does the outer and inner cores consist of?

The **outer core** of lipoprotein particles is hydrophilic and it consist of phospholipids and free(unesterified) cholesterol
The **inner** core is hydrophobic and it consist of triacylglycerols and cholesteryl esters

What's the function of phospholipase enzymes ?

1-Digestion of phospholipids by pancreatic juice
2- remodeling of phospholipids
3- Production of second messengers
4-Pathogenic bacteria produce phospholipases to dissolve cell membranes and spread infection

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Special thanks to the amazing academic leader : shayma 💞

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