

## ***HLS mid Pp collections***

### **Mid term Hematology-2011**

The correct statment:

Maximal Activation of cytotoxic T-Cells involves both interactions through MHC-I & MHC-II

**1) about the thalassemia major which of this is not true :**

a) HbA2 increases in B thalassemia

b) HbF increase in B thalassemia

c) Hb bart's increase in a thalassemia

>>> d) in a thalassemia major 3 or 4 copies are mutated but in B thalassemia major 2 copies are mutated

**2) regarding the binding of 2,3 BPG , it makes a cross linking by which subunits:**

>>B1 , B2 subunits

**3) The wrong statment:**

>> Macrophages secretes IL-2 that stimulates T-cells

**4) monocytes : phagocytic cells**

**5) F XIII (Fibrin Stablizer) >> the wrong about it was:**

related only to the Intrensic pathway of coagulation (( it's related to both; Intrensic & extrensic ones))

**6) An amino acid substitution in one of chains of hemoglobin could lead to hemoglobinopathy**

**(hemoglobin with abnormal function) for any of the following reasons EXCEPT:**

a) An increase in the 2,3-BPG binding affinity

b) A change in the affinity of subunits contact

c) A change in the solubility properties of reduced hemoglobin

d) An increase in the hydrophilic property of hemepocket

>>> e) An increase tendency of the heme iron to exist in the reduced state.

**7) Heme oxygenase:**

a) Produces carbon dioxide

b) Can oxidize the membrane bridge between two pyrrole rings of heme

>> c) Requires molecular oxygen

d) Produces bilirubin

e) two of the above are correct

**8) Which of the following about Haemophilia-A and Von-Willibrand inheritance is NOT TRUE:**

a) Von-Willibrand is a haemorrhagic disease

b) Haemophilia-A is usually confined to males

c) Haemophilia-A is inherited as a sex-linked abnormality

d) Haemophilia-A passes on from mother to child

>>> e) Von-Willibrand disease also appears in males only.

**9) A 25 year old female with red cell count of  $3.2 \times 10^6/\mu\text{l}$ . Haematocrite of 37 and haemoglobin concentration of 120g/l**

**According to the above parameters.**

**Which of the following statements is TRUE?**

>>> a) The RBCs are macrocytic, normochromic

b) The RBCs are normocytic, normochromic

c) The RBCs are microcytic, normochromic

d) The RBCs are microcytic, hypochromic

e) The RBCs are macrocytic, hyperchromic

**10) A guy with Chest Stab came to the hospital, his lab findings with regard to his RBS's are:**

>> Normocytic Normochromic RBC's

**11) Which of the following statements about iron is NOT TRUE:**

a) More than 65% in haemoglobin

>>> b) The iron daily intake is usually equal to daily iron requirement

c) Women have less store of iron than man

d) Iron absorption mostly at upper part of jejunum

e) There is more iron absorption from meat and meat products than that from vegetables

**12) A man of blood group A has 2 children, plasma from the blood of one of them agglutinates his red cells while that from the other does not. All of the following are TRUE EXCEPT ONE:**

a) Mother of 'agglutinating' child could be group B

b) Father must be heterozygous group A

>>> c) Children must have different mothers

d) 'agglutinating' child could be group O

e) 'Non-agglutinating' child could be group AB.

**13 )which is true:**

>>> if an antigen cross the blood- thymus barrier it will induce tolerance to that specific antigen.

**14) which of the following cells their granules contain peroxidase and histaminase:**

>>> eosinophile.

**15) HbF Wrong statment :**

It has affinity for O<sub>2</sub> similar to that of Myoglobin which in both more than the Hemoglobin affinity for O<sub>2</sub>.

**16) Which statment is False about spleen :-**

Splenectomy Affect Cell mediated , and Antibody mediated Immune response .

**17) about oxygen - Hb curve, which is wrong:**

>>> the % saturation of Hb with oxygen is dependent on Po<sub>2</sub> as well as Hb concentration.

**18) which of the following is not required for clot formation: (1) vitamin K (2) Ca (3)... (4)... (5)**

**fibrinogen**

>>> 3 and 4

**19)which of the following is true:**

>>> activated IRE-BP increase levels of transferrin receptor.

**20)which of the following is true about transferrin:**

a- binds only 2 molecules of iron

b- for transport and storage of iron in the blood

**21) a patient has hemorrhage , he loses 1.5 L of blood , when his blood is tested :**

a) normochromic , normocytic anemia

**22)about G6PD deficiency which is wrong:**

>>>mostly result from large deletions or frameshift mutation

**23) AIDS progression : CD4+ count decreases and viral load increases ..**

**24) an increase in 2,3 BPG and decrease in ATP indicate which of the following enzyme deficiency:**

>>a- Pyruvate kinase

b- G6PD

**25) in chronic myeloid leukemia the most apparent cell is the myeloblast (wrong)**

**26) thalassemia major is associated with all of the following except:**

a- increase HbA2 in beta thalassemia

b- increase HbF in beta thalassemia

c- HbH in beta thalassemia

d- Hb barrt in alpha thalassemia

e- 3 or 4 genes deficient for alpha to be major, and only 2 for beta to be major

**27) a man with blood group A , has 2 children ,, one of them agglutinates his cells & the other one doesn't ,, which statement is false :**

a- the father must be heterozygous

>>>b- children must have different mothers

**28) heme oxygenase :**

need molecular oxygen

**29) all of the following favors the transformation from the T form to the R form of hemoglobin except:**

a- decrease Pka

b- NO favors binds to the oxy form

**30) all the following is true about bacteremia except :**

a- mostly transient

b- asymptomatic

>>>c- high fatality

d- mostly by gram -ve bacteria

**31) in the second stage of iron deficiency:**

>>..... serum ferritin (low), TIBC (increase)

**32) which of the following is a rare cause of anemia:**

>>>a- vit B 12 deficiency

b- folate deficiency

c- iron absorption defect

33) which of the following isn't a correct match

		Haemophilia A	Von-Willibrand Disease
(a)	Inheritance	Sex-linked	Autosomal
(b)	Bleeding Time	Normal	Prolonged
(c)	VIII:C	Low	Low
(d)	VIII:R:Ag	Normal	Low
<u>(e)</u>	<u>Aggregation</u>	<u>Normal</u>	<u>Normal</u>

34) a 62 year old male, presented with microcytic hypochromic anemia, which of the following is the most common cause of the condition:

>>>a- GI bleeding

b- malabsorption

35) which one of these Hemoglobins isnt normally found in our body ?

Hb H

36) which of the following is not true about fetal hemoglobin:

a- produced only in fetus.

b- carries 8 atoms of oxygen

37) which of the following statments most describe why RBC's are efficient in carrying O2 :

(1)contains hemoglobin

(2 ) no nucleus

(3 ) biconcave shape

(4) 4 oxygen molecule in each Hb inside the cell

(5) have many mitochondria to produce ATP

ANSWER IS (1+2+3 +4 )

38) which of the following combinations isn't true :

a- factor 3 .. tissue thromboplastin ...extrinsic pathway

b- factor 10 ... steuart factor .....both

c- factor 13 ..... fibrin stabilizing factor .... intrinsic

d- factor 12.....hageman factor .....intrinsic

answer >> c

**39) commonly used techniques for infectious mononucleosis include all of the following except:**

a- atypical lymphocytes.

b- heterophile antibodies

c- specific antibodies

d- detection of viral genome by molecular techniques

>> e- viral isolate in culture.

**40) which of the following can't be seen in a patient of pure red cell aplasia:**

>>> skin rash and Arthralgia .

**41) a woman with RBC count  $3.2 \times 10^6$  /microliter**

**HcT= 37%**

**HB concentration is 120 g/l**

**which of the following best describes her RBC's ?**

>> RBC's are macrocytic normochromic

**42) regarding origin of blood infection, which of the following is most commonly to contribute:**

a- streptococcus pneumonia.

<<<b- E coli.

c- staphylococcus aureus.

d- streptococcus faecalis

e- bacteroides fragilis.

**43) all of the following is true about septic shock except:**

a- kills about 50% of their victims.

<<< b- most common victims are adults.

c- involve the development of metabolic acidosis.

d- decrease effective blood flow.

e- decrease oxygen consumption

**HLS Midterm (2012-2013)**

**PHYSIO**

**1. Which of the following cells increase in level during allergic reactions?**

- (a) Neutrophils
- (b) Basophils
- (c) Eosinophils
- (d) Lymphocytes
- (e) Monocytes

**2. Which of the following is the correct pathway when one lymph node sends a lymphocyte to educate another lymph node about antigenic stimulation?**

- (a) Post-capillary venules → Thoracic duct → Systemic Circulation → Efferent lymphatic vessel
- (b) Afferent lymphatic vessel → Post-capillary venules → Efferent lymphatic vessel
- (c) Afferent lymphatic vessel → Thoracic duct → Systemic Circulation → Efferent lymphatic vessel
- (d) Afferent lymphatic vessel → Thoracic duct → Efferent lymphatic vessel
- (e) Efferent lymphatic vessel → Thoracic duct → Systemic Circulation → Post-capillary venules

**3. Which of the following is NOT true of neutrophilia?**

- (a) Neutrophilia is not always associated with an increased production of neutrophils
- (b) Apparent neutrophilia results in the migration of neutrophils from the marginating compartment to the circulating one.
- (c) Intense muscular exercise increases the number of neutrophils for many days.
- (d) Band cells and metamyelocytes can be seen sometimes in certain bacterial infections
- (e) Glucocorticoids increase the mitotic activity and result in increased production of neutrophils

**4. Which of the following statements is NOT CORRECT? (NOT SURE OF ANSWER)**

- (a) Dendritic cells trap antigens on their surface and present them to T or B cells

(b) Interdigitating dendritic cells are found in the thymus-dependant zones of the lymph nodes and spleen

(c) Follicular dendritic cells can present an antigen not associated with MHC to a B cell

(d) The first cells to be activated in a secondary immune response are memory B cells

**5. Removal of the old and aged erythrocytes from the circulation:**

(a) Is due to the dilated endothelium and large pores in the lining of the sinusoids of the spleen

(b) Takes place in the marginal zone sinuses

(c) Occurs in the lymph node

(d) Is the function of splenic cords

(e) A + B

**6. All of the following regarding T lymphocytes is correct EXCEPT:**

(a) Maximal activation of cytotoxic T cells involves both MHC-I and MHC-II

(b) Both T helper and cytotoxic cells have a TCR

(c) Both T helper and cytotoxic cells have receptors for IL-1

(d) Both cells have receptors for IL-2

(e) CD4+ T helper cell binds an antigen on the surface of an APC

**7. A fall in sodium plasma concentration:**

(a) Decreases the freezing point of plasma

(b) Increases intracellular fluid volume

(c) Is not associated with thirst

(d) Can't be caused by excessive (uncontrolled) secretion of ADH (anti- deuteric hormone)

(e) Causes edema

**8. A 23 year old female with a red cell count of  $3.2 \times 10^6/\mu\text{l}$ , hematocrite of 37%, and haemoglobin concentration of 120g/L. According to the above parameters, which of the following statements is TRUE?**



- (a) The RBCs are normocytic, normochromic
- (b) The RBCs are microcytic, normochromic
- (c) The RBCs are microcytic, hypochromic
- (d) The RBCs are macrocytic, normochromic
- (e) The RBCs are macrocytic, hyperchromic

**9. Which of the following about Haemophilia A and Von-Willibrand inheritance is NOT TRUE?**

- (a) Von-Willibrand is a hemorrhagic disease
- (b) Haemophilia A is usually confined to males
- (c) Haemophilia A is inherited as a sex-linked abnormality
- (d) Haemophilia A passes from mother to child
- (e) Von-Willibrand disease also appears in males only

**10. A person with (A Rh<sub>-</sub>) blood can receive blood transfusion from which of the following?**

- 1. A Rh<sup>+</sup>
  - 2. B Rh<sup>+</sup>
  - 3. AB Rh<sub>-</sub>
  - 4. O Rh<sub>-</sub>
  - 5. A Rh<sub>-</sub>
- (a) 1 only
  - (b) 4 only
  - (c) 3 only
  - (d) 4 + 5
  - (e) 1 + 5

**11. Which of the following combinations is NOT TRUE?**

	Factor #	Factor Name	Pathway involved
(a)	3	Tissue Thromboplastin	Extrinsic Pathway
(b)	10	Stuart Factor	Both Pathways
(c)	1	Fibrinogen	Both Pathways
(d)	12	Hageman Factor	Intrinsic Pathway
(e)	13	Fibrin Stabilizing Factor	Intrinsic Pathway

12. Which of the following combinations is NOT TRUE?

		Haemophilia A	Von-Willibrand Disease
(a)	Inheritance	Sex-linked	Autosomal
(b)	Bleeding Time	Normal	Prolonged
(c)	VIII:C	Low	Low
(d)	VIII:R:Ag	Normal	Low
(e)	Aggregation	Normal	Normal

13. Which of the following is NOT a function of thrombin?

- (a) VIII → VIIIa
- (b) Fibrinogen → Fibrin
- (c) IX → IXa
- (d) XIII → XIIIa
- (e) Protein C → Protein Ca

14. Which of the following statements most describe why RBC's are efficient in carrying oxygen:

1. Contains hemoglobin
2. Have no nucleus
3. Have many mitochondria needed to produce ATP
4. Biconcave shape
5. 4 oxygen molecules are carried by hemoglobin

(a) 1, 3, 4

(b) 2, 4, 5

(c) 1, 2, 4, 5

(d) 1, 2, 3, 5

(e) 1, 2, 3, 4, 5

**15. Which of the following regarding iron absorption is NOT TRUE?**

- (a) The daily iron intake is usually equal to daily iron requirement
- (b) Women have less store of iron than men
- (c) More than 65 % of iron is present in hemoglobin
- (d) Iron absorption is mainly in the upper part of the jejunum
- (e) There is more iron absorption from meat and meat products than from vegetables

**16. A blood sample was tested and the results indicated a red cell count of  $3.8 \times 10^{12}/L$  and hemoglobin concentration of 16g/deciliter. From the following data:**

- (a) We can tell the person is a female
- (b) We can calculate the mean corpuscular volume (MCV)
- (c) We can calculate the mean corpuscular hemoglobin (MCH)
- (d) We can calculate the mean corpuscular hemoglobin concentration (MCHC)
- (e) We can tell if the red blood cells are normocytic, microcytic or macrocytic.

**17. All of the following regarding the bleeding caused by a small cut wound in the skin are true EXCEPT:**

- (a) Can be stopped by a vascular spasm

- (b) It will stop within a period of 5 minutes
- (c) It will be prolonged if Von-Willibrand factor is deficient
- (d) It will be prolonged in the case of thrombocytopenic purpura

**18. Which of the following regarding % saturation of hemoglobin and oxygen content is NOT CORRECT?**

- (a) The % saturation of hemoglobin is dependent on pO<sub>2</sub> and completely independent on the concentration of hemoglobin
- (b) The oxygen content is dependent on the concentration of hemoglobin
- (c) The % saturation of hemoglobin is dependent on pO<sub>2</sub> as well as on the concentration of hemoglobin
- (d) The oxygen content VS pO<sub>2</sub> will change when the concentration of hemoglobin is changed
- (e) The % saturation of hemoglobin VS pO<sub>2</sub> graph will remain the same despite changing the hemoglobin concentration

**19. Which of the following statements regarding leukocytes are correct**

1. They move out to the tissues by a process called emigration
2. Neutrophils and macrophages are required in phagocytosis
3. Inflammatory cells are attracted by bacterial molecules and inflamed tissue by a process called chemotaxis
4. Leukopenia is an increase in the number of WBC's in the circulation

- (a) 1 and 2 only
- (b) 2, 3, 4
- (c) 1, 2, 3
- (d) 1, 2, 3, 4
- (e) 3 and 4 only

**20. Which of the following regarding ABO blood groups is NOT CORRECT?**

- (a) Full cross match involves reacting recipient's plasma with patient's RBCs
- (b) Most cases of blood incompatibility are due to not cross matching the different blood groups
- (c) Anti- A and anti-B antibodies are sometimes absent in blood group O

**BIOCHEM**

**21. Which of the following regarding heme structure and abnormalities is CORRECT?**

- (a) Heme consists of a tetrapyrrole ring, with 4 methyl , 2 vinyl and 2 propionate groups
- (b) Structural changes in the heme are the most common cause of abnormal hemoglobin
- (c) Heme iron if found in aqueous solution will be present in the ferrous (Fe<sup>2+</sup>) state
- (d) The distal histidine of heme is involved in the binding to ferrous iron

**22. High levels of conjugated bilirubin, near-normal levels of unconjugated bilirubin and low fecal stercobilinogen is best characterized by:**

- (a) Hepatitis
- (b) Hemolytic disease
- (c) Obstruction of the bile duct
- (d) Low levels of UDP- glucuronic acid
- (e) Any of the above

**23. All of the following regarding 2,3 BPG are correct EXCEPT:**

- (a) Decreases the oxygen-binding capacity of hemoglobin
- (b) Decreases some of the effects of sickle cell anemia
- (c) Binds to the pocket situated between the two  $\beta$  globin chains
- (d) Raises the P50 of hemoglobin
- (e) All of the above are correct

**24. Lead poisoning will result in accumulation of:**

- (a) Porphobilinogen
- (b)  $\delta$ -aminolevulinic acid and protoporphyrin IX
- (c) Uroporphyrinogen
- (d) Hydroxymethylbilane
- (e)  $\delta$ -aminolevulinic acid and coproporphyrinogen

**25. Which of the following regarding glutathione and G6PD deficiency is NOT CORRECT?**

- (a) Glutathione is a tri-peptide that consists of (gly-cys-glu)
- (b) G6PD production of NADPH is required to maintain glutathione in a reduced state
- (c) G6PD A\_variant (class III) is associated with 80% enzyme activity in reticulocyte cells
- (d) In cells such as the liver, G6PD is not the only way for the production of NADPH
- (e) G6PD deficiency is associated with non-sense and frameshift mutations

**26. Which of the following regarding hemoglobin and myoglobin is NOT CORRECT?**

- (a) Both are rich in  $\alpha$ -helical content
- (b) Both bind one oxygen molecule per heme
- (c) Hemoglobin has 7  $\alpha$ -helical segments in its  $\alpha$  chain and 8 in its  $\beta$  chain
- (d) Both contain a proximal histidine (F8) and a distal histidine (E7)
- (e) The P50 of myoglobin is lower than hemoglobin but higher than fetal hemoglobin

**27. All of the following are required in heme synthesis EXCEPT:**

- (a) Glycine
- (b) Pyridoxal Phosphate
- (c) Succinyl CoA
- (d) Acetyl CoA
- (e) Ferrous iron

**28. HIV wasting syndrome is:**

- (a) Body weight loss >50%
- (b) Body weight loss >10%, unexplained chronic diarrhea, prolonged fever and physical weakness
- (c) Chronic diarrhea associated persistent generalized lymphadenopathy
- (d) Associated with clinical stage C of HIV infection
- (e) Persistent fever, malaise, and intermittent diarrhea

**29. Regarding the epidemiology of HIV, which of the following is NOT CORRECT?**

- (a) Most people infected do not know they have the disease
- (b) The epidemic has now reached a plateau
- (c) 90% of children infected with HIV are either due to being born to an infected mother or breast milk

**30. Which of the following regarding HIV diagnostic techniques is NOT CORRECT?**

- (a) Screening tests look for antibodies to the virus and have now reached almost a sensitivity of 100%
- (b) Screening tests look for antibodies to p24 and p55 antigens
- (c) The most common confirmatory test used is Western Blot
- (d) A minimum of 2 to 3 bands are need to confirm a positive diagnosis in Western Blot technique
- (e) Viral load can be found by measuring viral RNA or DNA using molecular detection methods

**31. Regarding the WHO clinical staging guidelines of HIV/AIDS, all of the following are correct EXCEPT:**

- (a) This staging system is used by WHO for resource limited countries
- (b) The staging depends entirely on clinical symptoms
- (c) Staging is classified according to count of CD4+ T cells
- (d) The patient's clinical symptoms are tested in every medical visit

(e) It consists of 5 different clinical stages

**32. Regarding bacterial infection of the blood, all of the following are correct EXCEPT:**

- (a) Sepsis is associated with an exaggerated systemic inflammatory response
- (b) Septicemia can result from disseminated spread of a pathogen at a local site of infection
- (c) The severity and predominance of the disease is the same regardless of the causative agent of infection
- (d) Misdistribution of oxygen to several organs in the body
- (e) Proceeds to multiple organ dysfunction in the last stages of infection

**33. A 29 year old woman suffering from severe menstrual bleeding for a few weeks had her blood tested. The results indicated a MCV of 63 fl, MCHC of 28 g/dl and RCC of  $3 \times 10^6$  / $\mu$ l. Which of the following indicators is inconsistent with the condition she has?**

- (a) Decreased transferrin saturation
- (b) Low level of hepcidin
- (c) Decreased serum ferritin
- (d) Decreased total iron binding capacity

**34. A 60 year old man suffers from episodes of infection and intermittent bleeding. Results showed that his hemoglobin concentration is below normal but with a normal MCHC. Thrombocytopenia was proven by a vast decrease in number of platelets. Which of the following conditions is least likely to be involved as well?**

- (a) Monocytopenia
- (b) Granulocytopenia
- (c) Splenomegaly
- (d) Absolute lymphocyte count is normal
- (e) Low RBC count

**35. A 43 year old woman suffers from weakness and fatigue for almost 2 months. Her blood**



count came up with a MCV of 110 fl, [Hb] of 8g/dl and MCHC of 32 g/dl. She is also positive for neutropenia, and has a decreased number of platelets. The reticulocyte levels have reached almost 4%. Which of the following is the most probable cause of her results?

- (a) Decreased utilization of iron
- (b) Increased level of hepcidin
- (c) Toxic effect on the stem cells
- (d) Drug adverse reaction
- (e) Antibody mediated

36. In anemia of chronic disease, which of the following is CORRECT?

- (a) MCV normal, \*↓ serum ferritin+ \*↓ iron stores+ \*↓ TIBC+
- (b) MCV normal, [↑ serum ferritin] [↑ iron stores] [↓ TIBC]
- (c) MCV low, \*↓ serum ferritin+ \*↓ iron stores+ \*↓ TIBC+
- (d) MCV high, \*↓ serum ferritin+ \*↑ iron stores+ \*↓ TIBC+
- (e) MCV low, \*↓ serum ferritin+ \*↓ iron stores+ \*↑ TIBC+

Answers:

1C 2E 3C 4D(not sure) 5A

6C 7B 8D 9E 10D

11E 12E 13C 14C 15A

16C 17C 18C 19C 20A

21A 22C 23B 24B 25E

26E 27D 28B 29B 30B

31C 32C 33D 34C 35E 36B

## HLS Midterm 2015

### Histology

- 1- **True about blood-thymus barrier** – antigens that cross is cause immunological tolerance
- 2- **Wrong about lymph nodes** – a heel diabetic ulcer primarily causes enlargement of the vertical group of the superficial inguinal lymph nodes
- 3- **Wrong about neutrophilia** – exercise causes neutrophilia that persists for days
- 4- **Wrong about granulopoiesis** – peripheral blood count of neutrophils is an absolute measure of their total count
- 5- **Wrong about second exposure to pathogen in the lymph node** – B-memory cells are the first cells to react
- 6- **Wrong combination** – chronic renal failure – iron deficiency anemia (mostly)
- 7- **Wrong about the spleen** – like HEC of the lymph node, marginal sinuses only allow lymphocytes to go to the spleen
- 8- **Wrong about WBCs** – eosinophils are more phagocytic and bactericidal than neutrophils
- 9- **Wrong about WBCs** – in chronic myelogenous leukemia you see high blood count of myeloblasts
- 10- **Wrong about lymphocytes** – naïve B-cells recirculate to the sites of inflammation

### Physiology

- 11- **Wrong about a 40-year old woman with: 110 g/L Hb,  $3 \times 10^{12}$ /L RBCs and a mean cell diameter of 8.2 microns** – Most likely is IDA
- 12- **Wrong about eosinophils** – with basophils form 10% of WBCs (maybe)
- 13- **Wrong match about clotting** – factor XIII is for the intrinsic pathway
- 14- **Least important clotting factor** – XII
- 15- **Not activated by thrombin** – IX
- 16- **Wrong about von Willebrand disease** – VIII:C is normal
- 17- **Wrong about electrolytes** – participate in the fluid movement between tissues and

capillaries (mostly)

**18- Wrong about lymph** – fluids filtered are usually less than reabsorbed

**19- Knowing Hb and cell count** – you can find the MCH

**20- A tissue that has no lymphatic capillaries** – CNS

**21- Wrong about Iron** – is mostly absorbed in the jejunum (maybe)

**22- Wrong about B12** – its deficiency mostly affects WBCs

**23- True about Hb** – its saturation curve is independent of Hb concentration

**24- Wrong about albumin** – transports CO<sub>2</sub>

### Pathology

**25- Wrong about PNH** – splenomegaly

**26- No low reticulocyte** – chronic blood loss

**27- Similar mode of inheritance to HBH disease** – sickle cell trait

**28- Doesn't worsen sickle cell disease** – malarial infection

**29- Not a color change in anemia** – green

**30- Wrong combination** – hereditary spherocytosis-mutation of horizontal membrane proteins

### Microbiology

**31- Doesn't cause sepsis** – polysaccharides

**32- Wrong about P. falciparum** – only has shizogony in the erythrocytes

**33- Wrong about P. malariae** – relapse

### Biochemistry

**34- A patient with chronic moderate anemia with high 2,3-BPG and low ATP** – pyruvate kinase deficiency

- 35- Wrong about hemeproteins** – Mb has lower p50 than HbA but higher than HbF
- 36- Lead poisoning affects an enzyme of heme synthesis that might be producing** –  
porphobilinogen
- 37- Wrong about bilirubin** – produced for heme by heme oxygenase system
- 38- Doesn't cause a hemoglobinopathy** – increasing the tendency of iron to stay in the ferrous  
form
- 39- Doesn't happen in the RBC** – heme synthesis
- 40- Wrong about iron** – transferrin is for serum transport and storage of iron
- 41- True about Hb** –  $\beta_4$  Hb has more sigmoidal saturation curve and thus more p50 (maybe)
- 42- Wrong about Mb and Hb** – both are affected by 2.3-BPG
- 43- Wrong about G6PD deficiency** – GSH is normally maintained in the reduced form by GSH-  
peroxidase
- 44- True about R and T forms of Hb** – R releases protons
- 45- Wrong about the structure of heme** – iron is coplanar with the heme in Hb in the deoxy  
Form

## Mid hematology 2017

### Micro

- The asexual cycle of Plasmodia occurs in? RBCs
- The infectious phase of Plasmodia is? Sporozoites
- Which is not caused by EBV? (anything other than the diseases mentioned in the lecture)
- There was also a question about the time course of antibody production in EBV infection

### Histology

- Wrong about blood: special type of CT that originates from endoderm
- \*It originates from mesoderm as other CT types
- Cytotoxic T lymphocytes' markers: CD45+ CD34- CD3+ CD19- CD8+ [handout1 page17]
- Which is wrong: Nucleus is eccentric in promyelocyte [handout3]
- Wrong about HLA class II: it is presented in all cells [handout4]
- Wrong about ultrastructure of platelets: dense tubular system (Ca+) is in peripheral zone [handout4]
- A hematopoietic growth factor that's not involved in myeloid differentiation: IL-7
- Someone is bleeding, has AB blood type, what to give? Packed B cells
- \*We can't give O blood because it has anti-A and anti-B Abs

### Biochemistry

- Which is wrong? Any change in pH will lead to death
- Lead poison affects the enzyme which forms: Ferroprotoporphyrin IX
- \*note: lead poisoning affects two enzymes: ALA - Dehydratase and Ferro chelatase. These two enzymes form Porphobilinogen & Ferroprotoporphyrin IX
- Which is False: Both Mb & Hb are affected by 2,3-BPG
- \*Oxygen binding to Hemoglobin is regulated by allosteric effectors (like 2,3-BPG) while Myoglobin is not because it is a monomer.
- Which doesn't have alpha chains? HbH

- **Which is false about Iron Deficiency:** Transferrin is low [sheet8]
- **Doesn't happen in RBC?** Heme Synthesis
- **wrong about heme degradation:** bilirubin is formed directly from heme [sheet6 page5]

Physio

- **Mismatch:** factor X= Christmas factor [sheet7]
- **Which step in the coagulation cascade doesn't need  $Ca^{+2}$ ?** XI  $\rightarrow$  XIa [sheet7 page8]
- **A male with hemophilia A married a carrier female, which is true about their kids:** 50% of males are affected. [sheet8]

\*There was another choice which could also be true which was "all females are healthy". It is true because homozygosity is fatal (Females are only carriers)

## HLS-Mid 018

**1-One of the following is NOT true in regards to tissue factor:**

- a. It is found on the surface of subendothelial cells
- b. It forms a complex with factor VII
- c. It links the intrinsic and extrinsic pathways
- d. Its activity requires calcium ions
- e. It is critical in the activation of factors IX and X

**2-Heparin blocks blood-coagulation by:**

- a. Inducing the activity of tissue factor pathway inhibitor
- b. Activating plasminogen activation
- c. Inhibiting the release of contents of platelet granules
- d. Sequestering calcium ions
- e. Promoting the interaction of anti-thrombin III to thrombin

**3-Deferasirox "Exjade" is preferable to deferoxamine in the treatment of chronic iron toxicity mainly because it is:**

- a. Less toxic.
- b. Will not result in mucormycosis.
- c. Cheaper.
- d. Given orally.
- e. More effective.

**4-Folic acid:**

- a. Should be included in any therapeutic regimen for managing anemia.
- b. Must be given along with vitamin B12 in treating pernicious anemia.
- c. Can induce a remission of anemia of pyridoxine deficiency.
- d. Can induce a remission of pernicious anemia but allowing the neurological disease to progress.
- e. Is specific for anemia caused by *Diphyllobothrium*.

**5-Which one of the following is NOT a cause of vitamin B12 deficiency?**

- a. Jejunal resection.
- b. Gastrectomy.

- c. Malabsorption.
- d. Veganism.
- e. Lack of gastric intrinsic factor.

**6-One of the following about iron metabolism in the body is NOT true:**

- a. Iron is important for the formation of not only hemoglobin but also other essential elements in the body.
- b. The total iron quantity in the body averages 4-5 gm.
- c. There is heme iron and non-heme iron, non-heme iron is absorbed more efficiently than heme iron.
- d. The amount of iron absorbed is normally about 3-6 % of the ingested amount.
- e. The average daily iron intake is about 20 -30 mg.

**7-One of the following statements about the blood is NOT true:**

- a. The percentage (%) of the fetal hemoglobin in the adult RBC is normally about 1-2%.
- b. The percentage (%) of the reticulocyte cells in the bone marrow and peripheral blood is equally distributed.
- c. The bone marrow begins to produce blood cells not from the very early months of the fetal life.
- d. The fetal hemoglobin is present in every RBC in the blood.
- e. The reticulocyte cells are present in the bone marrow and peripheral blood.

**8-One of the following about erythropoiesis is NOT true?**

- a. All the different forms of blood cells are produced at the same time in the fetus from the first month.
- b. Even trace elements (copper, cobalt) play a role in normal erythropoiesis.
- c. The main hormone that plays a role in erythropoiesis is erythropoietin.
- d. Erythropoietin is produced by the kidneys and other organ(s).
- e. In the adult the highest erythropoiesis occurs in the vertebrae and pelvis.

**9-One of the following about hemoglobin is NOT true:**

- a. In one hemoglobin molecule there are four hemes and four globins subunits.
- b. The term oxygenation is used for hemoglobin binding to oxygen not oxidation.



- c. One hemoglobin molecule can bind four oxygen molecules.
- d. Binding of four heme in the hemoglobin with oxygen doesn't occur at the same time, and the affinity of the fourth heme to oxygen is many times that of the first.
- e. Globins can't bind oxygen but they bind CO, CO<sub>2</sub> and hydrogen.

**10-With corresponding RBC morphology, one of the following is NOT true:**

- a. MCV= 69 M<sup>3</sup> (fl), MCH= 23 pg, MCHC= 32% The RBCS are microcytic and hypochromic .
- b. MCV= 90 M<sup>3</sup> (fl), MCH= 30 pg, MCHC= 34% The RBCS are normocytic and normochromic.
- c. MCV= 67 M<sup>3</sup> (fl), MCH= 20 pg, MCHC= 30% The RBCS are microcytic and hypochromic.
- d. MCV= 115 M<sup>3</sup> (fl), MCH= 38 pg, MCHC= 33% The RBCS are macrocytic and normochromic.
- e. MCV= 85 M<sup>3</sup> (fl), MCH= 26 pg, MCHC= 29% The RBCS are normocytic and hypochromic.

**11-One of the following statements about Hb-O<sub>2</sub> relationship is FALSE:**

- a. When plotted (%) saturation against Po<sub>2</sub>, the curve will always be the same whatever the Hb concentration is, if other factors remain the same.
- b. The (%) saturations of Hb with O<sub>2</sub> is dependent on Po<sub>2</sub> as well as the Hb concentration.
- c. The (%) saturation of Hb with O<sub>2</sub> is dependent on Po<sub>2</sub> and totally independent of Hb concentration.
- d. The quantity of O<sub>2</sub> carried in volume of blood is dependent on the Po<sub>2</sub> as well as the Hb concentration.
- e. If O<sub>2</sub> content is plotted against Po<sub>2</sub>, the level of the curve will be dependent on the Hb concentration of the sample of the blood.

**12-The highest (%) of blood volume in an adult at rest mainly in:**

- a. Veins.
- b. Lungs.
- c. Arteries.
- d. Capillaries.
- e. Heart.

**13-An increased in the P<sub>50</sub> of the oxygen- hemoglobin dissociation curve occurs with**

- a. A decrease in hydrogen ions.

- b. A decrease in the PCO<sub>2</sub>.
- c. A decrease in diphosphoglycerate ions.
- d. Exercise.
- e. A decrease in temperature.

**14-Which ONE of the following O<sub>2</sub> Carriers elements has higher O<sub>2</sub> affinity (its Hb-O<sub>2</sub> dissociation curve shifts to the left)?**

- a. Hemoglobin A (HBA).
- b. Hemoglobin A<sub>2</sub>.
- c. Have the same affinity.
- d. Fetal hemoglobin.
- e. Myoglobin.

**15-Which one of the following about the HCT is NOT true:**

- a. The value of HCT is usually 45%.
- b. The HCT expresses the (%) of red blood cells in a volume of whole blood.
- c. The values of HCT closely paralleled the values of hemoglobin & red cell count.
- d. The space occupied by the packed red blood cells is termed the hematocrit.
- e. The value of HCT does not vary with age & sex of the individual.

**16-If hemophilic male gets married from hemophilic carrier female which one of the followings could NOT be the result of this marriage?**

- a. All the females aren't healthy.
- b. 50% of the males they look healthy.
- c. All the children they look healthy.
- d. 50% of the females they look healthy.
- e. 50% of the females are hemophilic.

**17-Blood platelets assist in arresting bleeding by; Choose the INCORRECT answer:**

- a. Liberating high concentration of calcium.
- b. Releasing factors promoting blood clotting.
- c. Adhering together to form plugs when exposed to collagen.

- d. Serotonin from platelets can release vascular plasminogen activators.
- e. Releasing factors causing vasoconstriction.

**18-Which one of the following about the eosinophil is NOT true:**

- a. Like neutrophils, they migrate to sites of inflammation.
- b. They represent about 4% of total leukocytes.
- c. Eosinophil's number increases significantly in allergic reactions.
- d. They don't play role in wound healing.
- e. Are easy to spot because of their unique characteristic appearance.

**19-Lymphocytes, choose the CORRECT statement?**

- a. Are produced only in the bone marrow.
- b. Are the most abundant type of leucocytes.
- c. Are produced only in the lymphoid tissues.
- d. Are granular leucocytes.
- e. Are produced in the bone marrow & in the lymphoid tissues.

**20-One of the following about blood function is NOT completely true:**

- a. The patients of Covid-19 who have sufficient amount of vitamin D in the blood show lower suffering and symptoms of the corona virus infection.
- b. Regulates the blood (body) pH.
- c. Regulates the body temperature.
- d. Provides blood clotting factors.
- e. The main part of the immune system in the body are the white blood cells only.

**21-Diffuse lymphatic tissue , choose the WRONG statement:**

- a. Peyer's patches are composed of Lymphatic nodules with a thin underlying connective tissue capsule.
- b. M cells are intestinal epithelial cells overlying the diffuse lymphatic tissues.
- c. The basement membrane overlying lymphatic nodules of Peyer's patches is highly porous.
- d. Pharyngeal tonsils are covered by respiratory epithelium.
- e. Palatine tonsils are partly encapsulated and covered by nonkeratinized stratified squamous epithelium.

**22-The presence of which one of the following cells is of least value in distinguishing spleen from thymus?**

- a. Activated B cells.
- b. Fibroblasts in capsule and trabeculae.
- c. Endothelial cells with tight junctions and thick basement membranes.
- d. Reticular epithelial cells.
- e. Perisinusoidal macrophages.

**23-Erythrocytes, Choose the WRONG statement:**

- a. Eosinophilia of erythrocytes is due to hemoglobin.
- b. About one week is needed for the formation of erythrocytes from proerythroblasts.
- c. Erythrocytes appear electron dense and homogenous under TEM.
- d. Rouleaux formation is a reversible condition due to surface tension caused by erythrocytes biconcave surface in slow circulation.
- e. Mature erythrocytes are still capable of producing a little amount of hemoglobin.

**24-Which description is true of all primary lymphoid organs?**

- a. Contain crypts.
- b. Contain epithelial-reticular cells.
- c. Lack connective tissue capsules.
- d. Are sites for antigen exposure.
- e. Are capable of antigen-independent lymphopoiesis.

**25-The precursor cells of granulocytes are destroyed by radiotherapy. To reestablish the granulocytic lineage, which of the following cells should be transplanted?**

- a. Promyelocytes.
- b. Metamyelocytes.
- c. Promonocytes.
- d. Band cells.
- e. Myelocytes.

**26-Examination of a normal peripheral blood smear reveals a cell more than twice the diameter of an erythrocyte with a C-shaped nucleus and a frosted glassy cytoplasm; Which of the following cell types is being described ?**

- a. Basophil.
- b. Eosinophil.
- c. Lymphocyte.
- d. Neutrophil.
- e. Monocyte.

**27-Regarding granulopoiesis, choose the WRONG statement**

- a. Azurophilic granules first appear at the promyelocyte stage.
- b. Secondary granules first appear at the myelocyte stage.
- c. Metamyelocytes have kidney shaped nuclei and cannot divide.
- d. Both types of granules in granulopoietic cells are synthesized by the free ribosomes.
- e. Band cells are almost mature granulocytes but without segmented nuclei.

**28-Thrombocytes, choose the WRONG statement:**

- a. Microtubules and microfilaments are found in the outer marginal bundle.
- b. Have thick glycocalyx.
- c. Originate from bone marrow cells with many dynamic cell projections.
- d. Often form basophilic clumps in histological preparations.
- e. Lambda granules contain serotonin.

**29-Which of the following cells express receptors for IgE on their cell surface ?**

- a. Cells with spherical nuclei and scant cytoplasm.
- b. Biconcave cells with no nuclei.
- c. Multinucleated cells with irregular S-shaped nuclei and large basophilic cytoplasmic granules.
- d. Highly phagocytic cells with many basophilic cytoplasmic granules.
- e. Single nucleated cells with many basophilic cytoplasmic granules.

**30-Reticulocytes, choose the CORRECT statement:**

- a. Their percentage in peripheral blood is not changed in hemorrhage.
- b. Contain remnants of DNA.
- c. Contain acidophilic reticulum of polyribosomes.

- d. Have the same size as mature erythrocytes.
- e. They are stained with Brilliant cresyl blue.

**31-Lymph nodes enlargement in response to bacterial infection is explained by:**

- a. Increased flow of lymph through the nodes' afferent lymphatics.
- b. Arrival of antigen-presenting cells in each node's medulla.
- c. Enlargement and increased activity of the nodes' high endothelial venules.
- d. Increased thickness of each node's paracortex.
- e. Formation of germinal centers for B-cell proliferation in each node's cortex.

**32-Lymphatic organs, choose the WRONG statement:**

- a. Blood lymphocytes enter the spleen through marginal zone sinuses and enter the lymph nodes through postcapillary venules.
- b. Aggregations of lymphocytes occupy the majority of splenic parenchyma.
- c. The variation in color intensity of thymic lobules (cortex and medulla) is attributed to the density of thymocytes.
- d. Cells with TCR proteins that bind to MHC-1 will express CD8 proteins at the end of thymic education.
- e. PALS area in spleen and paracortex in lymph nodes are considered thymus dependent zones.

**33-In spleen, the plasma cells are found mainly in?**

- a. Splenic sinuses of splenic red pulp.
- b. Periarteriolar lymphoid sheathes of splenic white pulp.
- c. Primary follicles of splenic white pulp.
- d. Germinal centers of Malpighian corpuscles.
- e. Cords of Billroth of splenic red pulp.

**34-The presence of which one of the following characteristics is of least value in distinguishing lymph nodes from spleen?**

- a. High endothelial venules.
- b. Afferent lymphatic vessels at capsule.
- c. Lymphatic sinuses.
- d. Stromal reticular tissue.

e. Cortical lymphatic follicles.

**35-Blood formed elements, choose the wrong statement:**

a. Erythrocytes lack class 1 MHC molecules.

b. Both basophil and mast cell are granulated but basophil nucleus is lobulated while the mast cell nucleus is round.

c. Human thrombocytes have, in contrast to erythrocytes, never been individual nucleated cells.

d. The internum of eosinophilic granules contains major basic protein.

e. Most neutrophils in female peripheral blood normally show barr bodies.

**36-Which one of these statements is NOT true regarding the blood circulation in the spleen?**

a. Arterial blood comes from the splenic artery which breaks up into trabecular arteries.

b. The spleen has a unique 'open' circulation in which blood is not enclosed by endothelium.

c. The central arteriole terminates in the marginal zone as marginal zone sinuses and forms penicillar arterioles in the red pulp.

d. In closed circulation, blood empties from the sheathed capillaries into the splenic cords and then enters the sinuses through slits in the wall.

e. As an individual trabecular artery emerges from the connective tissue, it is then known as the central arteriole.

**37-The R form of hemoglobin is stabilized by:**

a. Electrostatic interaction between Asp of beta chain with His within the same chain.

b. Electrostatic interaction between carboxylate of His146 with Lys of alpha chain.

c. Electrostatic interaction between His146 of beta chain with Asp of the alpha chain.

d. Hydrogen bond between Asn of beta chain with Asp within the same chain.

e. Hydrogen bond between Asn of beta chain with Asp of alpha chain.

**38-Prediabetes is characterized by having these lab results of glucose:**

a. 155 mg/dL or 7%.

b. 212 mg/dL or 11.8 mmol/L.

c. 120 mg/dL or 40mmol/mol.

d. 9% or 11.8 mmol/L.

e. 8% glycosylated glucose or 64 mmol/mol.

**39-A carbamate is formed between CO<sub>2</sub> and:**

- a. Arg141 of the alpha chain.
- b. His146 of the beta chain Iron of heme.
- c. The N-terminus of the alpha chain.
- d. The carboxylate end of the beta group.

**40-Chloride ions move through the membrane of red blood cells in association with movement of:**

- a. Bicarbonate ion in the opposite direction.
- b. Oxygen.
- c. Protons in the same direction.
- d. Bicarbonate ion in the same direction.
- e. Protons in the opposite direction.

**41-2,3-bisphosphoglycerate binds weakly to fetal hemoglobin than adult hemoglobin because:**

- a. The heme pocket is less hydrophobic.
- b. Fetal hemoglobin has a serine instead of a histidine 143 residue.
- c. Fetal hemoglobin has a narrower core.
- d. The lysine residue within the core of hemoglobin is replaced by a tyrosine.
- e. The N-termini of the alpha chains of fetal hemoglobin are acetylated.

**42-The reason why liver is not affected by deficiency of pyruvate kinase is:**

- a. ATP and NADH are compensated by other metabolic pathways.
- b. The enzyme is not regulated.
- c. Reduced activity is compensated by increased expression.
- d. Reduced activity is compensated by alternative expression of pyruvate kinase M1.
- e. Reduced pyruvate level is compensated by increase uptake of pyruvate.

**43-G6PD Mediterranean is characterized by:**

- a. Reduced stability of the enzyme.
- b. Reduced expression, stability, and activity of the enzyme.
- c. Reduced activity of the enzyme.
- d. Reduced expression of the enzyme.
- e. Reduced stability and activity of the enzyme.



**44-Glucose is used in treating porphyries because:**

- a. It prevents entry of Coproporphyrinogen III into mitochondria.
- b. Fasting induces gluconeogenesis.
- c. It leads to inhibition of ALA synthase 1.
- d. It simulates breakdown of intermediates of heme biosynthesis pathways.
- e. It blocks exit of ALA from mitochondria.

**45-The most common porphyria is:**

- a. Porphyria cutanea tarda.
- b. Hereditary coproporphyria.
- c. Variegate porphyria.
- d. Erythropoietic protoporphyria.
- e. Acute intermittent porphyria.

**46-One of the following is true in regards to transferrin:**

- a. In normal conditions, most of it is free of iron.
- b. It binds iron in the ferric state.
- c. Its binding to transferrin receptor 1 induces tighter interaction of the receptor with HFE protein.
- d. When internalized into cells, it gets degraded.
- e. It has an intrinsic oxidase activity.

**47-The following does not cause an increase in expression of hepcidin:**

- a. Stimulation of transferrin receptor 2.
- b. Increased release of erythropoietin.
- c. Overexpression of hemojuvelin.
- d. Increased release of inflammatory cytokines.
- e. Increased release of bone morphogenetic 5.

**48-This hemoglobin variant is both a quantitative and a qualitative hemoglobinopathy:**

- a. Hb Hammersmith.
- b. Hb Kansas.
- c. HbS.
- d. HbE.

e. HbC.

**49-Mutation of distal histidine into tyrosine results in:**

- a. Inability to bind to methemoglobin reductase.
- b. Inability to release oxygen.
- c. Oxidation of iron.
- d. Attraction of carbon monoxide.
- e. Stabilization of the R form of hemoglobin.

**50-Platelet plug is an aggregate of platelets clustered together through this mechanism:**

- a. Direct interaction amongst themselves via electrostatic interactions.
- b. Fibrinogen-mediated interactions amongst themselves.
- c. Direct interaction with exposed extracellular matrix particularly collagen.
- d. Direct interaction amongst themselves via surface glycoproteins.
- e. Indirect interaction with endothelial cells via von Willebrand factor.

1 E 11 B 21 A 31 E 41 B

2 E 12 A 22 B 32 B 42 C

3 D 13 D 23 E 33 E 43 C

4 D 14 E 24 E 34 D 44 C

5 A 15 E 25 A 35 E 45 A

6 C 16 C 26 E 36 D 46 A

7 B 17 D 27 D 37 E 47 B

8 A 18 D 28 E 38 A 48 D

9 E 19 E 29 E 39 D 49 C

10 A 20 E 30 E 40 A 50 B

**P.P Collected Questions OF HLS Midterm by Dr 017**

**Physiology**

**1-Most of the blood exists in:**

- a. arteries
- b. veins
- c. heart
- d. lungs
- e. capillaries

answer: b

**2-Which of the following is wrong about blood PH?**

- a. acidosis is below 7.35
- b. alkalosis is above 7.45
- c. blood Ph is different from water Ph as the neutral Ph is 7.4 rather than being 7
- d. any change in Ph causes death

answer: d

**3-A 40-year old woman with 110 g/L Hb,  $3 \times 10^{12}$ /L RBCs and a mean cell diameter of 8.2 microns is not suspected to have:**

- a. IDA
- b. B12 deficiency
- c. Folate deficiency

answer: a

**4- Which of the following is wrong about B12 deficiency?**

- a. it leads to megaloblastic anemia
- b. it mostly affects WBCs
- c. hemoglobin content is relatively high

answer: b

**5- Which of the following is wrong about albumin?**

- a. it maintains exchange of fluids

- b. it is the most abundant plasma protein
- c. it transports CO<sub>2</sub>

answer: c

**6-Which of the following is a rare cause of anemia?**

- a. iron deficiency
- b. vitamin B12 deficiency
- c. chronic inflammation

answer: b

**7-Arrange the following according to activity in hematopoiesis-descending arrangement-**

- 1 .Vertebra
- 2 .Sternum
- 3 .Femur
- 4 .Tibia
- 5 .Ribs

- a. 1,2,3,4,5
- b. 1,2,5,3,4
- c. 2,1,5,3,4
- d. 2,3,5,4,3

answer: b

**8- Which of the following is true about iron?**

- a. the absorption of nonheme iron is restricted to the jejunum
- b. iron is absorbed in ferric form more readily than ferrous form
- c. the second storage for iron in the blood is ferritin

answer: c

**9-All of the following are required in heme synthesis EXCEPT :**

- a. Glycine
- b. Pyridoxal Phosphate
- c. Succinyl CoA

- d. Acetyl CoA
- e. Ferrous iron

answer: d

**10-Which of the following statements most describe why RBC's are efficient in carrying oxygen :**

- 1 .contains hemoglobin
- 2 .have no nucleus
- 3 .have many mitochondria needed to produce ATP
- 4 .biconcave shape
- 5.4oxygen molecules are carried by hemoglobin

- a. 1, 3,4
- b. 2, 4, 5
- c. 1, 2, 4, 5
- d. 1, 2, 3, 5
- e. 1, 2, 3, 4, 5

answer: c

**11-Which of the following regarding iron absorption is NOT TRUE ?**

- a. the daily iron intake is usually equal to daily iron requirement
- b. women have less stored iron than men
- c. more than 65 % of iron is present in hemoglobin
- d. iron absorption is mainly in the upper part of the jejunum
- e. there is more iron absorption from meat and meat products than from vegetables

answer: a

**12-Which of the following is true about transferrin?**

- a. It binds only 2 molecules of iron
- b. Used for transport and storage of iron in the blood
- c. It binds to iron in its ferrous form

answer: a

**13-Which of the following is not true?**

- a. IDA & sideroblastic anemia are the most common forms of microcytic anemia
- b. indices calculated from blood cells are defined
- c. IDA is common clinical problem throughout the world
- d. estimated to affect 30% of the world's population

answer: a (Note: Defined=Can be calculated)

**14-A 23 year-old female with a red cell count of  $3.2 \times 10^6$ /microliter, hematocrit of 37%, and hemoglobin concentration of 120g/L. According to the above parameters, which of the following statements is TRUE ?**

- a. the RBCS are normocytic, normochromic
- b. the RBCS are microcytic, normochromic
- c. the RBCS are microcytic, hypochromic
- d. the RBCS are macrocytic, normochromic
- e. the RBCS are macrocytic, hyperchromic

answer: d

**15-In severe chronic anemia, all of the following are compensatory mechanisms except:**

- a. PO<sub>2</sub> increases in arterial part
- b. 2,3-BPG increases
- c. cardiac output at rest is increased
- d. affinity of hemoglobin to oxygen is decreased

answer: a

**16-Choose the true statement about hemoglobin:**

- a. hemoglobin saturation curve is dependent on PO<sub>2</sub> and hemoglobin concentration
- b. O<sub>2</sub> content is dependent only on PO<sub>2</sub> and independent on Hemoglobin concentration
- c. hemoglobin saturation curve is independent on hemoglobin concentration

answer: c

**17-A blood sample was tested and the results indicated a red cell count of  $3.8 \times 10^6$ /L and hemoglobin concentration of 16g/deciliter. From the following data:**

- a. We can tell that the person is a female
- b. We can directly calculate the mean corpuscular volume (MCV)

- c. We can directly calculate the mean corpuscular hemoglobin (MCH)
- d. We can directly calculate the mean corpuscular hemoglobin concentration (MCHC)
- e. We can directly tell if the red blood cells are normocytic, microcytic or macrocytic

answer: c

**18-Which of the following regarding % saturation of hemoglobin and oxygen content is**

**NOT CORRECT?**

a. The % saturation of hemoglobin is dependent on pO<sub>2</sub>, and completely independent on the concentration of

hemoglobin

b. The oxygen content is dependent on the concentration of hemoglobin

c. The % saturation of hemoglobin is dependent on pO<sub>2</sub>, as well as on the concentration of hemoglobin

d. The oxygen content VS pO<sub>2</sub>, will change if the concentration of hemoglobin is changed

e. The % saturation of hemoglobin VS pO<sub>2</sub> graph will remain the same despite changing the hemoglobin

concentration

answer: c

**19-which of the following results in shift to the right in hemoglobin-oxygen saturation curve?**

a. exercise

b. decrease in temperature

c. increase in PH

d. decrease in PCO<sub>2</sub>

e. decrease in 2,3-diphosphoglycerate

answer: a

**20- Which of the following is wrong about HbF?**

a. it could be found in feti as well as in adults but in different concentrations

b. it has affinity for O<sub>2</sub> similar to that of Myoglobin which is higher than the Hemoglobin affinity for O<sub>2</sub>

c. it can carry 8 Oxygen atoms

answer: b

**21- Which of the following is wrong about WBCs?**

- a. in chronic myelogenous leukemia you see high blood count of myeloblasts
- b. leukemia results when leukocyte count increases and doesn't return back to normal
- c. usually the more undifferentiated the WBCs, the more acute is the leukemia

answer: a

**22- Which of the following is wrong about lymph?**

- a. It contains plasma proteins
- b. It contains cells
- c. lymph flow increases by muscle contractions (increases with muscular activity)
- d. fluids filtered are usually less than reabsorbed

answer: d

**23-A tissue that has no lymphatic capillaries**

- a. GIT
- b. Respiratory tract
- c. CNS
- d. UGT

answer: c

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### **Biochemistry**

**1-Which of the following enzyme deficiencies causes photo-insensitive porphyria?**

- a. Coproporphyrinogen III oxidase
- b. uroporphyrinogen decarboxylase
- c. ALAD
- d. Ferrochelatase

answer: c

**2- Which of the following is wrong about HbA1c (glycosylated hemoglobin)?**



- a. measurement of glucose bound to valine on Beta hemoglobin chains
- b. patient should be fasting
- c. according to IFCC 100mmol/mol is acceptable

answer: b+c = question deleted

**3- Which of the following is wrong about allosteric regulation?**

- a. low Ph decreases the affinity of hemoglobin towards oxygen
- b. the major effect of CO<sub>2</sub> is form carbamate
- c. 2,3-BPG does its action by increasing electrostatic interactions
- d. Bohr effect works by electrostatic interaction between His with negatively charged amino acid on the same

chain

answer: b

**4- Which of the following is wrong about HbE?**

- a. It is caused by mutation that affects B chain
- b. It is common in Africans
- c. It results in defected proteins
- d. A truncated (short) beta-chain is produced

answer: b

**5-In Hb Cowtown where His 146 is replaced by Leucine, choose the correct statement:**

- a. it stabilizes R state and increases affinity for oxygen
- b. it stabilizes T state and increases affinity for oxygen
- c. it stabilizes R state and decreases affinity for oxygen
- d. it causes degradation of protein

answer: a

**6-Hb Bart means that you have:**

- a. 4 chains of gamma
- b. 4 chains of beta
- c. 3 chains of beta and 1 chain of alpha

answer: a

7-You have sample X and S in heme electrophoresis, what can you conclude about sample S?  
(in X you have HbA, HbC, HbS,HbF, NOT ORDERED)



- a. HbS homozygous
- b. HbS heterozygous
- c. HbSC
- d. A neonate 4 weeks before birth

answer: d

8-Fetal pyruvate kinase influence to have hemoglobin with more affinity is by:

- a. producing more ATP
- b. producing more 2,3-BPG
- c. producing less 2,3-BPG

answer: c

9-G6PD deficiency class 2 (Mediterranean) produce enzyme with

- a. more activity
- b. less stability
- c. less activity
- d. B+C

answer: c

10-Heme oxygenase's function is:

- a. converting ferric to ferrous
- b. Absorption of iron
- c. carries iron in blood

d. release iron out of heme

answer: d

**11- Which of the following is wrong about hepcidin?**

a. It is increased in iron overload

b. It is decreased in inflammation

c. it decreases iron absorption

answer: b

**12- Which of the following is true regarding blood coagulation and Gla domains?**

a. warfarin affects coagulation directly by inhibiting formation of these domains

b. chelated domains can bind to platelet negatively charged surface

c. Factor XII contains Gla domain

d. these domains are formed by carboxylation of 1-6 Glu residues

answer: b

**13- Which of the following is true about the action of protein C and protein S?**

a. They help thrombin to bind thrombomodulin

b. They bind thrombin with antithrombin 3

c. They degrade factor 5 and factor 8

answer: c

**14-Jaundice in neonates is caused by:**

a. increased hemolysis

b. decreased release to bile duct

c. decreased transport in blood

d. decreased conjugation

answer: d

**15-Fibrin stabilizing factor is:**

a. factor V

b. factor VII

c. factor X

d. factor XIII

e. factor II

answer: d

**16-Lead poisoning affects the enzyme which forms:**

a. Ferroprotoporphyrin IX

b. Uroporphyrinogen III

c. Coproporphyrinogen III

answer: a

**17-Which of the following statements is False?**

a. BPG forms salt bridges with a lysine, a histidine and in both beta chains .

b. BPG increases the energy needed to transform hemoglobin from T to R state

c. Both Mb & Hb are affected by 2,3-BPG

answer: c

**18-Which of the following doesn't have alpha chains?**

a. HbS

b. HbH

c. HbF

answer: b

**19- Which of the following doesn't happen in RBC ?**

a. PPP

b. Heme Synthesis

c. glycolysis

answer: b

**20- Which of the following is wrong about heme degradation?**

a. Heme oxygenase produces Fe<sup>+2</sup>, CO, NADP<sup>+</sup> while catalyzing the reaction

b. Bilirubin is transported to the liver by binding noncovalently to albumin

c. bilirubin is formed directly from heme

answer: c

**21-All of the following favor the transformation from the T form to the R form of hemoglobin except:**

- a. decreased PH
- b. decreased 2,3-BPG
- c. decreased temperature

answer: a

**22-Which of the following is true?**

- a. most cells, unlike RBCs, have another pathway to synthesize NADPH
- b. NADH is required for the activity of cytochrome b5 reductase
- c. G6PD deficient Mediterranean variant shows severe enzyme deficiency of young cells
- d. all of the above are true

answer : d

**23-Lead poisoning will result in accumulation of :**

- a. Porphobilinogen
- b.  $\delta$ -aminolevulinic acid and protoporphyrin IX
- c. Uroporphyrinogen
- d. Hydroxymethylbilane
- e.  $\delta$ -aminolevulinic acid and coproporphyrinogen

answer: b

**24-Which one of these Hb isn't normally found in your body ?**

- a. HbH
- b. HbF
- c. HbA2

answer:a

**25- Which of the following doesn't cause a hemoglobinopathy?**

- a. increasing the tendency of iron to stay in the ferrous form
- b. decreasing numbers of hemoglobin
- c. changing hemoglobin structure

answer : a

**26- Which of the following is wrong about iron?**

- a. transferrin is for serum transport and storage of iron
- b. ferric= $\text{Fe}^{+3}$ , ferrous= $\text{Fe}^{+2}$

answer : a

**27- Which of the following is true about Hb?**

- a.  $\beta_4$  Hb has more sigmoidal saturation curve and thus higher  $p_{50}$
- b. Hb bart is composed of  $2\gamma 2\alpha$

answer : a

**28- Which of the following is wrong about G6PD deficiency?**

- a. GSH is normally maintained in the reduced form by Glutathione reductase
- b. G6PD gene is located on the X chromosome
- c. G6PD deficiency is mainly caused by large deletions

answer : c

**29- Which of the following is true about R and T forms of Hb?**

- a. R releases protons
- b. R has less affinity for oxygen than T






answer : a

**30- Which of the following is wrong about the structure of heme?**

- a. iron is coplanar with the heme in deoxy form Hb
- b. Iron can form six bonds
- c. porphyrin consists of four rings (designated A-D) called pyrrole rings

answer : a

**31-Which of the following is NOT a function of thrombin ?**

- a. VIII  VIIIa
- b. Fibrinogen  Fibrin
- c. IX  IXa
- d. XIII  XIIIa
- e. Protein C  Protein Ca

answer: c

**32-Which of the following regarding heme structure and abnormalities is CORRECT ?**

- a. Heme consists of a tetrapyrrole ring, with 4 methyl, 2 vinyl and 2 propionate groups
- b. Structural changes in the heme are the most common cause of abnormal hemoglobin
- c. Heme iron if found in aqueous solution will be present in the ferrous ( $Fe^{2+}$ )state
- d. The distal histidine of heme is involved in the binding to ferrous iron

answer: a

**33-High levels of conjugated bilirubin, near-normal levels of unconjugated bilirubin and low fecal stercobilinogen is best characterized by :**

- a. Hepatitis
- b. Hemolytic disease
- c. Obstruction of the bile duct
- d. Low levels of UDP- glucuronic acid
- e. Any of the above

answer: c

**34-All of the following regarding 2,3 BPG are correct EXCEPT :**

- a. Decreases the oxygen-binding capacity of hemoglobin
- b. Decreases some of the effects of sickle cell anemia
- c. Binds to the pocket situated between the two  $\beta$  globin chains
- d. Raises the  $P_{50}$  of hemoglobin
- e. All of the above are correct

answer: b

**35-Which of the following regarding glutathione and G6PD deficiency is NOT CORRECT ?**

- a. Glutathione is a tri-peptide that consists of (gly-cys-glu)
- b. G6PD production of NADPH is required to maintain glutathione in a reduced state
- c. G6PD A variant (class III) is associated with 80% enzyme activity in reticulocyte cells
- d. In cells such as the liver, G6PD is not the only way for the production of NADPH
- e. G6PD deficiency is associated with non-sense and frameshift mutations

answer: e

**36-Which of the following regarding hemoglobin and myoglobin is NOT CORRECT ?**

- a. Both are rich in  $\alpha$ -helical content
- b. Both bind one oxygen molecule per heme
- c. Hemoglobin has 7  $\alpha$ -helical segments in its  $\alpha$  chain and 8 in its  $\beta$  chain
- d. Both contain a proximal histidine (F8) and a distal histidine (E7)
- e. The P50 of myoglobin is lower than hemoglobin but higher than fetal hemoglobin

answer : e

**37- Which of the following is not true about thalassemia major?**

- a. HbA2 increases in B thalassemia
- b. HbF increase in B thalassemia
- c. Hb bart's increase in a thalassemia
- d. in a thalassemia major 3 or 4 copies are mutated but in B thalassemia major 2 copies are mutated

answer: d

**38-Regarding the binding of 2,3 BPG , it makes a cross linking by which subunits?**

- a. B1, A1 subunits
- b. B1 , B2 subunits
- c. B1 , A2 subunits
- d. A1 , A2 subunits

answer : b

**39- Which of the following is wrong about F XIII (Fibrin Stabilizer)?**

- a. related only to the Intrinsic pathway of coagulation
- b. it is a transglutaminase that is activated by thrombin

answer : a ((it's related to both; Intrensic & extrensic ones))

**40-An amino acid substitution in one of chains of hemoglobin could lead to hemoglobinopathy (hemoglobin with abnormal function) for any of the following reasons EXCEPT :**

- a. An increase in the 2,3-BPG binding affinity
- b. A change in the affinity of subunits contact
- c. A change in the solubility properties of reduced hemoglobin
- d. An increase in the hydrophilic property of heme-pocket
- e. An increase tendency of the heme iron to exist in the reduced state



answer: e

**41-Heme oxygenase :**

- a. Produces carbon dioxide
- b. Can oxidize the membrane bridge between two pyrole rings of heme
- c. Requires molecular oxygen
- d. Produces bilirubin
- e. two of the above are correct

answer: c

**42-Which of the following is not required for clot formation?**

- a. vitamin K
- b. Ca
- c. Cl
- d. Vitamin A
- e. fibrinogen

answer: c and d

**43- Which of the following is not required for heme biosynthesis?**

- a. heme oxygenase
- b. Glycine
- c. Succinyl CoA

answer : a

**44-Which of the following is true about uroporphyrinogenIII?**

- a. result from direct conversion of coproporphrinogen
- b. it is a substrate for uroporphyrinogen decarboxylase

answer : b

**45-Which of the following is true about HbS and HbA?**

- a. both have different migration speed in electrophoresis at PH 1-2
- b. both have different migration speed in electrophoresis at PH 8-9

answer : b

**46-All of the following are true about heme except :**

- a. Contains 4 methyl and 4 vinyl groups attached to it
- b. The iron is held in the center of the heme molecule by bonds to the four nitrogens of the porphyrin ring.
- c. Heme is a complex of protoporphyrin IX and ferrous iron (Fe<sup>2+</sup>)

answer : a

**47-Which of the following can't be present in beta thalassemia :**

- a. HbH
- b. HbA
- c. HbF

answer : a

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### Histology

**1- Which of the following is true about all secondary lymph organs?**

- a. contain lymph follicles
- b. contain epithelial reticular cells as stroma
- c. contain afferent vessels
- d. contain capsule

answer: a

**2-Choose the wrong statement:**

- a. Unlike platelets, RBCs never stack together
- b. Internum of the crystalloid granules contains major basic proteins

answer: a

**3-T cells in spleen are mostly presented in:**

- a. lymphoid follicles
- b. splenic cords
- c. splenic sinuses
- d. PALS

answer: d

**4-The right arrangement of hemoglobin chains synthesis in humans:**

- a. it starts in liver then yolk sac and finally in bone marrow
- b. it starts in yolk sac then liver and finally in bone marrow
- c. yolk sac and liver synthesize hemoglobin for almost the same period in gestation
- d. liver and yolk sac then bone marrow after birth

answer: b

**5- Which of the following is wrong about neutrophils?**

- a. it has its own specific granules
- b. it lives for several hours only and stores glycogen
- c. it has polymorphic nucleus throughout its life
- d. measuring neutrophils from blood represents all neutrophils in our body

answer: d

**6-The cell that contains bi-lobed nucleus and large granules that obscure its nucleus**

- a. monocyte
- b. eosinophil
- c. basophil
- d. neutrophil

answer: c

**7-A cell with c shaped single non lobulated nucleus:**

- a. mast cell
- b. eosinophil
- c. neutrophil
- d. monocyte

answer: d

**8-Which of the following is covered by stratified squamous non keratinized epithelium?**

- a. palatine tonsils
- b. appendix
- c. payers patch

answer: a

**9-Choose the right statement about thymus gland**

- a. it has afferent lymph vessels
- b. Thymic epithelial cells form a blood thymic barrier in the medulla
- c. thymic epithelial cells form the stroma of the gland

answer: c

**10-Lymphocytes in the circulation enter lymph node from:**

- a. afferent vessels
- b. marginal zone
- c. postcapillary venule

answer: c

**11- Which of the following is wrong about reticulocytes?**

- a. Contain DNA not RNA
- b. increases in hemolytic anemia
- c. can synthesize heme

answer: a

**12-Cytotoxic T lymphocytes' marker:**

- a. CD45 +
- b. CD34 -
- c. CD3 +
- d. CD19 -
- e. CD8 +

answer : e

**13-Which of the following is wrong?**

- a. Nucleus is eccentric in promyelocyte
- b. In Myelocyte phase, specific granules start to appear
- c. In promyelocyte phase, primary granules appear

answer :a

**14- Which of the following is wrong about HLA class II?**

- a. it is presented in all nucleated cells
- b. it is recognized by T helper
- c. it is coupled to peptide product of proteins the cells had ingested

answer : a

**15- Which of the following is wrong about ultrastructure of platelets?**

- a. Dense tubular system (Ca<sup>+</sup>) is in peripheral zone
- b. Alpha granules: clotting factors + serotonin
- c. They have thick glycocalyx
- d. Hyalomere contains cytoskeleton and membranous channels while Granulomere contains granules and

organelles

answer :b

**16- Which of the following is true about blood-thymus barrier?**

- a. antigens that cross is cause immunological tolerance
- b. It envelops groups of T cells that are multiplying and maturing in medulla

answer :a

**17- Which of the following is wrong about lymph nodes?**

- a. a heel diabetic ulcer primarily causes enlargement of the vertical group of the superficial inguinal lymph

nodes

- b. they have many afferent vessels and one or two efferent vessels
- c. the lymph node can be divided into an outer cortex and inner paracortex.

answer : a

**18-Which of the following is NOT true of neutrophilia ?**

- a. Neutrophilia is not always associated with an increased production of neutrophils
- b. Apparent neutrophilia results in the migration of neutrophils from the marginating compartment to the

circulating one .

- c. Intense muscular exercise increases the number of neutrophils for many days .

- d. Band cells and metamyelocytes can be seen sometimes in certain bacterial infections
- e. Glucocorticoids increase the mitotic activity and result in increased production of neutrophils

answer :c

**19- Which of the following is wrong about neutrophil?**

- a. peripheral blood count of neutrophils is an absolute measure of their total count
- b. Barr body appears in females
- c. Its primary granules contain myeloperoxidase

answer :a

**20- Which of the following is true about second exposure to pathogen in the lymph node**

- a. Second response is faster than the first one

answer : a

**21-All of the following are characteristics of all secondary lymphoid organs except**

- a. They have PeriArteriolar Lymphatic Sheath( PALS )
- b. They are sites for lymphocytes to encounter pathogens and become activated
- c. Spleen is considered one of them

answer :a

**22- Which of the following is wrong about WBCs?**

- a. Neutrophils are the most prominent cells in blood
- b. eosinophils are more phagocytic and bactericidal than neutrophils
- c. B cells can act as APCs

answer :b

**23-Which of the following cells increase in level during parasitic infections ?**

- a. Neutrophils
- b. Basophils
- c. Eosinophils
- d. Lymphocytes
- e. Monocytes

answer: c

**24-Which of the following is the correct pathway when one lymph node sends a lymphocyte to educate another lymph node about antigenic stimulation ?**

- a. Post-capillary venules → Thoracic duct → Systemic Circulation → Efferent lymphatic vessel
- b. Afferent lymphatic vessel → Post-capillary venules → Efferent lymphatic vessel
- c. Afferent lymphatic vessel Thoracic duct → Systemic Circulation → Efferent lymphatic vessel
- d. Afferent lymphatic vessel → Thoracic duct → Efferent lymphatic vessel
- e. Efferent lymphatic vessel → Thoracic duct → Systemic Circulation → Post-capillary venules

answer: e

**25-Which of the following statements is NOT CORRECT ?**

- a. Dendritic cells trap antigens on their surface and present them to B cells only
- b. Interdigitating dendritic cells are found in the thymus-dependant zones of the lymph nodes
- c. Follicular dendritic cells can present an antigen not associated with MHC to a B cell

answer :a

**26-Removal of the old and aged erythrocytes from the circulation :**

- a. Is due to the dilated endothelium and large pores in the lining of the sinusoids of the spleen
- b. Takes place in the marginal zone sinuses
- c. Occurs in the lymph node
- d. Is the function of splenic cords
- e. A + B

answer: a

**27- Which of the following is the correct statement?**

- a. Cytotoxic cells recognize MCH 1 and the Ag presented on it
- b. cytotoxic T-Cells bind to MHC 2
- c. cytotoxic T-Cells express MHC 2 on their surface

answer : a

**28- Which of the following is correct about monocytes?**

- a. They are phagocytic cells

- b. They increase dramatically in parasitic infections
- c. They are responsible for allergic reactions

answer :a

**29-Which of the following cells have granules containing peroxidase and histaminase?**

- a. neutrophils
- b. basophils
- c. eosinophils

answer : c

**30-Which statement is False about spleen ?**

- a. Splenectomy Affect Cell-mediated and Antibody mediated Immune response
- b. People without spleen are more prone to infections with unencapsulated bacteria
- c. It is divided to red and white pulp

answer : b

**31-Foreign antigen recognition is the spleen takes place in:**

- a. marginal zone sinuses
- b. splenic sinusoids
- c. splenic cords

answer : a

**32-Not involved directly in an immune response to a foreign antigen:**

- a. thymus
- b. WBCs
- c. MALT

answer : a

**33-We recognize myelocytes from:**

- a. specific granules
- b. Primary granules
- c. size

answer : a

**34-Which of the following is false?**



- a. monocytes have kidney shaped nucleus
- b. 5-lobed-nucleus neutrophils are less mature than 4-lobed ones
- c. B and T lymphocytes cannot be distinguished under LM

answer : b

**35-Which of the following is false :**

- a. neutrophils phagocytic activity is enhanced by the presence of complement
- b. absence of barr body in neutrophils and other body cells indicate true male (XY)
- c. Neutrophils are called cells of chronic inflammation

answer : c

**36-which of the following result in true neutrophilia?**

- a. bacterial infection
- b. exercise
- c. administration of epinephrine

answer : a

**37-Incorrect lymphatic drainage:**

- a. thoracic duct with right subclavian
- b. Right lymphatic duct Drains from the upper right quadrant of the body

answer :a

**MID-2019**

**BioChem (Dr Mamoun)**

**1) which of the following enzymes deficiency causes photo-insensitive porphyria**

- A- Coproporphyrinogen oxidase
- B- uroporphyrinogen decarboxylase
- C- ALAS
- D- Ferrochelatase

**2) Wrong about HbA1c (glycosylated hemoglobin)**

- A- measurement of glucose bound to valine on Beta hemoglobin chains
- B- patient should be fasting
- C- according to IFCC 100mmol/mol is acceptable

**3) Which of the following doesn't happen in gene expression regulation in hemoglobin**

- A- LCR as an enhancer for multiple genes
- B- promotor for each gene
- C- chromatin looping
- D- adding organic groups on genes
- E- protein ubiquitination

**4) In blood transfusion, some components are "rejuvenated" because?**

- A- hemoglobin affinity towards oxygen is decreased
- B- hemoglobin loses its ability to carry oxygen

C- To repair the PH

D- The hemoglobin can't release oxygen because 2,3BPG is broken

**5) Wrong about allosteric regulation**

A- low Ph decreases the affinity of hemoglobin towards oxygen

B- the major effect of CO<sub>2</sub> is form carbamate

C- 2,3BPG does its action by increasing electrostatic interactions

D- the bohr effect is caused by electrostatic interaction between His with negatively charged amino acid on the same chain

**6) Wrong about HbE**

A- caused by mutation that affects B chain B- common in Africans

C- produce defect protein D- truncated (short) beta-chain is produced

**7) In Hb Cowtown where His 146 is replaced by Leucine, choose the correct**

A- it stabilizes R state and increases affinity for oxygen

B- it stabilizes T state and increases affinity for oxygen

C- it stabilizes R state and decreases affinity for oxygen

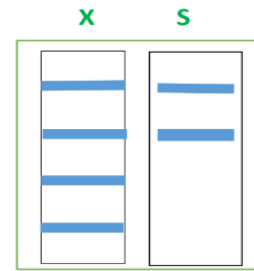
D- it causes degradation of protein

**8) Hb Bart means that you have**

A- 4 chains of beta B- 4 chains of gamma

C- 3 chains of beta and 1 chain of alpha

**9) you have sample X and S in heme electrophoresis, what is your result according to it (in X you have HbA, HbC, HbS, HbF, NOT ORDERED)**



A- HbS homozygous

B- HbS heterozygous

C- HbSC

D- neonate 4 weeks before birth

10) fetal pyruvate kinase influence to have hemoglobin with more affinity by

A- produce more ATP

B- produce more 2,3BPG

C- produce less 2,3BPG

11) G6PD deficiency class 2 (Mediterranean) produce enzyme with

A- more activity

B- less stability

C- less activity

D- A+B

12) Heme oxygenase function is ?

A- convertes ferric to ferrous

B- Absorption of iron

C- carries iron in blood

D- release iron out of heme

X S

**13) wrong about hepcidin**

A- increased in iron overload B- decreased in inflammation

C- it decreases iron absorption

**14) regarding blood coagulation and true about Gla domains**

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B- chelated domains can bind to platelet negatively charged surface

C- Factor XII contains Gla domain

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C- decreased transport in blood D- decreased conjugation

Answers:

1	2 <i>Deleted</i>	3	4	5	6	7	8	9	10	11	12	13	14	15	16
C	B+C are right	E	D	B	B	A	B	D	C	C	D	B	B	C	D

HISTO (Dr Hiba)

**1) True about all secondary lymph organs**

- A- contain lymph follicles B- contain epithelial reticular cells as stroma
- C- contain afferent vessels D- contain capsule

**2) choose the wrong statement**

- A- platelets in contrast to RBCs shows never individual nucleated cells in blood
- B- extensum of eosinophils contains major basic protein

**3) T cells in spleen are mostly presented in**

- A- lymphoid follicles B- splenic cords
- C- splenic sinuses D- PALT

**4) the right arrangement of hemoglobin chains synthesis in human**

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- B- it lives for several hours only and stores glycogen
- C- it has polymorphic nucleus throughout its life
- D- measuring neutrophils from blood represents all neutrophils in our body

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- A- monocyte B- eosinophil
- C- basophil D- neutrophil

**7) cell with c shaped single non lobulated nucleus**

- A- mast cell B- eosinophil
- C neutrophil D- monocyte

**8) which of the following is covered by stratified squamous non keratinized epithelium**

- A- palatine tonsils B- appendix
- C- payers patch

**9) choose the right statement about thymus gland**

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- A- afferent vessels B- marginal zone
- C- postcapillary venule

**11) wrong about reticulocytes**


- A- Contain DNA not RNA B- increases in hemolytic anemia
- C- can synthesize heme

1 2 3 4 5 6

A B D B D C

7 8 9 10 11

D A C C A

1 missed question 

**PHYSIO (Dr Saleem)**

**1) most of the blood exist in?**

A- arteries B- veins

C- heart D- lungs

E- capillaries

**2) wrong about eosinophil**

A- like neutrophil, they migrate to inflammation site

B- they don't play any role in wound healing

C- easily detected in blood samples

D- with basophils, they form 5% of blood cells

**3) fibrin stabilizing factor is**

A- factor V B- factor VII

C- factor X D- factor XIII

E- factor II

**4) In severe chronic anemia all of the following are compensatory mechanisms,  
choose the wrong answer**

A- PO<sub>2</sub> increases in arterial part B- 2,3-BPG increases

C- cardiac output at rest is increased D- affinity of hemoglobin to oxygen is decreased

**5) A blood sample with MCH=12g/dl , and blood cells count = 3.2m/microl ,  
choose the right answer:**

A- MCV can be measured B- MCH can be measured

C- MCHC can be measured D- this represents normal men values

**6) wrong about coagulation**



A- partial thromboplastin time monitors extrinsic pathway while thrombin time monitors intrinsic pathway

B- neither one of the both pathways can alone cause hemostasis

**7) wrong about blood Ph**

A- acidosis is below 7.35 B- alkalosis is above 7.45

C- blood Ph is different from water Ph as the neutral Ph is 7.4 rather than being 7

D- any change in Ph causes death

**8) regarding hemophilia A , a healthy man has married carrier women, choose the wrong statement regarding their children**

A- half of males are diseased B- half of females are carriers

C- half of females are healthy D- All females are carriers

**9) Which of the following isn't true**

A- IDA and sideroblastic anemia are the most common forms of microcytic anemia

B- IDA is common clinical problem throughout the world

C- IDA affects 30% of the worlds population

D- indices calculated from the blood are defined

**10) Choose the wrong statement regarding iron absorption**

A- stomach acidity influence iron absorption

B- non heme iron is absorbed from the whole intestine

C- heme iron is preferential in meat products compared to non-heme iron

**11) Which of the following combinations is not true?**


		Haemophilia A	Von-Willibrand Disease
(a)	Inheritance	Sex-linked	Autosomal
(b)	Bleeding Time	Normal	Prolonged
(c)	VIII:C	Low	Low
(d)	VIII:R:Ag	Normal	Low
(e)	<u>Aggregation</u>	<u>Normal</u>	<u>Normal</u>

**12) about hemoglobin, choose the true statement**

- A- hemoglobin saturation curve is dependent on PO<sub>2</sub> and hemoglobin concentration
- B- O<sub>2</sub> content is dependent only on PO<sub>2</sub> and independent on Hemoglobin concentration
- C- hemoglobin saturation curve is independent on hemoglobin concentration

**13) Wrong about haemophilia A**

- A- it is sex linked
- B- causes prolonged bleeding

1 missed question 

1 2 3 4 5 6 7

B B D A B A D

8 9 10 11 12 13

D A B E C B

**MID- doctor 019**

**Q1. Why 2,3 BPG is low in fetal tissues?**

**Ans: Accelerate conversion to subsequent products**

**Q2. Absolute polycythemia can be caused by:**

- A. Diarrhea
- B. Diuretic drugs
- C. Vomiting
- D. Carcinoma in renal cells

**Ans: D**

**Q3. When do we have massive reticulocytosis?**

**Ans: sudden cut in varices**

**Q4. One of these doesn't change between genders?**

**Ans: MCV**

**Q5. One characteristic has least value in differentiation between spleen and lymph nodes**

**Ans: the presence of small cells with dark stained nucleus**

**Q6. All of the following cells can be seen in the cortex of thymus except:**

- A. Macrophages
- B. Dendritic cells
- C. reticular epithelial cells
- D. Double positive T cells
- E. Double negative T cells

**Answer: B**

**Q7. which of the following is an adaptive mechanism in IDA?**

- A. Increased erythropoietin
- B. Diminished hepcidin

**Ans: B**

**Q8. Defasirox is preferred over deferoxamine because :**

**Answer: it's taken orally**

**Q9. Related with vitamin B12 deficiency:**

**Answer: diphylobothrium latum**

**Q10. Which of the following describes MWC model best:**

**Answer: equilibrium changes upon oxygen binding**

**Q11. can't be found in embryo?**

**Answer: HB A2**

**Q12. which of the following blood disorders doesn't cause pancytopenia?**

**A)cooleys**

**B)complicated sickle cell**

**C)megaloblastic**

**D)myelodysplastic**

**E) PNH**

**Answer: A**

**Q13. Not strictly a function of the blood?**

**A. Maintains homeostasis**

**B. Transports hormones and vitamins**

**C. Plays a role in hemostasis**

**D. Carrying oxygen and CO2**

**E. defence against microbes and toxins**

**Answer: A**

**Q14. not true about HbE?**

**Answer: mutation at 6 position**

**Q15. not a definite effect of vitamin b12 deficiency?**

**A) pernicious anemia**

**B) megaloblastic anemia**

**C) sterility**

**D) neuropathy**

**E) macrocytic hypochromic**

**Answer: E**

**Q16. cell with the same size of erythrocyte and blue cytoplasm with large nucleus?**

**Answer: lymphocyte**

**Q17. Which one of the following is a correct pair?**

**Answer: Basophil / Histamine**

**Q18. Correct sequence of blood cells producing sites:**

**Answer: Yolk sac -> Liver -> Bone marrow**

**Q19. all of the following are functions of cortical TEC except:**

**Answer: Expression of special proteins**

**Q20. Correct pair:**

**Answer: methyldopa / spherocytosis**

**Q21. In parasitic infection which of the following increases:**

**Answer: Cells with acidophilic granular bilobular nucleus**

**Q22. Which of the following RBCs are macrocytic and normochromic?**

**Answer: mcv=115, mchc=33**

**Q23. Which of the following isn't affected by CO2 on hemoglobin?**

**Answer: 2,3 BPG**

**Q24. Hb H is caused by: (BIOCHEM)**

**Answer: deletion of 3 genes**

**Q25. Hb Barts is caused by: (PATHO)**

**Answer: deletion of 3 genes**

**Q26. What happens in IDA?**

**Answer: Platelets ↑ + TIBC ↑**

**Q27. Which statement is wrong about granulopoiesis?**

**Answer: Precursors have lobulated nucleus**

**Q28. Wrong statement:**

**Answer: Neutrophils circulate for days in blood after maturation**

**Q.29 Choose the wrong statements:**

**A. Lowest erythropoiesis occurs in pelvis and vertebrae**

**B. All blood cells are formed at the same time in the fetus during the first 3 months**

Answer: A&B – DELETED));

**Q30. Which of the following statements regarding oncotic pressure is incorrect:**

- A. Also called colloidal osmotic pressure
- B. Accounts for a major part of the total osmotic pressure
- C. Regulates fluid movement between tissue and capillaries
- D. Mainly caused by the plasma protein Albumin
- E. A second function of the protein albumin is to transport products, such as fatty acids, hormones, drugs, etc..

Answer: B

**Q31. Mediterranean G6pd isn't manifested by:**

- A. unstable enzyme
- B. large deletions

Answer: A+B (DELETED)

**Q32. Choose the true statement about hemoglobin:**

- a. hemoglobin saturation curve is dependent on PO<sub>2</sub> and hemoglobin concentration
- b. O<sub>2</sub> content is dependent only on PO<sub>2</sub> and independent on Hemoglobin concentration
- c. hemoglobin saturation curve is independent on hemoglobin concentration

Answer: C

**Q33. Choose the wrong statement:**

Answer: Granulocytes have irregular shape in blood, and a spherical shape in connective tissue

**Q34. Which of the following shifts HB saturation curve to the left?**

- A. 2,3 BPG ↑
- B. CO<sub>2</sub> ↑
- C. 2,3 BPG ↓
- D. Temperature ↑

Answer: C

**Q35. Which of the following isn't true about lymphnodes:**

Answer: post capillary venules are located in the outer cortex

**Q36. Choose the wrong statement:**

A. All iron is absorbed in the duodenum

B. Men have lower iron than women

Answer: B

**Q37. Activated B lymphocytes in spleen are located in:**

Answer: Malpighian corpuscles

**Q38. Choose the wrong statement:**

Answer: Erythrocyte contains granules

**Q39. Choose the wrong statement about spleen:**

Answer: it contains post capillary venules

**Q40. What can be found inside the red bone marrow?**

Answer: Hematopoietic stem cells + sinusoidal capillaries + reticular tissue

### Histology

**1) Choose the wrong statement:**

a. Unlike platelets, RBCs never stack together

b. Internum of the crystalloid granules contains major basic proteins

**2) Which of the following is wrong about neutrophils?**

a. it has its own specific granules

b. it lives for several hours only and stores glycogen

c. it has polymorphic nucleus throughout its life

d. measuring neutrophils from blood represents all neutrophils in our body

**3) The cell that contains bi-lobed nucleus and large granules that obscure its nucleus**

a. monocyte

b. eosinophil

c. basophil

d. neutrophil

**4) A cell with c shaped single non lobulated nucleus:**

a. mast cell

b. eosinophil

c. neutrophil

d. monocyte

**5) Which of the following is wrong about reticulocytes?**

a. Contain DNA not RNA

b. increases in hemolytic anemia

c. can synthesize heme

**6) Which of the following is wrong about HLA class II?**

a. it is presented in all nucleated cells

b. it is recognized by T helper

c. it is coupled to peptide product of proteins the cells had ingested

**7) Which of the following is wrong about ultrastructure of platelets?**

a. Dense tubular system (Ca<sup>+</sup>) is in peripheral zone

b. Alpha granules: clotting factors + serotonin

c. They have thick glycocalyx

d. Hyalomere contains cytoskeleton and membranous channels while Granulomere contains granules and organelles

**8) Which of the following is wrong about neutrophil?**

a. peripheral blood count of neutrophils is an absolute measure of their total count

b. Barr body appears in females

c. Its primary granules contain myeloperoxidase

**9) Which of the following is wrong about WBCs?**

a. Neutrophils are the most prominent cells in blood

b. eosinophils are more phagocytic and bactericidal than neutrophils

c. B cells can act as APCs

**10) Which of the following cells increase in level during parasitic infections ?**

a. Neutrophils

b. Basophils



- c. Eosinophils
- d. Lymphocytes
- e. Monocytes

**11) Which of the following is the correct statement?**

- a. Cytotoxic cells recognize MCH 1 and the Ag presented on it
- b. cytotoxic T-Cells bind to MHC 2
- c. cytotoxic T-Cells express MHC 2 on their surface

**12) Which of the following is correct about monocytes?**

- a. They are phagocytic cells
- b. They increase dramatically in parasitic infections
- c. They are responsible for allergic reactions

**13) Which of the following cells have granules containing peroxidase and histaminase?**

- a. neutrophils
- b. basophils
- c. eosinophils

**14) Which of the following is false?**

- a. monocytes have kidney shaped nucleus
- b. 5-lobed-nucleus neutrophils are less mature than 4-lobed ones
- c. B and T lymphocytes cannot be distinguished under LM

**15) Which of the following is false :**

- a. neutrophils phagocytic activity is enhanced by the presence of complement
- b. absence of barr body in neutrophils and other body cells indicate true male (XY)
- c. Neutrophils are called cells of chronic inflammation

**16) which of the following result in true neutrophilia?**

- a. bacterial infection
- b. exercise
- c. administration of epinephrine

**17) Which of the following cells can give rise to an APC ?**

- a. myeloblast

- b. basophil
- c. monocyte

**18) Wrong about monocyte:**

- a. pink
- b. it has azurophilic granules
- c. neutrophil most abundant in plasma

**21) True about monocytes**

- a. multinucleated cell
- b. frosted glass appearance
- c. nucleus is masked by granules

**22) Which one of the following about the eosinophil is NOT true:**

- a. Like neutrophils, they migrate to sites of inflammation.
- b. They represent about 4% of total leukocytes.
- c. Eosinophil's number increases significantly in allergic reactions.
- d. They don't play role in wound healing.
- e. Are easy to spot because of their unique characteristic appearance.

**23) Lymphocytes, choose the CORRECT statement?**

- a. Are produced only in the bone marrow.
- b. Are the most abundant type of leucocytes.
- c. Are produced only in the lymphoid tissues.
- d. Are granular leucocytes.
- e. Are produced in the bone marrow & in the lymphoid tissues

**24) Erythrocytes, Choose the WRONG statement:**

- a. Eosinophilia of erythrocytes is due to hemoglobin.
- b. About one week is needed for the formation of erythrocytes from proerythroblasts.
- c. Erythrocytes appear electron dense and homogenous under TEM.

- d. Rouleaux formation is a reversible condition due to surface tension caused by erythrocytes biconcave surface in slow circulation.
- e. Mature erythrocytes are still capable of producing a little amount of hemoglobin.

**25) Thrombocytes, choose the WRONG statement:**

- a. Microtubules and microfilaments are found in the outer marginal bundle.
- b. Have thick glycocalyx.
- c. Originate from bone marrow cells with many dynamic cell projections.
- d. Often form basophilic clumps in histological preparations.
- e. Lambda granules contain serotonin

**26) Which of the following cells express receptors for IgE on their cell surface ?**

- a. Cells with spherical nuclei and scant cytoplasm.
- b. Biconcave cells with no nuclei.
- c. Multinucleated cells with irregular S-shaped nuclei and large basophilic cytoplasmic granules.
- d. Highly phagocytic cells with many basophilic cytoplasmic granules.
- e. Single nucleated cells with many basophilic cytoplasmic granules.

**27) Blood formed elements, choose the wrong statement:**

- a. Erythrocytes lack class 1 MHC molecules.
- b. Both basophil and mast cell are granulated but basophil nucleus is lobulated while the mast cell nucleus is round.
- c. Human thrombocytes have, in contrast to erythrocytes, never been individual nucleated cells.
- d. The internum of eosinophilic granules contains major basic protein.
- e. Most neutrophils in female peripheral blood normally show barr bodies.

**28) Examination of a normal peripheral blood smear reveals a cell more than twice the diameter of an erythrocyte with a C-shaped nucleus and a frosted glassy cytoplasm; Which of the following cell types is being described ?**

- a. Basophil.

- b. Eosinophil.
- c. Lymphocyte.
- d. Neutrophil.
- e. Monocyte.

1A 2D 3C 4D 5A

6A 7B 8A 9B 10C

11A 12A 13C 14B 15C

16A 17C 18A 19A 20C

21B 22D 23E 24E 25E

26E 27E 28E

### Physiology

**1) Most of the blood exists in:**

- a. arteries
- b. veins
- c. heart
- d. lungs
- e. capillaries

**2) Which of the following is wrong about blood PH?**

- a. acidosis is below 7.35
- b. alkalosis is above 7.45
- c. blood Ph is different from water Ph as the neutral Ph is 7.4 rather than being 7
- d. any change in Ph causes death

**3) A 40-year old woman with 110 g/L Hb,  $3 \times 10^{12}/L$  RBCs and a mean cell**

**diameter of 8.2 microns is not suspected to have:**

- a. IDA
- b. B12 deficiency

c. Folate deficiency

**4) Which of the following is wrong about B12 deficiency?**

- a. it leads to megaloblastic anemia
- b. it mostly affects WBCs
- c. hemoglobin content is relatively high

**5) Which of the following is wrong about albumin?**

- a. it maintains exchange of fluids
- b. it is the most abundant plasma protein
- c. it transports CO<sub>2</sub>

**6) Which of the following is a rare cause of anemia?**

- a. iron deficiency
- b. vitamin B12 deficiency
- c. chronic inflammation

**7) Arrange the following according to activity in hematopoiesis-descending arrangement**

- 1 .Vertebra
- 2 .Sternum
- 3 .Femur
- 4 .Tibia
- 5 .Ribs

- a. 1,2,3,4,5
- b. 1,2,5,3,4
- c. 2,1,5,3,4
- d. 2,3,5,4,3

**8) Which of the following is true about iron?**

- a. the absorption of nonheme iron is restricted to the jejunum
- b. iron is absorbed in ferric form more readily than ferrous form
- c. the second storage for iron in the blood is ferritin

**9) All of the following are required in heme synthesis EXCEPT :**

- a. Glycine

- b. Pyridoxal Phosphate
- c. Succinyl CoA
- d. Acetyl CoA
- e. Ferrous iron

**10) Which of the following statements most describe why RBC's are efficient in carrying oxygen :**

- 1 .contains hemoglobin
  - 2 .have no nucleus
  - 3 .have many mitochondria needed to produce ATP
  - 4 .biconcave shape
  - 5. 4 oxygen molecules are carried by hemoglobin
- a. 1, 3,4
  - b. 2, 4, 5
  - c. 1, 2, 4, 5
  - d. 1, 2, 3, 5
  - e. 1, 2, 3, 4, 5

**11) Which of the following regarding iron absorption is NOT TRUE?**

- a. the daily iron intake is usually equal to daily iron requirement
- b. women have less stored iron than men
- c. more than 65 % of iron is present in hemoglobin
- d. iron absorption is mainly in the upper part of the jejunum
- e. there is more iron absorption from meat and meat products than from vegetable

**12) Which of the following is not true?**

- a. IDA & sideroblastic anemia are the most common forms of microcytic anemia
- b. indices calculated from blood cells are defined
- c. IDA is a common clinical problem throughout the world
- d. estimated to affect 30% of the world's population

**13) A 23 year-old female with a red cell count of  $3.2 \times 10^6$ /microliter, hematocrit**

**of 37%, and hemoglobin concentration of 120g/L. According to the above parameters, which of the following statements is TRUE?**

- a. the RBCs are normocytic, normochromic
- b. the RBCs are microcytic, normochromic
- c. the RBCs are microcytic, hypochromic
- d. the RBCs are macrocytic, normochromic
- e. the RBCs are macrocytic, hyperchromic

**14) In severe chronic anemia, all of the following are compensatory mechanisms except:**

- a. PO<sub>2</sub> increases in arterial part
- b. 2,3-BPG increases
- c. cardiac output at rest is increased
- d. affinity of hemoglobin to oxygen is decreased

**15) Choose the true statement about hemoglobin:**

- a. hemoglobin saturation curve is dependent on PO<sub>2</sub> and hemoglobin concentration
- b. O<sub>2</sub> content is dependent only on PO<sub>2</sub> and independent on Hemoglobin concentration
- c. hemoglobin saturation curve is independent on hemoglobin concentration

**16) A blood sample was tested and the results indicated a red cell count of  $3.8 \times 10^6/L$  and hemoglobin concentration of 16g/deciliter. From the following data:**

- a. We can tell that the person is a female
- b. We can directly calculate the mean corpuscular volume (MCV)
- c. We can directly calculate the mean corpuscular hemoglobin (MCH)
- d. We can directly calculate the mean corpuscular hemoglobin concentration (MCHC)
- e. We can directly tell if the red blood cells are normocytic, microcytic or macrocytic

**17) Which of the following regarding % saturation of hemoglobin and oxygen content is NOT CORRECT?**

- a. The % saturation of hemoglobin is dependent on pO<sub>2</sub>, and completely independent on the concentration of hemoglobin
- b. The oxygen content is dependent on the concentration of hemoglobin
- c. The % saturation of hemoglobin is dependent on pO<sub>2</sub>, as well as on the concentration of hemoglobin
- d. The oxygen content VS pO<sub>2</sub>, will change if the concentration of hemoglobin is changed
- e. The % saturation of hemoglobin VS pO<sub>2</sub> graph will remain the same despite changing the hemoglobin concentration

**18) which of the following results in shift to the right in hemoglobin-oxygen saturation curve?**

- a. exercise
- b. decrease in temperature
- c. increase in PH
- d. decrease in PCO<sub>2</sub>
- e. decrease in 2,3-diphosphoglycerate

**19) Choose the wrong statement regarding iron absorption**

- a. stomach influence iron absorption
- b. non heme iron is absorbed from the whole intestine
- c. heme iron is preferential in meat products compared to non-heme iron

**20) Which of the following is wrong about HbF?**

- a. it could be found in feti as well as in adults but in different concentrations
- b. it has affinity for O<sub>2</sub> similar to that of Myoglobin which is higher than the Hemoglobin affinity for O<sub>2</sub>
- c. it can carry 8 Oxygen atoms

**21) A blood sample with MCH=12g/dl , and blood cells count = 3.2m/microL , choose the right answer**



- a. MCV can be measured
- b. MCH can be measured
- c. MCHC can be measured
- d. this represents normal men values

**22) Choose the wrong statement regarding iron absorption**

- a. stomach acidity influence iron absorption
- b. non heme iron is absorbed from the whole intestine
- c. heme iron is preferential in meat products compared to non-heme iron

**23) One of the following about iron metabolism in the body is NOT true:**

- a. Iron is important for the formation of not only hemoglobin but also other essential elements in the body.
- b. The total iron quantity in the body averages 4-5 gm.
- c. There is heme iron and non-heme iron, non-heme iron is absorbed more efficiently than heme iron.
- d. The amount of iron absorbed is normally about 3-6 % of the ingested amount.
- e. The average daily iron intake is about 20 -30 mg.

**24) One of the following statements about the blood is NOT true:**

- a. The percentage (%) of the fetal hemoglobin in the adult RBC is normally about 1-2%.
- b. The percentage (%) of the reticulocyte cells in the bone marrow and peripheral blood is equally distributed.
- c. The bone marrow begins to produce blood cells not from the very early months of the fetal life.
- d. The fetal hemoglobin is present in every RBC in the blood.
- e. The reticulocyte cells are present in the bone marrow and peripheral blood.

**25) One of the following about erythropoiesis is NOT true?**

- a. All the different forms of blood cells are produced at the same time in the fetus from the first month.

- b. Even trace elements (copper, cobalt) play a role in normal erythropoiesis.
- c. The main hormone that plays a role in erythropoiesis is erythropoietin.
- d. Erythropoietin is produced by the kidneys and other organ(s).
- e. In the adult the highest erythropoiesis occurs in the vertebrae and pelvis.

**26) One of the following about hemoglobin is NOT true:**

- a. In one hemoglobin molecule there are four hemes and four globins subunits.
- b. The term oxygenation is used for hemoglobin binding to oxygen not oxidation.
- c. One hemoglobin molecule can bind four oxygen molecules.
- d. Binding of four heme in the hemoglobin with oxygen doesn't occur at the same time, and the affinity of the fourth heme to oxygen is many times that of the first.
- e. Globins can't bind oxygen but they bind CO, CO<sub>2</sub> and hydrogen

**27) With corresponding RBC morphology, one of the following is NOT true:**

- a. MCV= 69 M<sup>3</sup> (fl), MCH= 23 pg, MCHC= 32% The RBCs are microcytic and hypochromic .
- b. MCV= 90 M<sup>3</sup> (fl), MCH= 30 pg, MCHC= 34% The RBCs are normocytic and normochromic.
- c. MCV= 67 M<sup>3</sup> (fl), MCH= 20 pg, MCHC= 30% The RBCs are microcytic and hypochromic.
- d. MCV= 115 M<sup>3</sup> (fl), MCH= 38 pg, MCHC= 33% The RBCs are macrocytic and normochromic.
- e. MCV= 85 M<sup>3</sup> (fl), MCH= 26 pg, MCHC= 29% The RBCs are normocytic and hypochromic.

**28) The highest (%) of blood volume in an adult at rest mainly in:**

- a. Veins.
- b. Lungs.
- c. Arteries.
- d. Capillaries.
- e. Heart.

**29) One of the following statements about Hb-O<sub>2</sub> relationship is FALSE:**

- a. When plotted (%) saturation against Po<sub>2</sub>, the curve will always be the same whatever the Hb concentration is, if other factors remain the same.
- b. The (%) saturations of Hb with O<sub>2</sub> is dependent on Po<sub>2</sub> as well as the Hb concentration.
- c. The (%) saturation of Hb with O<sub>2</sub> is dependent on Po<sub>2</sub> and totally independent of Hb concentration.
- d. The quantity of O<sub>2</sub> carried in volume of blood is dependent on the Po<sub>2</sub> as well as the Hb concentration.
- e. If O<sub>2</sub> content is plotted against Po<sub>2</sub>, the level of the curve will be dependent on the Hb concentration of the sample of the blood.

**30) An increased in the P<sub>50</sub> of the oxygen- hemoglobin dissociation curve occurs with**

- a. A decrease in hydrogen ions.
- b. A decrease in the PCO<sub>2</sub>.
- c. A decrease in diphosphoglycerate ions.
- d. Exercise.
- e. A decrease in temperature.

**31) Which ONE of the following O<sub>2</sub> Carriers elements has higher O<sub>2</sub> affinity (its Hb-O<sub>2</sub> dissociation curve shifts to the left)?**

- a. Hemoglobin A (HBA).
- b. Hemoglobin A<sub>2</sub>.
- c. Have the same affinity.
- d. Fetal hemoglobin.
- e. Myoglobin.

**32) Which one of the following about the HCT is NOT true:**

- a. The value of HCT is usually 45%.
- b. The HCT expresses the (%) of red blood cells in a volume of whole blood.
- c. The values of HCT closely paralleled the values of hemoglobin & red cell count.

d. The space occupied by the packed red blood cells is termed the hematocrit.

e. The value of HCT does not vary with age & sex of the individual.

\* Wrong about Iron – is mostly absorbed in the jejunum (maybe)

Wrong about B12 – its deficiency mostly affects WBCs

True about Hb – its saturation curve is independent of Hb concentration

Wrong about albumin – transports CO<sub>2</sub>

\* Knowing Hb and cell count – you can find the MCH

Answers:

1B 2D 3A 4B 5C

6B 7B 8C 9D 10C

11A 12A 13D 14A 15C

16C 17C 18A 19B 20B

21B 22B 23C 24B 25A

26E 27A 28A 29B 30D

31E 32E

### Pathology

1) Very easy description of iron deficiency anemia, what is your next step?

- a. Iron studies
- b. hepcidin level
- c. Electrophoresis
- d. bone marrow biopsy

2) Reticulocyte count is used to differentiate between?

- a. Microcytic and macrocytic
- b. Hemolysis anemia and normocytic anemia
- c. Anemia of hemorrhage and anemia of bone marrow failure
- d. Iron deficiency anemia and thalassemia

**3) Chronic disease anemia caused by high**

- a. Hepcidin
- b. Iron

**4) Which of the following causes pancytopenia**

- a. Immune hemolytic anemia
- b. Thalassemia
- c. Iron deficiency anemia
- d. Hereditary spherocytosis
- e. B12 deficiency

**5) Which one of the following is NOT a cause of vitamin B12 deficiency?**

- a. Jejunal resection.
- b. Gastrectomy.
- c. Malabsorption.
- d. Veganism.
- e. Lack of gastric intrinsic factor

**6) Which of the following is NOT an expected finding in a patient with iron deficiency anemia?**

- a. Koilonychia (spoon nails)
- b. Angular stomatitis
- c. Hypochromic microcytic red blood cells
- d. Pallor
- e. Symmetric paraesthesia in lower limbs

**7) Recent research showed that patients with marked obesity have increased level of IL-6 in blood that is mainly secreted from adipose tissue which results in anemia.**

**Which of the following is an expected finding?**

- a. Absent haptoglobin level
- b. High erythropoietin level
- c. High reticulocyte count

- d. Low total iron binding capacity
- e. Presence of gall bladder stones

8) Which of the following is MOST likely to be required by a 5-year-old boy with chronic renal insufficiency?

- a. Oprelvekin (IL-11)
- b. Cyanocobalamin
- c. Erythropoietin
- d. Deferoxamine
- e. Filgrastim (G-CSF)

9) Chronic alcoholism is a risk factor for:

- a. Megaloblastic anemia
- b. Iron deficiency anemia
- c. Aplastic anemia
- d. Immune hemolytic anemia
- e. Myelodysplastic syndrome

10) Which of the following is wrong about hepcidin?

- a. It is increased in iron overload
- b. It is decreased in inflammation
- c. it decreases iron absorption

Answers:

1A 2C 3A 4E 5A

6E 7D 8C 9A 10B

### Biochemistry

1) Which of the following is wrong about HbA1c (glycosylated hemoglobin)?

- a. measurement of glucose bound to valine on Beta hemoglobin chains
- b. patient should be fasting
- c. according to IFCC 100mmol/mol is acceptable
- d. B+C

**2) Which of the following is wrong about allosteric regulation?**

- a. low Ph decreases the affinity of hemoglobin towards oxygen
- b. the major effect of CO<sub>2</sub> is form carbamate
- c. 2,3-BPG does its action by increasing electrostatic interactions
- d. Bohr effect works by electrostatic interaction between His with negatively charged amino acid on the same chain

**3) Which of the following statements is False?**

- a. BPG forms salt bridges with a lysine, a histidine and in both beta chains .
- b. BPG increases the energy needed to transform hemoglobin from T to R state
- c. Both Mb & Hb are affected by 2,3-BPG

**4) All of the following favor the transformation from the T form to the R form of hemoglobin except:**

- a. decreased PH
- b. decreased 2,3-BPG
- c. decreased temperature

**5) Which one of these Hb isn't normally found in your body ?**

- a. HbH
- b. HbF
- c. HbA<sub>2</sub>

**6) Which of the following is true about R and T forms of Hb?**

- a. R releases protons
- b. R has less affinity for oxygen than T

**7) Which of the following is wrong about the structure of heme?**

- a. iron is coplanar with the heme in deoxy form Hb
- b. Iron can form six bonds
- c. porphyrin consists of four rings (designated A-D) called pyrrole rings

**8) Regarding the binding of 2,3 BPG , it makes a cross linking by which subunits?**

- a. B1, A1 subunits
- b. B1 , B2 subunits
- c. B1 , A2 subunits
- d. A1 , A2 subunits

**9) All of the following are true about heme except :**

- a. Contains 4 methyl and 4 vinyl groups attached to it
- b. The iron is held in the center of the heme molecule by bonds to the four nitrogens of the porphyrin ring.
- a. Heme is a complex of protoporphyrin IX and ferrous iron (Fe<sup>2+</sup>)

**10) The R form of hemoglobin is fixed by:**

- a. Electrostatic interaction between Asp of beta chain with His within the same chain.
- b. Electrostatic interaction between carboxylate of His146 with Lys of alpha chain.
- c. Electrostatic interaction between His146 of beta chain with Asp of the alpha chain.
- d. Hydrogen bond between Asn of beta chain with Asp within the same chain.
- e. Hydrogen bond between Asn of beta chain with Asp of alpha chain.

**11) Prediabetes is characterized by having these lab results of glucose:**

- a. 155 mg/dL or 7%.
- b. 212 mg/dL or 11.8 mmol/L.
- c. 120 mg/dL or 40mmol/mol.
- d. 9% or 11.8 mmol/L.
- e. 8% glycosylated glucose or 64 mmol/mol.

**12) A carbamate is formed between CO<sub>2</sub> and:**

- a. Arg141 of the alpha chain.



- b. His146 of the beta chain Iron of heme.
- c. The N-terminus of the alpha chain.
- d. The carboxylate end of the beta group.

**13) Chloride ions move through the membrane of red blood cells in association with movement of:**

- a. Bicarbonate ion in the opposite direction.
- b. Oxygen.
- c. Protons in the same direction.
- d. Bicarbonate ion in the same direction.
- e. Protons in the opposite direction.

**14) 2,3-bisphosphoglycerate binds weakly to fetal hemoglobin than adult hemoglobin because:**

- a. The heme pocket is less hydrophobic.
- b. Fetal hemoglobin has a serine instead of a histidine 143 residue.
- c. Fetal hemoglobin has a narrower core.
- d. The lysine residue within the core of hemoglobin is replaced by a tyrosine.
- e. The N-termini of the alpha chains of fetal hemoglobin are acetylated.

Answers:

1D 2B 3C 4A 5A

6A 7A 8B 9A 10E

11A 12C 13A 14B