Lecture 7: RBCs indices

Red cells indices :

- They are calculated from **total red cell count**, **hematocrit(pcv)** and **hemoglobin.**
- It can determined by automated hematology analyzer in CBC test or manual

Usefulness of RBCs Indices :

- It used to help diagnose the cause of anemia
- These parameters are useful in classifying anemia's into **microcytic**, **normocytic**, or **macrocytic**; and **hypochromic** or **normochromic**..

Note: three most used RBCs indices are the MCV, MCH and MCHC

- They include :

1. **Total red blood cells (RBC):** The number of red cells is given as an absolute number per litre.
2. **Hemoglobin (Hb):** The amount of hemoglobin in the blood, expressed in (grams per decilitre) (d/dl). (Low hemoglobin is called anemia.)
3. **Hematocrit or packed cell volume (PCV)** : This is the fraction of whole blood volume that consists of red blood cells.
4. **Mean corpuscular volume (MCV)** : The average volume of the single red cell.
5. **Mean corpuscular hemoglobin (MCH) :** The average amount (or wight) of hemoglobin per single red blood cell.

6. **Mean corpuscular hemoglobin concentration (MCHC)** : The average concentration (or wight) of hemoglobin inside all the red blood cells. It correlates with the degree of hemoglobinization of the red cells on the peripheral blood film.

7. **Red blood cell distribution width (RDW):** A measure of the variation of the RBC population.

RBC indices

RBCs indices		Unit	Normal range	usefullness
MCV	$\mathbf{Mcv}=\frac{hct}{rbc}\times 10$	Femtoliter fl	80-100 fl	MCV increased in macrocytic anemia and decreased in microcytic anemia like IDA and thalassaemia
MCH	$MCH=\frac{Hb}{rbc}\times 10$	Picogram pg	27_32 pg	MCH increased in macrocytic anemia and decreased in microcytic anemia like IDA and thalassaemia
MCHC	$MCH=\frac{Hb}{pcv}\times 100$ *Hb g/dl* *OR* $MCH=\frac{MCH\ pg}{MCV\ fl}\times 100$	Percentage Or g/dl or g/l	32_36 g/dl or percentage	MCHC is useful guide to measure the degree of hypochromasia present in IDA
RDW		Percentage	11.5_14.5	RDW is more sensitive in microcytic anemia than macrocytic anemia Used to distinguished IDA from thalassemia