



## Academy Of Health Sciences, Lodhran

### Anemia

#### 1. Define anemia

#### 2. Classification of the anemia On the basis of size of the RBC (MCV)

- a. Microcytic hypochromic anemia
  - i. Iron deficiency anemia
  - ii. Thalassemia
- b. Macrocytic normochromic anemia
  - i. Megaloblastic anemia
  - ii. Pernicious anemia
- c. Normocytic normochromic anemia
  - i. Anemia due to blood loss
  - ii. Many hemolytic anemia

#### 3. Classify hemolytic anemia

- a. Extravascular hemolytic anemia ; destruction of the RBCs outside the blood vessels i.e. in spleen and liver
- b. Intravascular hemolytic anemia
  - i. Extracarpuscular
    - Autoimmune hemolytic anemia
    - Drug induced
    - Infections etc.
  - ii. Intracarpuscular
    - Thalassemia
    - G6PD deficiency
    - Pyruvate kinase deficiency etc.
  - iii. Membranopathies
    - Spherocytosis
    - Eleptocytosis etc.

#### 4. Classify anemia on the basis of underlying mechanism

- a. Anemia due to blood loss
  - i. E.g. Acute or chronic blood loss
- b. Anemia due to increased destruction of RBCs
  - i. E.g. hemolytic anemia
- c. Anemia due to decreased production of RBC
  - i. E.g. aplastic anemia, iron deficiency anemia

#### 5. Define the following terms

- a. Pack cell volume (PCV)
- b. Hematocrit (hct)
- c. Mean cell volume (MCV)
- d. Mean cell hemoglobin (MCH)
- e. Mean cell hemoglobin concentration (MCHC)
- f. Erythrocyte sedimentation rate (ESR)



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### 6. Describe the signs and symptoms of the anemia

- a. Pallor skin
- b. Anorexia
- c. Headache
- d. Insomnia
- e. Syncope
- f. Lethargy
- g. Malaise
- h. Black circles around eyes
- i. Splenomegaly (In hemolytic anemia)
- j. Hepatomegaly (In hemolytic anemia)
- k. Hemoglobinurea (In hemolytic anemia)
- l. Hemosidrinurea (In hemolytic anemia)
- m. Jaundice (In hemolytic anemia)
- n. Koilonychia (In iron deficiency anemia)

### 7. Explain the structure of the hemoglobin.

One Hb molecule contain 4 globin chains and four haem molecules. One haem molecule is attached with one globin chain. One combination of Globin and haem carries one oxygen molecule. So one Hb molecule carries four oxygen molecules. One RBC contains about 2 million molecules of Hb.

- a. Haem
  - i. Iron (Fe).... It gives red color to Hb
  - ii. Protoporphyrin ring (Upon degradation it forms bilirubin i.e yellow pigment)
    - Tetrapyrrol ring
    - Methylene bridge
- b. Globin
  - i. 2  $\alpha$ -chains (141 amino acids) .....if length get shorter it is  $\alpha$ -thalassemia
  - ii. 2  $\beta$ -chains (146 amino acids).....if length get shorter it is  $\beta$ -thalassemia

### 8. What are the basic tests to diagnose anemia

- a. CBC/CP
  - i. Hb
  - ii. TLC
  - iii. Platelets
  - iv. DLC
    - Neutrophils
    - Lymphocytes
    - Monocytes
    - Eosinophils
    - Basophils
- b. ESR
- c. Reticulocyte counts (High in hemolytic anemia)
- d. Hb electrophoresis for thalassemia