**\_ 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**

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| --- | --- | --- | --- | --- |
| RBCs indices  |  | Unit  | Normal range | usefullness |
| MCV | **Mcv=**$ \frac{hct}{rbc}$ **×10** | Femtoliter fl | 80-100 fl | MCV increased in macrocytic anemia and decreased in microcytic anemia like IDA and thalassaemia |
| MCH | ***MCH***$=\frac{ Hb}{rbc}×10$ | Picogrampg | 27\_32 pg | MCH increased in macrocytic anemia and decreased in microcytic anemia like IDA and thalassaemia |
| MCHC | ***MCH***$=\frac{ Hb}{pcv}×100$***Hb g/dl*** ***OR******MCH***$=\frac{ MCH pg}{MCV fl}×100$ |  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  |