

HEMATOLOGY CALCULATIONS

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PURPOSE To provide instruction for manual calculations of Hematology related parameters.

BACKGROUND

The automated hematology analyzer measures some parameters and calculates others. In certain circumstances it may be necessary to manually calculate the Indices or other parameters. **All parameters must be valid and not influenced by interfering factors before calculating the results.**

Calculations done by LIS may need to be done manually during down time.

Calculations included here:

MCV

MCH

MCHC

RBC

HCT

WBC corrected for NRBCs

Absolute Neutrophil count- ANC

Correcting RBC for high WBC

Body Fluid cell counts

Platelet count done on Blue Top (Citrate) tube

Retic parameters- Retic Corrected Count and RPI

INR- for INR calculation formula, see ACL TOP-Prothrombin Time (PT)

NOTE: These are different representations of the same units

- cumm = mm³
- square mm= mm²
- 10³ = 1,000
- 10⁶ = 1,000,000

RELATED DOCUMENTS

LH Retic Count M-W-HEM1573

Hemocytometer Counts R-W-HEM1405

INSTRUCTIONS

- **MCV:(Mean Corpuscular Volume)**

$$MCV = (HCT \times 10) \div RBC$$

For example: $MCV = (45.0 \times 10) \div 5.00 = 90$ reporting units are fL.

- **MCH (Mean Corpuscular Hemoglobin)**

$$\text{MCH} = (\text{HGB} \times 10) \div \text{RBC}$$

For example: $\text{MCH} = (16.0 \times 10) \div 5.00 = 32.0$ reporting units are pg

- **MCHC (Mean Corpuscular Hemoglobin Concentration)**

$$\text{MCHC} = (\text{HGB} \times 100) \div \text{HCT}$$

For example: $\text{MCHC} = (16.0 \times 100) \div 48 = 33.3$ reporting units are g/dl

- **RBC (10^6)**

$$\text{RBC} = \frac{\text{HCT}}{(\text{MCV} / 10)}$$

For Example: $\frac{29\%}{(93/10)} = 3.12$ reporting units are 10^6

- **HCT (Hematocrit)**

$$\text{HCT} = \text{RBC} \times \text{MCV} \div 10$$

For Example: $\text{HCT} = 5.23 \times 101.4 \div 10 = 53$ reporting unit is %

- **CORR WBC (WBC corrected for Nrbc's)**

$$\text{CORR WBC} = \frac{\text{Total Nucleated Cell Count} \times 100}{100 + \text{NRBC}}$$

For Example: $\text{CORR WBC} = \frac{12.5 \times 100}{100 + 8 \text{ NRBCs counted}} = 11.6$ reporting units are $\times 10^3$

- **ABSOLUTE NEUTROPHIL, also known as ANC (includes Neuts and Bands),**
ABSOLUTE NEUTROPHIL = $\text{WBC} \times \frac{(\text{Neut}\% + \text{Band}\%)}{100}$

For Example: $\text{ANC} = 8.2 \times \frac{(60 + 11)}{100} = 5.8$ reporting units are $\times 10^3$

- **Correcting RBC count when WBC is elevated**

Corrected RBC=Original RBC result – Correct WBC result

For Example: Corrected RBC if RBC from instrument is 3.12 and WBC is 250.0 x 10³

$$\text{Corrected RBC} = 3.12 - (250/1000) = 2.87 \text{ reporting units are } \times 10^6$$

- **Body Fluid Cell Counts-** 1 large square is 1 mm²

Body Fluid Cell count= $\frac{\text{\# cells counted}}{\text{\#large squares}} \times \frac{\text{Dilution Factor}}{0.1 \text{ (depth of chamber)}}$

For Example: A times 2 dilution was made, 4 squares were counted and 56 cells were present.

$$\frac{56}{4} \times \frac{2}{0.1} = 280 \text{ cells, reporting units are /cumm}$$

- **Platelet count done on Blue Top (3.2% Citrate) tube**

Corrected Platelet count= Instrument platelet count x 1.1

For Example: 253 x 1.1 = 278 reporting units are x10³

- **Retic Corrected Count or RCC**

RCC= $\frac{\text{Raw Retic\% from instrument} \times \text{Patient HCT}}{\text{Reference Hct (see table in LH Retic Count W.I.)}}$

For Example: Patient Hematocrit is 35, patient is 45 years old so the reference HCT is 37, Retic% is 3.2

$$\text{RCC} = \frac{3.2 \times 35}{37} = 3.0 \text{ reporting unit is \%}$$

- **Retic Production Index or RPI**

RPI= $\frac{\text{RCC}}{\text{Mat Time (see table in LH Retic Count W.I.)}}$

For Example: Where RCC is 3.0 and patient HCT is 35, the maturation time is 1.5

$$\text{RPI} = \frac{3.0}{1.5} = 2.0 \text{ no reporting units are used}$$

REFERENCES

LH750 Operator's Guide—Sample Analysis

Beckman Coulter Retic-C package insert

Clinical Hematology—"Principles, Procedures, Correlation, Cheryl A. Lotspeich-Steinger, E. Anne Stiene-Martin, John A. Koepke, J. B. Lippincott Company, 1992, pp. 116-117.

Rodak, Bernedette, Hematology, Clinical Principles and Applications, W.B. Saunders, Co., 2 nd ed., 2002, Chapter 13, pp.163-165.

Hematology Procedures for Abnormal Bloods, Beckman-Coulter Manual, 11, pp. 3.1- 3.3, 4.23-4.25.