HEM.SYSMEX.5.0 Complete Blood Count Using the Sysmex XS-1000i/XS-1000

PRINCIPLE

The Sysmex XS-1000i/1000 analyzer is an automated hematology analyzer for in vitro diagnostic use in screening patient populations found in clinical laboratories. The XS-1000i/1000 can analyze and output the results of 24 parameters of a blood sample.

The Sysmex XS-1000i/1000 analyzer performs analysis of WBC and differential with an optical detector block based on the flow cytometry method, using a semiconductor laser. The RBCs and platelets are analyzed by the RBC detector using the Hydro Dynamic Focusing method. Analysis data is displayed on the Information Processing Unit (IPU.) Hemoglobin is analyzed by the HGB detector based on the SLS hemoglobin detection method.

The following steps are automatically performed by the analyzer. After sample aspiration, a part of the whole blood sample is diluted to 1:50 with lysing reagent STROMATOLYSER-4DL and then STROMATOLYSER-4DS dye is added. After a predefined response time the stained sample is introduced into the detector, where forward light scatter and side fluorescent emission are measured. From this, five leukocyte populations are computed: neutrophil count (NEUT#), lymphocyte count (LYMPH#), monocyte count (MONO#), eosinophil count (EO#), and basophil count (BASO#), as well as neutrophil percentage (NEUT%), lymphocyte percentage (LYMPH%), monocyte percentage (MONO%), eosinophil percentage (EO%), and basophil percentage (BASO%).

The Sysmex XS-1000i/1000 analyzer is equipped with a rinse cup to provide automatic cleaning of the sample probe after sample or control blood aspiration. It is not necessary to wipe the sample probe.

OWNERS

Manager, St. Vincent Anderson Hospital Based Laboratory

RELATED DOCUMENTS

HEM.SMEARS.4.0	Blood Smear Review and Differential
HEM.SMEARS.6.0	Criteria for Review of Blood Smears by a Pathologist (DFREV)
HEM.SYSMEX.9.0	Quality Control Management on the Sysmex XS, XT, XE
HEM.SYSMEX.10.0	Maintenance on the Sysmex XS, XT, XE

SPECIMEN

A. Required specimen
   1. Whole blood anticoagulated with K EDTA preferred.

2. Sodium Citrate may be used as an alternative when platelet clumping or platelet satellitism is noted on the EDTA specimen. Use Sodium Citrate results only for platelet counts and WBC counts. Multiply instrument PLT and WBC result by 1.1 to correct for anticoagulant dilution. See Data Review section.

B. Specimen volumes required

1. Optimal draw is a tube drawn to capacity. Minimum volume is a ¼ filled tube. Tubes that are less than ½ full will be checked for erroneous results associated with short draw specimens. For example, but not limited to, clumped platelets or clotted samples due to difficult draws.
   EXCEPTION: a 2.5mL EDTA tube filled less than ½ full is unacceptable.
2. A minimum of 1 mL whole blood is required for auto mode analysis.
3. An EDTA micro-container filled above the 250 µL line is adequate for testing in the open mode.

C. Stored Specimen Stability

1. Stored at 2-8°C, EDTA blood samples (4.0 mL, 2.0 mL and microtainers) may be analyzed up to 48 hours for CBC without significant loss of differential stability.
2. Sample stability at room temperature is 48 hours. Samples stored at room temperature may exhibit an increase in MCV after 24 hours, which may be minimized by refrigeration.
3. Allow refrigerated samples to come to room temperature for a minimum of 15 minutes and mix well before analysis.
4. Specimens collected by venipuncture are best when tested within 4 hours of collection due to possible disintegration of platelets.
5. Micro-samples should be tested as soon as possible after collection.
6. WBC differentials are less stable than the hemogram. Differential analysis of WBC's is best when testing is performed within 12 hours of collection to prevent abnormal distribution of WBC's caused by weakened WBC membranes.

D. Unacceptable specimens must be redrawn. Examples:

1. Samples containing clots, fibrin strands or platelet clumps. All specimens will be checked visually by the operator for obvious clots prior to sampling.
2. Grossly hemolyzed samples (causes falsely decreased RBC and hematocrit).
3. Samples drawn above an IV.

REAGENTS

A. The Sysmex XS analyzers use the following reagents:

Reagent	Function	Volume per Container	Open Expiration
Cellpak (EPK)	Whole blood diluent for use in hematology analyzers	20 L	60 days
Stromatolyzer -4DL (FFD)	Diluent and lyse reagent for the enumeration of LYMPH, MONO, EO, and granulocytes after eliminating RBC stroma	5L	60 days
Stromatolyzer-4DS (FFS)	Used to stain leukocytes in diluted, lysed blood samples for the determination of the 5-part differential including LYMPH, MONO, EO, and granulocytes	42 mL	90 days
Sulfolyser (SLS)	RBC lysing reagent that releases the hemoglobin to be measured by SLS hemoglobin method	500 mL	60 days

1. All reagents are stored at room temperature and are to be used within the expiration date.
2. Record date received and date opened on container.
3. All reagents are azide free, and intended for in vitro diagnostic use only; do not ingest.

B. Other reagents

1. *e*-CHECK (XS): Tri-level commercial controls. Store vials at 2-8°C. When properly stored, unused vials are stable to the expiration date on the vial. Once opened, the product is stable for 14 days when promptly refrigerated after each use. Unused material from open vials should be discarded after 14 days. Do not add residual to a new vial. Record open date on each vial upon opening. Once a vial is opened, the new expiration date should be written on the vial.
2. Sysmex SCS-1000: a secondary whole blood calibrator. Store at 2-8°C. Do not freeze or expose to excessive heat. Unopened and properly stored, SCS-1000 is stable until expiration date stated on the vial. Open vial stability is 4 hours. Calibration is performed by Sysmex field engineers.
3. CLOROX® bleach (used for Sysmex Cell-clean). A 5% solution of Clorox® bleach is recommended for use in cleaning and shutdown of Sysmex analyzers.

** Note that 5% Clorox® bleach must be prepared from the 8.25% concentration commercially available using the following formula:

Formula	(Conc. 1) x (Vol. 1) = (Conc. 2) x (Vol. 2)

8.25% Concentration	(8.25%) x (Vol. 1) = (5.00%) x (100 mL)
Solve (Vol. 1)	(Vol. 1) = $\frac{0.05 \times 100 \text{ mL}}{0.0825}$
Answer	Vol. 1 – 60.6 mL
Conclusion	**V1 = 60.0 mL 8.25% bleach and 39.4 mL of CLRW will make 100 mL of 5% sodium hypochlorite solution**

a. Once prepared, solution should remain tightly capped when not in use.
b. Diluted bleach should be dated. Expiration is 7 days. Store in the dark.

EQUIPMENT /SUPPLIES

A. Equipment
   1. Sysmex XS analyzer (1000i/1000) (with or without Autoloader)
   2. Sample racks (for Autoloader)
B. Supplies
   1. Clinical Laboratory Reagent Water (CLRW)
   2. Lint-free plastic lined lab wipes
   3. Test tubes
   4. Gauze
   5. Wooden applicator sticks

CALIBRATION

Initial calibration is performed during installation and verified bi-annually during preventative maintenance (PM) by a Field Service Representative, or by remote assistance by Field Service Representative. Calibration compensates for any bias inherent to the pneumatic, hydraulic, and electrical system that may affect the accuracy of results. Calibrators traceable to reference methods are used in the calibration of the instrument. WBC differential parameters are calibrated in the factory prior to shipment and verified by the Sysmex Field Service Representative upon installation.

The laboratory must verify calibration every six months or on an “as needed” basis to ensure accuracy of the system. Calibration is also required if one or more of the following occur:

1. Critical parts are replaced such as manometers, apertures, or detector circuit boards.
2. Controls show a usual trend or are outside the acceptable limits and cannot be corrected by maintenance or troubleshooting.
3. When advised by Sysmex Field Service Representative.

Calibration verification may include review and documentation of acceptable performance of all three levels of commercial control, and Xm QC data, proficiency testing results and patient control testing results. The operator may calibrate the following parameters: WBC, RBC, HGB, HCT, and PLT.

QUALITY CONTROL

See HEM.SYSMEX.9.0 Quality Control Management on the Sysmex XS, XT, XE

PROCEDURE

A. SAMPLE ANALYSIS – SAMPLER MODE (only for XS-1000i Autoloader):

1. Place bar coded EDTA specimens in the sample rack. Ensure that labels are smooth with no loose edges.
2. Place sample rack in the sample bay. Close the Sampler cover.
3. On the IPU, click **[Sampler]** or press **[F3]**. The Sample number dialog box displays.
4. Click on the starting position or the rack and tube position in which the tubes have been placed. Press **[OK].** Note that it is not necessary to specify tube position, but doing so will make the testing process quicker if the sample is not placed in position 1 as the analyzer will check each rack position until a sample is detected.
5. Press the sampler **[Start]** switch on the left side of the Main Unit.
6. The Sysmex XS automatically mixes the sample 10 times, aspirates and analyzes the sample according to the bar code.
7. A dialog box displays when analysis is complete.

B. SAMPLE ANALYSIS – MANUAL MODE (XS-1000i without Autoloader):

1. On the IPU, click **[Manual]** or press **[F2].**
2. Enter the specimen number (accession number) using the keyboard or scan using the hand held bar code reader.
3. Click **[OK]**.
4. Ensure appropriate sample tube adapter is in place. Adapter for pediatric tubes must be used for all micro-sample tubes.
5. Mix the patient sample 10 times by gentle end-to-end inversion.
6. Place sample in the sample tube adapter. It is necessary to remove the cap when using non-pierceable micro sample containers.
7. Press the **Start** switch. (Located inside the sampler cover on the XS.)

DATA REVIEW

If any of the parameters on a specimen have had a considerable change from their most recent previous results, the Sunquest computer will flag as a failed delta. A considerable change might include the following:

1. WBC count 0-10.5 150% change
   WBC count >10.5 50% change
2. Hgb ± 3.0 gms/dL
   a. If HGB fails delta high from previously lower HGB, check Function IQ, test: BB (Blood Bank) for transfused blood products. Comment – PRB "Patient received blood product" if applicable.
3. MCV ± 4.0 fL
   a. Check Function IQ, test: BB for transfused blood products. Comment – PRB if applicable.

b. Check for agglutinin or rouleaux on Wright-stained smear.
c. Check for IV fluid contamination by examining plasma for lipemia. Specimen must be recollected if contaminated with IV fluid.

4. 30% change of PLT count
   a. Check for clot.
   b. Check Function IQ, test: BB for transfused PLT products.

NOTE: Checking Function IQ, test: BB (Blood Bank) for transfused blood products refers only to testing personnel at HBLs. Checking specimen integrity, labeling and patient identification is sufficient.

These are only suggested guidelines to use since it is up to the technologist's discretion to check any parameter that changes or that doesn't appear to be a feasible result for that specimen or patient.

Any specimen suspected for inaccurate results due to a flagged delta, abnormal instrument histogram or flag, or noncorrelating results should be checked for clots by visual inspection and with applicator sticks.

C. <u>PERFORM A MANUAL DIFFERENTIAL FOR THE FOLLOWING SITUATION</u>

1. Patients under 3 months of age.
2. WBC Suspect flags.
   NRBC?, Blasts?, Immature Grans?, IG Present, WBC ABN Scattergram, Abn Lympho/Blasts?
3. WBC <1.0 x 10^3 µL, regardless of flags.
4. WBC > 45.0 x 10^3 µL, regardless of flags.
5. %EOS >25
6. %BASO >4
7. Absolute LYMPH >9.0 x 10^3 µL in children and >6.0 x 10^3 µL in adults.
8. Absolute MONO >10x 10^3 µL
9. For MACL specimens or specimens approaching 24 hours old, hold the differential to scan. See HEM.SMEARS.4.0

D. <u>Review a Wright-stained slide for the following situations.</u>

1. RBC Fragments
2. MCV <70 with RBC ≥ 5.0 with no previous history
3. MCV >110 with no previous history
4. RDW >22.0 with no previous history
5. Left Shift?
6. Atypical Lymphocyte: Scan. If atypicals present, do DIFF.
7. Platelet flags:

- Platelet >800 or < 30 x 10^9 µL with no previous history
- PLT Abn Distribution—after review of the slide, if the platelet slide estimate is in agreement with the instrument result, type "**HIDE**" for the MPV result if the instrument was unable to calculate a result.
- * on Platelets
- PLT Clumps: only scan slide if result is less than the reference range

A. All specimens that are ordered with a differential should be sent for a pathologist review if any of the results meet the defined criteria (see HEM.SMEARS.6.0). If a pathologist review has been ordered by a physician, the specimen must have had a differential ordered and performed on it in order to be sent to the pathologist for review.
B. If for any reason a slide is made on a sample that does not have a differential ordered and upon reviewing the slide, abnormalities are noted which meet the criteria for review, the slide should be sent for a pathologist review. The technologist should record on the report the reason, or criteria, that prompted the pathologist review to be ordered.
C. If you do not get a RDW result due to RBC ABN Distribution, **HIDE** it.
D. Turbidity/HGB Interference: SPIN SPECIMEN
    a. If hemolyzed, recollect specimen
    b. If lipemic, perform dilution or plasma replacement
E. Action Displays and Flagging – RERUN PROMPTS
    1.. If further action is necessary for analyzing a specimen, a message stating **Positive** will appear in the upper left corner of the display as well as on the printout.
    2.. Extremely elevated WBC's may cause turbidity and increase the hemoglobin. It may be necessary to dilute the specimen 1:7 with Cellpack and analyze the diluted sample using the capillary mode.
        a. If making a 1:7 dilution of patient specimen and NOT running in the capillary mode, multiply measured parameters by 7; recalculate indices.
        b. If correcting the HGB and HCT due to interfering substances recalculate and correct the affected indices:

            MCHC = HGB/HCT x 100
            MCH = HGB/RBC x 10
            MCV = HCT/RBC x 10

    3.. A variety of flags can appear on the print out and on the main or graph tab contents. The operator must dilute or use other means of resolving the sampling problem. Flags include:

@	Data is outside linearity limits
*	Data is unreliable and may affect results
----	Analysis cannot be performed
++++	Data exceeds analyzer's reportable range

4.. Platelet clumping or satellistism

a. If platelet clumping is determined to be the problem, vortex the sample for 1-2 minutes at high speed. Rerun the sample and make a new slide. If the platelet clumps have disaggregated and the slide review agrees, then the count can be reported from the vortexed sample along with the MPV. An estimate of the WBC count should also be performed from the vortexed sample, since the platelet clumps could have falsely elevated the WBC count in the nonvortexed sample.

b. If vortexing does not disaggregate clumps, an estimate of platelet concentration must be made from the blood smear.
   i. If platelets appear adequate, i.e., within or above the normal range, result platelet with text code **PAQ** – "Platelets clumped in EDTA but appear adequate on smear. Recollect in citrate for accurate count."
   ii. If platelets appear decreased, i.e., below the normal range, result platelet with text code **PAD** – "Platelets appear decreased on smear but clumped in EDTA. Recollect in citrate for accurate count." Call report to floor or doctor's office.
   iii. If platelets appear increased, i.e., near or above critical value, result platelet count with text code **PAI** – "Platelets appear increased on smear by clumped in EDTA. Recollect in Sodium Citrate for accurate count. Call report to floor or doctor's office.
   iv. Report MPV with **UNCAL** "Unable to calculate"

c.. Platelet satellitism is a condition of the platelets encircling the peripheral borders of the neutrophils. Satellitism is due to a plasma factor which reacts in the presence of EDTA. Follow step c above. If unable to obtain a sodium citrate specimen, incubate the blood at 37˚C for 30 minutes to obtain accurate WBC count. Verify that the platelets have dissociated from WBCs on a slide of pre-warmed blood before resulting WBC. Result PLT with text code **PLSAT** – "Platelet satellitism in EDTA, but count appears adequate on smear. Recollect in citrate for accurate count." Result MPV with **UNCAL**.

d.. Upon receipt of Sodium Citrate tube:
   i. Run sodium citrate specimen on the Sysmex. Multiply results of platelet and WBC count by 1.1 to correct for the dilutional effect of the anticoagulant. Check counts by examining a Wright-stained smear.
   ii. If clumping problem is resolved, enter calculated WBC and PLT result with comment – **CITR** – "Test performed on citrate specimen"
   iii. RBC, Hgb, Hct, MCV, RDW, and RBC indices are reported from the EDTA tube.

iv.. The MPV is reported directly from the Sysmex reading on the Sodium Citrate specimen (no multiplication required).

v.. If clumping is present on the sodium citrate smear, notify doctor's office or floor of need for recollection using a finger stick for the manual platelet method. Send manual platelet fingerstick collection to Regional Hematology Laboratory.

VIEWING/PRINTING ANALYZER RESULTS

A. Confirm that GP and HC are check-marked and all boxes are marked "output" in the auto-report under the settings. If these are not selected, the analyzer will not communicate with the host and the printer.

B. To view results, select Explorer from the analyzer main screen.

C. To find a recently assayed specimen, highlight the desired sample and double click anywhere in the highlighted area.

D. To find a patient sample by accession number:
   1. On tool bar click Edit
   2. Click Find
   3. Enter sample number or patient ID in pop up box.
   4. Click Next. If specimen not found click Previous.
   5. Specimen will be highlighted in list. To view graph either double click in highlighted area or click browser.

E. To retransmit data to host:
   1. Find specimen in explorer list.
   2. On tool bar click Report.
   3. Click on Host (HC).

F. To reprint a report:
   1. Find specimen in explorer list.
   2. On toolbar click on Report.
   3. Click on Report (GP).

G. To view graphs of each specimen, select Browser. Use the down arrow to scroll through samples that have been run recently. Highlight and double-click to select the desired sample.

ENTERING SAMPLES INTO THE SYSMEX COMPUTER

A. Samples will be automatically uploaded into the Sysmex computer once samples have been received in Sunquest function CVIS. The analyzer will perform the testing associated with that accession number.

B. The analyzer may prompt to rerun a sample, or the operator may decide that a rerun of a sample is indicated. In these cases, it is necessary to manually enter the sample identification and required tests into the system.

1. Select Worklist
2. Type in sample accession number
3. Select test(s)
4. Type in patient medical record number
5. Confirm patient information
6. Click Save

CALCULATIONS

HCT = $\frac{\text{RBC X MCV}}{10}$ MCH = $\frac{\text{HGB X 10}}{\text{RBC}}$ MCHC = $\frac{\text{HGB X 1000}}{\text{RBC X MCV}}$

REPORTING RESULTS

A. Reference Ranges:

Parameter	Sex	1-14 days	15-30 days	31-60 days	61-180 days	.5-2 yr	2-10 yr	10-18 yr	>18 yr
WBC (K/cu.mm)	Male	8.6-14.9	7.4-13.3	6.0-13.7	6.6-15.6	6.3-15.4	4.0-12.0	3.2-11.0	3.3-10.5
	Female	8.3-17.6	6.9-15.0	6.1-13.8	6.8-16.2	6.4-15.5	4.0-12.0	3.2-11.0	3.2-11.0
RBC (mil/cu.mm)	Male	3.8-5.3	3.0-5.0	2.9-3.8	3.5-4.8	4.1-6.0	4.00-5.30	3.90-5.60	4.15-5.75
	Female	3.9-5.2	2.3-4.4	2.3-4.4	3.6-4.7	4.0-5.0	4.00-5.30	3.90-5.30	3.80-5.20
Hgb (g/dL)	Male	12.2-19.9	9.1-16.9	8.7-12.7	9.7-13.3	10.3-13.1	11.5-14.5	11.1-16.1	12.8-16.9
	Female	13.6-18.8	10.5-15.6	9.4-13.5	9.9-13.1	10.4-13.2	11.5-14.5	11.1-15.0	11.6-15.2
Hct (%)	Male	36.2-58.5	26.7-50.3	25.2-37.1	28.2-39.7	30.8-39.1	33.0-43.0	32.9-46.7	38.8-50.2
	Female	39.1-58.5	31.8-46.9	27.2-41.6	28.8-39.5	30.7-39.3	33.0-43.0	32.9-46.7	34.4-45.6
MCV (FL)	Male	95.9-100.9	80.3-100.1	83.9-91.8	71.8-85.1	69.5-79.7	76.0-90.0	78.0-95.0	78.0-100.0
	Female	98.0-104.2	88.9-98.4	82.9-93.8	73.8-85.8	70.9-80.1	76.0-90.0	78.0-95.0	78.0-100.0
MCH (PG)	Male	32.2-35.3	30.0-33.7	28.6-31.8	24.2-29.0	23.2-27.3	25.0-31.0	26.0-32.0	27.0-34.0
	Female	32.4-36.5	29.7-34.4	28.6-32.2	24.8-29.2	23.4-27.4	25.0-31.0	26.0-32.0	27.0-34.0
MCHC (g/dL)	Male	32.8-35.3	33.0-35.3	33.0-35.8	32.6-35.3	32.4-35.0	32.0-36.0	32.0-36.0	32.0-36.0
	Female	32.9-34.4	33.3-35.1	33.4-35.5	32.6-35.4	32.4-34.9	32.0-36.0	32.0-36.0	32.0-36.0

RDW (%)	Male	15.2-18.0	14.5-18.5	13.8-16.3	12.2-15.0	12.7-15.0	11.5-15.0	11.5-14.0	11.5-15.0
	Female	15.3-16.6	14.2-17.0	14.0-16.4	12.1-14.5	12.6-14.7	11.5-15.0	11.5-14.0	11.5-15.0
PLT (K/cu.mm)	Male	249-481	253-493	269-591	307-619	229-494	150-450	150-450	150-450
	Female	236-441	315-506	320-608	304-574	238-497	150-450	150-450	150-450
MPV (FL)	Male	7.3-11.5	7.3-11.5	7.3-11.5	7.3-11.5	7.3-11.5	7.3-11.5	7.5-11.9	7.7-12.2
	Female	7.3-11.5	7.3-11.5	7.3-11.5	7.3-11.5	7.3-11.5	7.3-11.5	7.5-11.9	7.7-12.2

B. Sysmex linearities:
   a. WBC: 0.10 – 400 x 10^3 µL
   b. RBC: 0 – 8.00 x 10^6 µL
   c. HGB: 0 – 25.0 g/dL
   d. HCT: 0 – 60.0%
   e. PLT: 1 – 5000 x 10^9 µL

C. Critical Values:
   HCT, adult < 18%
   HCT, newborn < 28%
   HGB, adult < 6 g/dL
   PLT (> 12 years old) < 20 x 10^9 µL , > 999
   PLT (≤ 12 years old) < 50 x 10^9 µL, > 999
   WBC > 74.9 x 10^3 µL
   SEGSA <0.4k/mm^3 absolute neutrophils

D. Reportable Range
   Parameters that exceed the limits listed below are flagged with @ beside the result. The sample must be diluted 1:7 with Cellpack and rerun using the capillary mode.
   1 WBC >400x10^3/uL
   2 RBC >8.0x10^6/uL
   3 HGB >25.0 g/dL
   4 HCT >60.0%
   PLT >5000x10^3/uL

ONLINE ENTRY

1 Function: OEM, <cr>
2 Tech: <cr>
3 Shift: <cr>
4 Device: Site method Code, <cr>; Test 1: <cr>
5 Workload Data For: <cr>
6 Start at Cup: **Enter number or enter, <cr>**
7 Cursor will appear below accession number assigned to the cup number. Check to see that

these numbers are correct. <cr>

8 Accept (A), Modify (M), Prelim (P), or Reject (R):

A: If results are acceptable and there are no messages to attach to report enter:

A, <cr>

M: If there are messages to attach to the report type **M-WBC, <cr>**. The WBC will appear on the screen. Enter "-" then English text codes if indicated, or "-;" to add free text comments. Also select "M" to modify results if a dilution, saline replacement, etc. has been performed and these results need to be entered in place of the original results.

R: Reject

LIMITATIONS

A. Reject clotted samples or those containing clots, fibrin strands, or platelet clumps. All specimens will be checked visually by the operator for obvious clots prior to sampling on the analyzer. Reject all clotted specimens.

B. Severely hemolyzed samples (in vitro) falsely decrease RBC and hematocrit. Recollect grossly hemolyzed specimens.

C. Do not place samples on a mechanical rocker. Constant rocking may cause PLT clumping and alter white cell membranes resulting in false flagging messages.

D. Cold agglutinins produce spurious macrocytosis, elevated MCH's, MCHC's, falsely decreased RBC counts and HCT's. Warm the specimen at 37°C for minimum of 15 minutes and rerun. Some specimens may require up to one hour incubation due to a high level of red cell agglutination.

E. Giant platelets and clumped platelets may falsely elevate the WBC count and falsely decrease the platelet count.

F. Abnormal paraproteins found in Multiple Myeloma patients can falsely increase the HGB and on rare occasions the WBC and PLT parameters can be affected. To correct HGB perform saline replacement using Sysmex Cellpack.

G. Lipemia falsely elevates the HGB and MCHC. Perform a plasma replacement by making 1:7 dilution with CELLPACK.

H. Severely icteric samples falsely elevate the HGB value and related indices. Make a 1:7 dilution with CELLPACK.

I. Possible Additional Sample Interferences:

1 WBC – Where the following are present, the white blood cell count may be reported falsely high: red blood cells resistant to hemolysis; cold agglutinins; platelet aggregation; nucleated RBCs; cryoglobulin.

2 RBC – Where the following are present, the red blood cell count may be reported falsely low: cold agglutinins; microcytosis; fragmented erythrocytes. The red blood cell count may be reported falsely low in the presence of leukocytosis (more than 100,000/µL.)

3 HGB – Where the following are present, the hemoglobin may be reported falsely high: leukocytosis (more than 100,000/µL); lipemia; bilirubin.

4 HCT – Where the following are present, the hematocrit value may be reported falsely low: cold agglutinins; fragmented erythrocytes. Where the following are present, the hematocrit value may be reported falsely high: leukocytosis (more than 100,000/µL); severe diabetes; uremia.

5 PLT – Where the following are present, the platelet count may be reported falsely low: pseudo platelet attrition; platelet aggregation; megalocytic platelets. Where the following are present, the platelet count may be reported falsely high: micro erythrocytes; red cell fragments; WBC fragments; cold albumin.

REFERENCES

A. Sysmex Instructions for Use XS-1000i/XS-800i, Sysmex Corporation, Kobe, Japan, June 2011.

B. Sysmex User's Guide, XS-1000i/XS-800i, Sysmex Corporation, Kobe, Japan, June 2011.