University of Mosul
Lecture No.: 2
College of Veterinary Medicine
Date:
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Lecture title: Hematology -1-

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Summary:

Erythrocytes:

Normal & Abnormal :

Normal red cell : 2.0 um, Cross- sectional view. , 7.5 um Top view .

Abnormal morphology of Erythrocytes : Normocytic, Microcytic &Macrocytic.

Evaluation of Erythrocyte Picture

 This will include:

1 -Determination of total erythrocyte count. (T/L)

2-Determination of Hemoglobin concentration.(Gm./L)

3-Determination of Packed cell volume (P.C.V%)

 4-Detrmination of mean corpuscular volume (MCV)(FL)

5-Detrmination of mean corpuscular Hemoglobin MCH(pg)

6-Determination of mean corpuscular Hemoglobin concentration MCHC(gm/dl)
7.Determination of Erythrocyte morphology.

Pathological variations:

I-Total Erythrocyte count:

a.Polycythemia :

 It means increased number of total erythrocyte count .polycythemia Vera is a disease characterized by an absolute increase in the number of total erythrocyte count (TRBSs).Accompanied by an increase in total blood volume . The case was seen in dogs ,cat and bovine. True polycythemia appears following hypoxic stimulation of the bone marrow under the following condition :

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1 -Exposure to high altitude .

2-Any disease that interferes with oxygenation of the erythrocyte as in obstructive lesion in air passage ways ..

3-Conginatel heart diseases in which there is a right to left shunting of blood.

b.Anemia:

Is a reduction in the number of erythrocyte ,hemoglobin , or both in circulating blood .

2-Hemoglobin concentration.

3- packed cell volume (P.C.V).

4.Mean corpuscular volume (MCV-FL) : It is determined as follows:

MCV=PCV x 10   = Femto litiers(FL).

TRBCs count in mm3

e.g = 45 × 10 = 90 FL

5

This indices is used to classify red cells as:

Normocytic red blood cells are of normal size.

Microcytic red blood cells are of smaller than normal.

Macrocytic red blood cells are of larger than normal.

MCV value is used to classify anemia morphologically .

5-Mean corpuscular hemoglobin (MCH-PG) .

MCH =HB x 10   pictogram(pg.).

TRBCs count in mm3

e.g. = 150 × 30 pg.

5

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6-Mean corpuscular hemoglobin concentration (MCHC)G/DL.

MCHC=   Hb per liter x 100   g/dl

P.C.V reading %

e.g. = 150 x 100= 30 g/dl

50

Based on MCH and MCHC red blood cell may be :

Normochromic red cells with normal Hb concentration.

Hypochromic red cells with lowered Hb concentration.

Hyper chromic red cells elevated Hb concentration.

7- Erythrocyte morphology :

It is bean studied in blood smears . Wet smears are preferred for detection of alteration in Size and Shape.

Erythrocyte of the cow, Sheep and Dog are typically biconcave whereas those of the Horse and Cat have a shallow concavity and those of the Goat are the rather flat.

Anemia :

Definition:

Reduction in the number of erythrocytes, hemoglobin or both below the lower limit of the normal range in the circulating blood.

Classification:

I-The two most common and widely accepted classification are:

a-Morphological classification.

b-Etiological classification.

2-Morphological classification is based on the results of MCV, MCH and MCHC values.

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Classify Anemia According to Morphology:

1-Microcytic hypochromic .

2-Microcytic normochromic.

3-Normocytic normochromic.

4-Macrocytic normochromic

1-Normocytic Normochromic Anemia:

 MCV normal, MCHC normal

 Examples:

 1-acute blood loss 2-aplastic anemia . 3- most leukemia. 4- bone marrow infiltration.

 2-Microcytic Normochromic Anemia :

 MCV decreased , MCHC normal

Examples: 1- mid-stage iron deficiency   2- thalassemia

3-Microcytic Hypochromic Anemia :

MCV decreased , MCHC decreased

Examples: 1- iron deficiency 2- Thalassemia. 3-lead poisoning 4-anemia of chronic disease.

4-Macrocytic Normochromic Anemia :

MCV increased , MCHC normal

Examples: 1-folate deficiency   2- vitamin B12deficiency   3-pernicious anemia.

2-Etiological anemia may be as a results of :

a-Blood loss.

b-Excessive destruction of erythrocytes or shortened erythrocyte life span.

c-Depression in bone marrow.

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d-Nutritional deficiencies.

References:

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