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Haemoglobin and Red Cell Indices

Practical 01 / Teaching laboratory

Aim

Measure or interpret haemoglobin, haematocrit and red cell indices in an approved teaching sample.

Principle

Haemoglobin measures the oxygen-carrying protein concentration. Haematocrit is the red cell volume fraction. The two measures and the red cell count provide different information.

Materials and Requirements

- Simulated blood count and packed-cell-volume readings
- Approved haemoglobin method or analyser display
- Reference and quality control records

Procedure

1. Verify the sample identity, method and units. Check instrument or reference controls before accepting values.
2. Set up the worksheet with columns for haemoglobin in g/dL, haematocrit in percent and RBC count in millions per microlitre. Check whether any value requires conversion.
3. Read haemoglobin and haematocrit from the authorised demonstration and record the raw red cell count.
4. In a packed cell demonstration distinguish the red cell column from the buffy coat and plasma. Use the supplied scale and record the proportion as a percentage if that convention is required.

Continue with step 5 on the next page.

Procedure Continued

Haemoglobin and Red Cell Indices

5. Compute MCV in fL as haematocrit × 10 divided by RBC count. Compute MCH in pg as haemoglobin × 10 divided by RBC count. Use the same RBC concentration units for both.
6. Compute MCHC in g/dL as haemoglobin × 100 divided by haematocrit in percent. Calculate before rounding, then cross-check the arithmetic against the example.
7. Compare each result independently with its laboratory interval. Flag inconsistent inputs or an implausible index for confirmation before describing the red cell pattern.
8. Relate the pattern to the supplied reference interval and write one reason an independent smear may be useful.
9. Enter calculated values and units next to the raw data. Give a short morphology statement supported by the indices and distinguish a possible cause from the measured pattern.

Precautions

- Use approved prepared material. Follow local specimen and sharps rules if a demonstration uses clinical material.
- Convert a decimal haematocrit to percent before applying the displayed formula.

Observations and Interpretation

Haemoglobin and Red Cell Indices

Observations and Record

Item	What to record	What it tells you
Haemoglobin	g/dL and method	Quantifies haemoglobin concentration
Haematocrit	Percent or L/L	Use the correct basis in calculations
Red cell indices	MCV, MCH and MCHC	Characterise cell size and haemoglobinisation

Worked Example

With Hb 12 g/dL, haematocrit 36% and RBC 4.0 million/µL, MCV = 36 × 10 / 4 = 90 fL. MCH = 12 × 10 / 4 = 30 pg. MCHC = 12 × 100 / 36 = 33.3 g/dL.

Result and Interpretation

Report the indices with units and relate them to the blood picture. Use laboratory intervals appropriate to the case.

Viva Questions and Answers

What does MCV represent?

Average red cell volume.

Why record the RBC units?

The displayed index factors assume millions of cells per microlitre.

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