TRAINING UPDATE

Lab Location:	GEC, SGAH & WAH	**Date Distributed:**	4/10/13
Department:	All staff	**Due Date:**	5/1/13

DESCRIPTION OF PROCEDURE REVISION

Name of procedure:
Hemolysis, Icteria and Lipemia Interference **GEC.L04, SGAH.L05, WAH.L05 v002**
Description of change(s):
Section 4: revise hemoglobin levels of slight and moderate hemolysis Section 6: updated documents Section 9: add App A (HIL Interference Chart), update App B Changes are shown in yellow highlight on the attached SOP

Document your compliance with this training update by taking the quiz in the MTS system.

Approved draft for training all sites (version 002)

Non-Technical SOP

Title	**Hemolysis, Icteria and Lipemia Interference**	
Prepared by	Hannah Tran	Date: 12/8/2008
Owner	Robert SanLuis	Date: 7/24/2012

Laboratory Approval		
Print Name and Title	**Signature**	**Date**
Refer to the electronic signature page for approval and approval dates.		
Local Issue Date:	Local Effective Date:	

Review:		
Print Name	**Signature**	**Date**

Form revised 3/31/00

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1. PURPOSE

The presence of hemolysis, icteria and lipemia in serum or plasma may lead to erroneous laboratory test results. This procedure outlines how specimens, which have visible hemolysis, icteria or lipemia or which have been measured hemolysis, icteria or lipemia by the Siemens Dimension System, should be handled in this laboratory.

2. SCOPE

Applies to all test procedures.

3. RESPONSIBILITY

All specimen processing and technical staff must be competent in identifying hemolyzed, icteric and lipemic samples and follow appropriate procedures.

4. DEFINITIONS

Hemolysis – alteration or destruction of red blood cells in such a manner that hemoglobin is liberated into the medium in which the cells are suspended

Hemolysis Grading System (see Appendix A)

Slight: ≈ 100 mg/dL hemoglobin
Moderate**:** ≈ 200 mg/dL hemoglobin
Gross: ≈ or > 500 mg/dL hemoglobin

Icteria – The yellow greenish color of the serum or plasma cause by bilirubin, a byproduct of old red cells.

Lipemia – Is manifested by a milky appearance of the serum or plasma caused by an excess of lipids in the blood.

5. PROCEDURE

Handling visible hemolysis:

1. Remove the specimen from the centrifuge. Make a visual assessment of the specimen's integrity, before testing.

2. If the plasma or serum portion of the specimen has an obvious pink to reddish appearance, compare it to the Hemolysis chart (Appendix A) to estimate the degree of hemolysis. Borderline readings should be reported to the next higher category.

3. If the hemolysis is slight (~100-200 mg/dL) the specimen should be given to the technical staff for testing in all the departments.

4. If moderate or gross hemolysis is observed, the specimen should be handled in the following manner
   Moderate - All coagulation specimens must be recollected
   - Chemistry specimens should be given to the department for testing.
   Gross - All specimens should be recollected

   Note: The Dimension chemistry system will calculate the HIL and Auto-verification rules in Data Innovation (Instrument Manager will flag appropriate action).

5. The staff member handling the sample will query the computer system to determine if other blood specimens have been drawn on the patient at the same time. Each specimen drawn will be located and examined for hemolysis. If moderate (for coagulation only) or gross hemolysis exists in any of the primary tubes, these must also be recollected.
   ***Note**: Staff should exercise due diligence in determining if an alternate, acceptable specimen, might be available for testing before requesting recollection. For example: a green top tube might have been drawn in addition to a red top tube and could be an acceptable alternative for various chemistry assays.*

   For nurse-collected specimens:
   a) Notify the nurse that the specimen is being canceled due to hemolysis.
   b) Nursing needs to reorder for a re-draw.

   For Lab-collected specimens:
   a) Notify the nurse that a specimen is being canceled due to hemolysis.
   b) The Lab will order for a re-draw and a phlebotomist will be notified to re-draw the specimen.

6. Specific specimens
   a) For coagulation specimens, analyze the slightly hemolyzed specimen and report with the comment @HMS (Slight Hemolysis). Lipemia and icteria do not affect coagulation testing.

   b) For chemistry specimens, analyze the specimen and report according to section 8 below.

7. Grossly hemolyzed specimens (500 mg/dL or greater) should not be analyzed without the express permission of the Medical Director, or pathologist on call (example: post-mortem analysis) except when hemolysis does not effect a specific analyte. *For chemistry values refer to appendix B.*

8. The Siemens Dimension clinical chemistry analyzer is set to measures HIL with every analyte tested, which is based on the spectral characteristics of a serum or plasma sample. The HIL provides an index to alert the user to potential interference from hemolysis, icterus, and lipemia in the sample, where:

   H = hemoglobin resulting from lysis of red blood cells
   I = icterus resulting from endogenous bilirubin
   L = lipemia or turbidity caused by insoluble lipids

   The HIL Index appears on the report slip as a three-digit value where:

   1st digit = H index
   2nd digit = I index
   3rd digit = L index

   a) When instrument reports are printed the technologists must check the instrument printouts for "HIL interference" codes. Under normal operation the Data Innovation (Instrument Manager) will flag HIL interference and guide the technical staff with appropriate result commenting or remedial action instruction.

   b) Append the canned comment HIR (Results may be inaccurate due to specimen hemolysis) to all analytes that have the "HIL interference" code for hemolysis.

   c) Append the canned comment IIR (Results may be inaccurate due to specimen icteria) to all analytes that have the "HIL interference" code for icteria.

   d) If the "HIL interference" code for lipemia is displayed, repeat the test(s) after ultracentrifuging the specimen for all tests except AMON (NH_3).

      Note: At GEC, if the "HIL interference" code for lipemia is displayed, the specimen is referred to SGAH Laboratory for testing.

   e) For LDH and K results with the "HIL interference" code for hemolysis remove the numeric results and result with the canned comment HLK (unable to analyze due to hemolysis).

   f) For NH_3 results with the "HIL interference" code for lipemia remove the numeric results and result with the canned comment LLK (unable to analyze due to lipemia), then send out the specimen for testing.

   g) The ordering doctor should be notified every time a NH_3 result is removed.

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Note: For the processing of lipemic and icteric hematology specimens see the procedures Coulter LH750 Operation for Complete Blood Count and Reticulocyte Automated Tests and Coulter HmX Operation for Complete Blood Count as applicable.

6. RELATED DOCUMENTS

Coulter LH750 Operation for Complete Blood Count and Reticulocyte Automated Tests
Coulter HmX Operation for Complete Blood Count
Airfuge Ultracentrifuge (Beckman Coulter™)

7. REFERENCES

None

8. REVISION HISTORY

Version	Date	Reason for Revision	Revised By	Approved By
		Supersedes SOP L010.002		
000	4/16/2010	Updated owner	L. Barrett	L. Loffredo
001	4/1/2013	Updated owners Section 4: revise hemoglobin levels of slight and moderate hemolysis Section 6: updated documents Section 9: add App A, update App B	R. SanLuis	L. Loffredo

9. APPENDICES

A: Hemolysis, Icteria and Lipemia (HIL) Interference Chart
B: HIL Index Alert Values (see Attachment Tab of Infocard)

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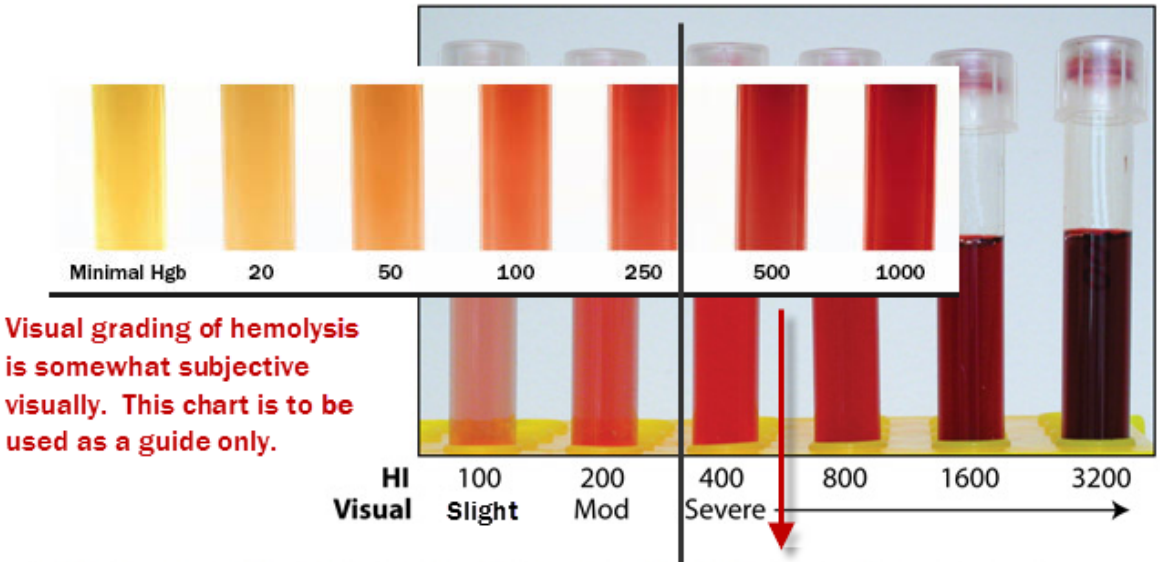
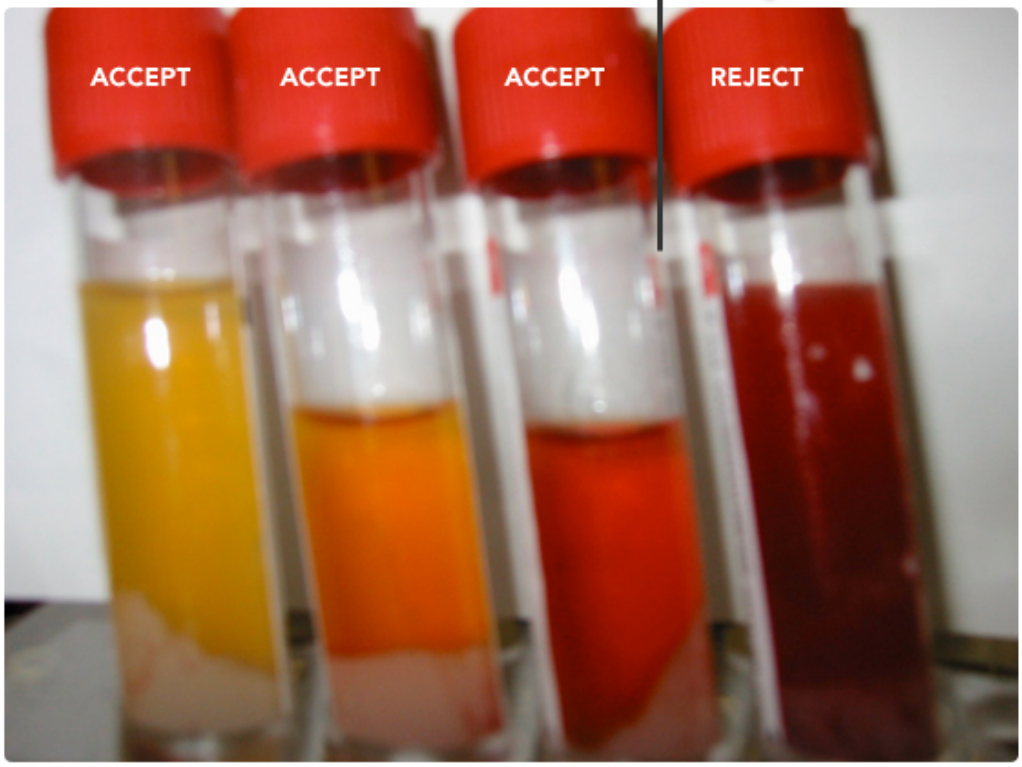
APPENDIX A

Hemolysis, Icteria, and Lipemia Interference



Visual grading of hemolysis is somewhat subjective visually. This chart is to be used as a guide only.



Note: It can be difficult to establish hemolysis when in combination with icteria and/or lipemia. In addition, special consideration/care should be taken when evaluating bullet tubes.

TestCode	Hemolysis Hold	Icteria Hold	Lipemia Hold	Hemolysis Comment	Icteria Comment	Lipemia Comment	Add Comment	Replace Result	Internal Comment Instruction
ALC						8	LIP		
ALC					8		IIR		
ALC				8			HIR		
ALP						8	LIP		
ALP					8		IIR		
ALP				8			HIR		
ALT	8			8			HIR		Hemolyzed
ALT						8	LIP		
ALT						7	LIP		
ALT						5	LIP		
ALT						6	LIP		
ALT				7			HIR		
ALT				8			HIR		
AMON				7			HIR		
AMON				8			HIR		
AMON					7		IIR		
AMON					8		IIR		
AMON			7			7	*	LLK	LLK - Notify RN
AMON			8			8	*	LLK	LLK - Notify RN
AST				3			HIR		
AST				4			HIR		
AST				5			HIR		
AST				6			HIR		
AST				7			HIR		
AST				8			HIR		
AST					4		IIR		
AST					5		IIR		
AST					6		IIR		
AST					7		IIR		
AST					8		IIR		
AST						4	LIP		
AST						5	LIP		
AST						6	LIP		
AST						7	LIP		
AST						8	LIP		
CA				8			HIR		
CA					8		IIR		
CA						5	LIP		
CA						6	LIP		
CA						7	LIP		
CA						8	LIP		
CHOL				8			HIR		
CHOL					3		IIR		
CHOL					4		IIR		
CHOL					5		IIR		
CHOL					6		IIR		
CHOL					7		IIR		
CHOL					8		IIR		
CHOL						8	LIP		
CKI	4			4			HIR		Hemolyzed
CKI	5			5			HIR		Hemolyzed
CKI	6			6			HIR		Hemolyzed
CKI	7			7			HIR		Hemolyzed
CKI	8			8			HIR		Hemolyzed
CRBM			8			8	LIP		Ultra-Centrifuge if Required
CRBM				8			HIR		
CRBM					8		IIR		
CREA				7			HIR		
CREA				8			HIR		
CREA					5		IIR		
CREA					6		IIR		

TestCode	Hemolysis Hold	Icteria Hold	Lipemia Hold	Hemolysis Comment	Icteria Comment	Lipemia Comment	Add Comment	Replace Result	Internal Comment Instruction
CREA					7		IIR		
CREA					8		IIR		
CREA						8	LIP		
DBIL	8			8			HIR		Hemolyzed
DBIL					8		IIR		
DBIL						8	LIP		
DBILN	8			8			HIR		Hemolyzed
DBILN					8		IIR		
DBILN						8	LIP		
ECO2				8			HIR		
ECO2					8		IIR		
ECO2						8	LIP		
GENP			8			8	LIP		Ultra-Centrifuge if Required
GENP					8		IIR		
GENP				8			HIR		
GENT			8			8	LIP		Ultra-Centrifuge if Required
GENT					8		IIR		
GENT						8	HIR		
GLUC	8			8			HIR		Hemolyzed
GLUC					6		IIR		
GLUC					7		IIR		
GLUC					8		IIR		
GLUC						4	LIP		
GLUC						5	LIP		
GLUC						6	LIP		
GLUC						7	LIP		
GLUC						8	LIP		
K				3			HMS		
K	4			4			HIR		Hemolyzed
K	5						*	HLK	Hemolyzed
K	6						*	HLK	Hemolyzed
K	7						*	HLK	Hemolyzed
K	8						*	HLK	Hemolyzed
LA				8			HIR		
LA					7		IIR		
LA					8		IIR		
LA						7	LIP		
LA						8	LIP		
LDI				3			HMS		
LDI	4						*	HLK	Hemolyzed
LDI	5						*	HLK	Hemolyzed
LDI	6						*	HLK	Hemolyzed
LDI	7						*	HLK	Hemolyzed
LDI	8						*	HLK	Hemolyzed
LDI						8	IIR		
LDI						8	LIP		
LIPL	8			8			HIR		Hemolyzed
LIPL					8		IIR		
LIPL						8	LIP		
MG	4			4			HIR		Hemolyzed
MG	5			5			HIR		Hemolyzed
MG	6			6			HIR		Hemolyzed
MG	7			7			HIR		Hemolyzed
MG	8			8			HIR		Hemolyzed
MG						8	LIP		
MG					8		IIR		
PHOS	7			7			HIR		Hemolyzed
PHOS	8			8			HIR		Hemolyzed
PHOS					7		IIR		
PHOS					8		IIR		
PHOS						7	LIP		

TestCode	Hemolysis Hold	Icteria Hold	Lipemia Hold	Hemolysis Comment	Icteria Comment	Lipemia Comment	Add Comment	Replace Result	Internal Comment Instruction
PHOS						8	LIP		
TBIL	8			8			HIR		Hemolyzed
TBIL					8		IIR		
TBIL						7	LIP		
TBIL						8	LIP		
TBILN	8			8			HIR		Hemolyzed
TBILN					8		IIR		
TBILN						7	LIP		
TBILN						8	LIP		
THEO						8	LIP		Ultra-Centrifuge if Required
TOBP						8	LIP		Ultra-Centrifuge if Required
TOBR						8	LIP		Ultra-Centrifuge if Required
TOBT						8	LIP		Ultra-Centrifuge if Required
TP	8			8			HIR		Hemolyzed
TP					6		IIR		
TP					7		IIR		
TP					8		IIR		
TP						8	LIP		
URCA	8			8			HIR		Hemolyzed
URCA					8		IIR		
URCA						8	LIP		
VANC				8			HIR		Hemolyzed
VANC					8		IIR		
VANC						8	LIP		Ultra-Centrifuge if Required
VANP				8			HIR		
VANP					8		IIR		
VANP						8	LIP		Ultra-Centrifuge if Required
VANT				8			HIR		
VANT					8		IIR		
VANT						8	LIP		Ultra-Centrifuge if Required

Hold = Hold for Manual Test Review in Data Innovation (Instrument Manager).