ELEVATED WBC COUNT FOR DXH/LH

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PURPOSE

To provide instruction for managing CBC samples with interference from elevated WBC counts on the LH and DXH analyzers.

BACKGROUND

Elevated WBC counts near or over 100, may give invalid results for some CBC parameters due to increased turbidity in the WBC/RBC bath. The MCV and RBC results may be falsely elevated due to WBC's being counted simultaneously with RBC's and PLT's in the RBC bath. The Analyzers flag the WBC result with an "R" Flag or with the code: (+++++) when interference is detected. Interference may affect all parameters. The HGB and PLT may be least affected, unless the WBC count is extremely high, or if hemolysis, lipemia, or platelet interference is also present.

LH USERS: When any interference is detected, affected parameters will have an "R" flag or (+++++) Flag.

DxH USERS: The DxH software algorithm automatically corrects for interferences. When corrected, NO flagging will display on the WBC and associated parameters, unless the correction fails. If the software is not "confident" in the correction, "R" flags will display on affected parameters. These parameters must be reviewed.

RELATED DOCUMENTS

R-W-HEM1436	Hematology Calculations
R-W-HEM1326	Hematology Slide Review
R-PO-HEM0108	Pathologist Review of Blood and Body Fluids

SPECIMEN

Potassium (K2/K3) EDTA whole blood specimen

EQUIPMENT / SUPPLIES

Hematology Analyzer Diluent and / or 0.9% saline for dilution, dilution pipette
Glass slide

STEPS

1. Prepare and stain 1 or 2 slides for slide review and for referral to the pathologist, if indicated.

2. Dilute the sample with the minimum dilution necessary (X2 or X3) to eliminate suspect or system flagging and repeat testing. To avoid inaccuracy, do not use a dilution factor greater than X4.

- LH Users- **do not** set the instrument dilution factor to automatically correct for the dilution. It is recommended instead, to type the dilution factor as part of the sample identifier and to manually correct for the dilution. For example: x3 10009154432
- DxH Users: Results are **not** corrected for the dilution factor. **Note:** The Pre-dilute function has not been validated. Multiply the WBC, RBC, HGB, HCT, and PLT by the dilution factor.

3. Review the WBC result. The dilution result must fall within reportable limits. See CBC Review Criteria policy for the specific analyzer series.

4. Review the remaining parameters. If results are not flagged with "Suspect" or "System" flags (i.e "R"-flag) and correlate with the original results, the WBC, RBC, HGB, HCT and PLT results may be manually corrected for dilution and reported. See WI for Failed Patient Run for acceptable correlation checks.

NOTE: Do NOT correct these parameters for dilution MCV, MCH, MCHC, RDW, MPV, Differential

5. If R-flags remain after dilution, you may consider using a larger dilution factor. Report only unflagged parameters. In many cases, the HGB, MCV, and PLT may be reportable simply through dilution.

6. If flags remain on the RBC, or indices, subtract the WBC count from the RBC result. See manual calculation below. (This is performed to correct the RBC for the presence of a large number of WBCs) Enter the corrected RBC in LIS. Do not result the MCH, and MCHC unless you manually calculate the corrected values. You may report these, including the RDW as "N/A" in LIS. Add the comment: "Unable to report due to interference from elevated WBC count."

7. You may use the corrected RBC and the MCV to manually calculate an estimated HCT. Calculations are listed at the end of the procedure. Add the comment: "HCT result is estimated due to interference from elevated WBC count."

8. If the WBC and PLT remain flagged, perform slide estimates. The results may be reported if the estimate matches the count by 15% and no other obvious interference is noted (i.e., platelet clumps or NRBC's).

9. Compare the automated differential results with the slide. Follow the procedure for Hematology Slide Review. In many cases, a manual differential may be indicated.
   NOTE: For better accuracy for WBC counts above 100.0, it is recommended you count additional cells for the differential. (For example, perform two 100 cell counts and average the results before reporting.)

10. Carefully review and report the RBC, WBC, and PLT morphology and call any critical results.

11. Follow the laboratory policy: Pathologist Review of Blood and Body Fluids to determine if a slide should be submitted for review.

IMPORTANT PROCEDURAL NOTES

- When using dilutions, the result of the diluted sample must fall within reportable limits prior to multiplying by the dilution factor.
- Results for the indices may be obtained by manual back-calculation but should be viewed with caution due to possible inaccuracy. See procedure: Hematology Calculation work instruction. If results are manually calculated, add chartable comments in LIS to those tests: "Results have been manually calculated from estimated results, review results with caution."

- **LH750 USERS**: (Product Corrective Action Alert from Beckman Coulter): BCI has identified a software issue for patients exhibiting a VERY elevated WBC count in the region of $600x10^3$ µL AND when the cells are predominately small lymphocytes (i.e. Chronic Lymphocytic Leukemia). Per Beckman, the LH750 software may incorrectly calculate the WBC count, falsely low. Therefore, for WBC counts near 300.0 x 10^3 µL or higher, perform a 1:3 dilution of the sample and correlate this result with a WBC slide estimate before reporting the WBC result.

MANUAL CALCULATION FOR CORRECTED RBC

Corrected RBC = RBC-WBC

Example: RBC is 4.00 million and WBC is 200.0 thousand

Corrected RBC = 4,000,000 – 200,000 = 3,800,000 or 3.80 million

MANUAL CALCULATION OF HEMATOCRIT

$$HCT\% = \frac{MCV \times \text{Corrected RBC}}{10}$$

REFERENCES

Hematology Procedures for Abnormal Bloods, Beckman-Coulter Manual, Procedure 1, pp. 3.1-3.5.

Instructions for Use UniCel® DxH 800 Coulter® Cellular Analysis System PN 629743AE (March 2009)