PURPOSE

Hemolysis (intravascular or extravascular) may cause chemical interferences and interference with some optical instrumentation. Hemolysis is defined as the release of intracellular components of erythrocytes and other blood cells into the extracellular space. It can appear in vivo as well as in vitro in all components of the preanalytical phase. After the separation of blood cells, hemolysis is detected in serum and plasma by its red color caused by hemoglobin.

Icteric serum or plasma is noted as having yellowish or brownish discoloration. The discoloration is due to excessive bilirubin in the sample, usually caused by either liver disease or excessive red cell breakdown inside the body. Icterus can affect many lab tests, but recollection is not an option, since it is due to the patient’s disease state and not the collection process.

DEFINITIONS N/A

PROCEDURE

1. Evaluate all specimens for hemolysis.

**2. If hemolysis is noticeably present in plasma/serum, the specimen should be redrawn.**

3. Safeguards are built into the analyzer to interpret the amount of hemolysis present (indices), even if it is not grossly visible. The analyzer will flag results affected by hemolysis based on the analyte.

4. In the absence of gross hemolysis, the following guidelines should be followed:

A. Analytes that are not affected by the measured level of hemolysis will be reported.

B. Enter a Generic Comment for the specimen:

Generic comment for mild (non-visible) hemolysis:

*Hemolysis is present in the sample. The hemolysis index is* ***XXX****.*

C. Non-critical analytes that are affected in a predictable way will be reported as “See Note”.

The result will be reported in the Comment section along with a standard interpretive comment.

In general, this will apply to analytes Asp Aminotransferase (AST), Direct bilirubin (DBil), Lactate

dehydrogenase (LDH), Acetaminophen (Acet), and Unsaturated iron binding capacity (UIBC).

Comment for AST, DBil, LDH, Acet, UIBC:

*Hemolysis is present in the specimen. The measured value is* ***ZZZ (UNITS)****.*

*Manufacturer’s studies have shown that recovery of this analyte is* ***FALSELY***

***INCREASED BY GREATER THAN 10%*** *in the presence of hemolysis.*

D. Troponin T, a critical analyte, is affected by hemolysis in a predictable way. It will be

reported as “See Note”. The result will be reported in the Comment section along with a

standard interpretive comment.

Comment for Troponin T:

*Hemolysis is present in the specimen. The measured value is* ***ZZZ (UNITS)****.*

*Manufacturer’s studies have shown that recovery of this analyte is* ***FALSELY***

***DECREASED BY GREATER THAN 10%*** *in the presence of hemolysis.*

E. Potassium, a critical analyte, will not be reported in hemolyzed specimens except under the

specific circumstances outlined in section F below. In the result field, enter the comment

 “Hemolyzed – unable to perform”. In the Comment section, enter the potassium-specific

standard comment. Telephone the clinical team to notify that the assay cannot be performed,

and document in the Comment section.

Comment for Potassium:

*Hemolysis is present in the specimen; the assay cannot be performed. Notification was*

*given to ZZZ.*

Have the floor reorder potassium and see that specimen is recollected as soon as possible. If

the floor cannot reorder the potassium, it is OK for the lab to reorder.

F. Under exceptional circumstances, the treating provider may ask, and the pathologist may

approve, analysis and reporting of potassium in hemolyzed samples, particularly for samples

from neonates. This exception will be made routinely for neonatal intensive care patients

because of the wider acceptable “normal” range for this age cohort AND because it is used

more to adjust TPN and less as a critical analyte requiring immediate intervention. When

potassium is reported in hemolyzed samples, the comment “*Hemolyzed – see comment*” will be

placed in the result field and the following neonate-specific comment will be placed in the

comment section.

Comment for Potassium reported in neonates:

*The specimen has a hemolysis index of* ***XXX,*** *which is known to falsely elevate*

*potassium levels. The measured potassium is* ***ZZZ (UNITS)****. The true potassium value*

*is less than the measured value.*

5. In the very rare event that repeated samples are grossly hemolyzed or that there is extensive in

vivo hemolysis (resulting in grossly hemolyzed samples), then report results as follows:

A. Notify the clinical team.

B. Enter a generic comment for the specimen:

Generic Comment:

*Gross hemolysis is present in the sample. The hemolysis index is* ***XXX****. Repeat draw*

*attempts have failed to yield a non-hemolyzed sample. When feasible, measured values*

*are reported in the Comment section for each requested analyte. Please refer to the*

*hemolysis interpretive table for further information. The hemolysis interpretive table is*

*provided as an appendix to procedure (****PROCEDURE NUMBER****) Notification was given*

*to ZZZ.*

C. Analytes that are not affected by the measured level of hemolysis will be reported.

D. In the result field for Potassium, enter “*Hemolyzed – unable to perform*”. In the Comment

section, enter the potassium-specific standard comment for hemolyzed specimens.

E. For analytes other than potassium, result with “*See Note*.”

F. Enter the following in the Comment section for analytes other than potassium:

Comment:

*Hemolysis is present in the specimen. The measured value is* ***ZZZ (UNITS)****. Please*

*refer to the hemolysis interpretive table for further information.*

6. For Blood Bank, Coagulation, and Hematology testing, using hemolyzed specimens is

inappropriate.

7. Any questions concerning application of these guidelines should be directed to the Laboratory

Director or the Director of Laboratory Services.

**Icterus**

1. Evaluate all specimens for icterus.

2. If icterus is present in the plasma/serum, results for Total Protein (TP), Creatininine, Ammonia,

CO2, Creatinine Kinase,, GGT, Calcium, and Direct Bilirubin are affected. By extension, eGFR,

which is a calculated value based on Creatinine, is also affected.

3. Safeguards are built into the analyzer to interpret the amount of icterus present. The analyzer

will flag results affected by icterus based on analyte.

4. Result all tests affected with *“See Note”,* and add standard comment with test result.

Comment for Total Protein (TP), Creatinine, Ammonia, CO2, Creatinine Kinase, GGT,

Calcium, and Direct Bilirubin:

*An interfering substance is present (icterus). The measured value is* ***ZZZ (UNITS)****.*

*Interpret with caution.*

5. Additionally, result eGFR with *“See Note*”, and add standard comment.

Comment for eGFR:

*Unable to report due to presence of an interfering substance (icterus).*

RELATED DOCUMENTS

Hemolysis Interpretive Table

Hemolysis & Icterus Comments

REFERENCES

1. Clinical and Laboratory Standards Institute, H18-A4 Vol. 30 No. 10. Copyright 2010. .

“Procedures for the Handling and Processing of Blood Specimens for Common Laboratory Tests;

Approved Guideline-Fourth Edition.

2. Roche Cobas, package insert Serum Index (SI2). Copyright, 2010.

3. Zhang, J. and Meng, Q. (2011). “*Evaluation of the interference of hemoglobin,*

*bilirubin, and lipids on Roche Cobas 6000 assays”.* Clinica Chimica Acta.

Personal communication with Alice Johnson and Dr. Nathan Lepp, April 17, 2013.