Beaumont Laboratory
Clinical Pathology
Royal Oak, MI 48073

Effective Date: 11/19/2019
Supersedes: 11/07/2019
Related Documents: RC.CH.LOP.SH.PY.002
RC.CH.PY.SH.SOP.013A1

Processing Difficult Specimens

RC.CH.LOP.SH.PR.006r09

Purpose

On occasion, the laboratory receives specimens that require special processing in order to analyze them properly and report accurate results.

Some instances in which special processing techniques must be used include:

1) Hyperviscosity or suspected monoclonal protein (serum)
2) Cryoglobulins
3) Brown serum
4) Serum continues to clot after rimming
5) Continuously high K+, unsuspected in patient w/ significantly increased platelets or WBCs
6) In-Vivo Hemolysis suspected
7) Lipemia
8) Phosphorus interference from abnormal serum protein (high PO4)
9) Significantly decreased Uric Acid in serum specimen
10) Fluids not validated for routine testing

Procedure

1) Notify Pathologist, Technical Director or Supervisor of the problem specimen and request consultation, if needed.
2) **Supervisor/designee** will e-mail an ALERT with patient name, medical record number and location to technical staff, should subsequent specimens for the patient be delivered to Automated Chemistry Lab.
3) **Supervisor/designee** will post ALERT on dry-erase board in Core Lab AutoChemistry and post note at appropriate analyzer(s) in Stat Lab.

Special Processing Instructions for the following:

1) **Hyperviscosity observed or suspect presence of monoclonal protein (serum):** Likely signs include viscous serum or analyzer aspiration errors. Check patient's Chart Review for previous elevated protein results. If the serum is too viscous, warm an aliquot of serum to 37° C for approximately 30 minutes and re-analyze. If this is unsuccessful, make a x2 dilution of the serum with saline for testing, EXCEPT for electrolytes. Do NOT use hyaluronidase to liquefy serum.

2) **Cryoglobulins:**
If a cryoglobulin is suspected, warm an aliquot of serum to 37° C for 30 minutes. Re-analyze by *front-loading* on the instrument to minimize processing time. Do NOT use hyaluronidase to liquefy serum.

3) **Brown serum:**
Comment on color of specimen, "Sample appears brown" and visually inspect the LHI index as sometimes the Hemolysis index may be falsely elevated.

4) **Serum continuously clots:**
Warm serum specimen to 37° C for 30 minutes and attempt to reanalyze. Do NOT use hyaluronidase to liquefy serum.

5) **Continuously high K+ in patient w/ significantly increased platelets or WBCs**
Request lithium heparinized specimen.

6) **In-vivo hemolysis suspected:**
Refer to RC.CH.LOP.SH.PY.002 Policy for the Determination of Hemolysis, Lipemia, and Icterus

7) **Lipemia:**
Lipemia index on instrument is **≥ 200** or serum is cloudy/milky. Airfuge specimen for all tests other than those included in Lipid Panels. Repeat analyses on airfuged specimen. Report results with comment "Specimen pre-treated to minimize the effects of lipemia."

8) **Phosphorus (PO4) Interference from abnormal serum protein:**
Suspect if high PO_4 instrument (LIS will flag abnormal high phosphorus > 8.0 mg/dL)
See Flowchart RC.CH.PY.SH.SOP.013A1 to proceed w/ investigation. Steps include Chart Review for high total protein (>8.5 g/dL)/presence of a large amount of monoclonal protein and preparation of a protein free-filtrate.

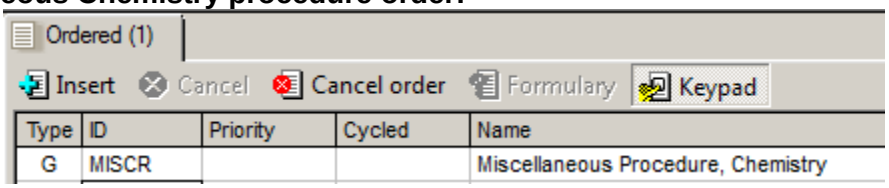
Prepare a protein-free serum filtrate with filter used for free drug analysis. Use filtrate for PO4 measurement:

a) Pipet 0.5-1 mL serum, using a transfer pipet, into the Centifree centrifugal filter device (obtain from Toxicology).
b) Spin for 20 min in Tox's centrifuge used to prepare free phenytoins.
c) Remove the neck of the filter device and discard serum.
d) Test filtrate collected in the bottom plastic cup for PO4.

9) **Significantly low Uric Acid (typically less than 1.0 mg/dL) on serum specimen:**
Chart Review for previous low uric acids. Consult Nursing Unit to query whether patient is being treated with Rasburicase, a uric-acid lowering drug. If so, see LTD. Request recollection on heparinized specimen, iced, to be sent STAT to Stat Lab for immediate uric acid analysis.

10) **Fluids not validated for routine testing**
Fluids received in the lab for testing that are not orderable in SOFT have not been validated for routine testing. A Pathologist or Clinical Chemist must be consulted for approval to perform the requested test. If approved, the test will be ordered in SOFT using the MISCR test code. The technologist will need to manually order the test in Centralink or at the instrument for testing. See below for required fields when reporting results.

Miscellaneous Chemistry procedure order:



Resulting:
These fields are **REQUIRED** when reporting results:

	T Ord	T Ind	Result
1	MISCR	AMIS1	
2	MISCR	MISCU	
3	MISCR	ANUFL	
4	MISCR	ASITM	

- **Chemistry Test Name** (AMIS1)
- **Test Result** (MISCU) *****
- **Source** (ANUFL)
- **Body Site** (ASITM)

*****Under the Test Result (MISCU), you must add the test units and a *comment* using the SOFT canned comment, **@CH42**: *This assay has not been FDA approved for this specimen type. Reference range and other method performance specifications have not been established for this body fluid. The test result must be integrated into the clinical context for interpretation.*

Note: Synovial fluid is NOT orderable in SOFT but has been validated.
In the event that this fluid has been approved by a Pathologist or Technical Director and is highly viscous or mucoid synovial fluid follow guideline below to achieve results:
Add a pinch of hyaluronidase (Sigma-Aldrich H3506) (approximately 1 mg per mL fluid, or powder that clings to clean applicator stick when dipped into hyaluronidase reagent). Incubate at 37°C for 30 minutes to liquefy sample before processing.
The following tests may be reported using the treated synovial fluid:

- Uric Acid
- Total Protein
- Glucose

Notes

Some recommendations for specimens with test results to be reviewed:

- Tech will not release results that need to be reviewed by a pathologist or supervisor prior to release.
- Enter *Internal Notes* comment "_____ pending review".
- Email or page Pathologist (or Technical Director) with the patient name, patient MRN, and test to be reviewed.

Authorized Reviewers

Section Medical Director or Technical Director

PROCESSING DIFFICULT SPECIMENS

Document Control
Location of Master:
Master electronic file stored on the Clinical Pathology server under S:/Automated Chemistry/Document Control Library/CH/LOP
Master printed document: Automated Chemistry General Policy Procedure Manual, Core Lab
Number of Controlled Copies posted for educational purposes:
Number of circulating Controlled Copies: 1
Location of circulating Controlled Copies:
Automated Chemistry General Policy Procedure Manual, Stat Lab

Document History

Signature	Date		
Prepared by: M. Landskroener, V. Peterson	07/16/2009		
Approved by: Raymond Karcher, PhD	07/16/2009		
Reviewed by: (Signature)	**Date**	**Revision #**	**Modification**
Elizabeth Sykes, MD	01/20/2010	01	Add instructions for PFF w/ high Phosphorus. Add note H index must be < Siemens' recommendations to report analytes not listed in table.
Elizabeth Sykes, MD	02/22/2011	02	Reformat; Add flowchart for Phos interference; LIS internalizes Phos >8.0 mg/dL; Add ionized Ca to Radiometer in-vivo hemolysis ABL725; Add lipemic specimen; Add Rasburicase Uric Acid.
Elizabeth Sykes, MD	08/15/2011	03	Change to TP cutoff > 8.5 for Phos Interference. Rename SOP w/ RC prefix
Elizabeth Sykes, MD	02/16/2012		
Elizabeth Sykes, MD	10/14/2013	04	Added LD, Hapto. Notify Blood Bank, Comment for unreportable analytes. Renamed from RC.CH.PY.SH.SOP.013
Elizabeth Sykes, MD	03/24/2014	05	Added Hyaluronidase for viscous synovial fluids
Elizabeth Sykes, MD	6/23/2014	06	Removed AVL references. Added DBil (in-Vivo Hemolysis) and airfuge comment for lipemia.
Elizabeth Sykes, MD	9/24/2016	07	Removed >100% saturation; Add fluid. Removed In-Vivo Hemolysis, added to RC.CH.LOP.SH.PY.002
Peter Millward, MD	11/19/2018		
Kelly Walewski C(ASCP)cm	11/07/2019	08	Made instrumentation general
Tyler Swift MLS(ASCP)^{CM}	11/19/2019	09	Airfuged specimens and lipid panels