

Processing Cerebral Spinal Fluid (CSF) Specimens

Purpose This procedure provides instructions for RECEIVING AND PROCESSING CEREBRAL SPINAL FLUID (CSF) SPECIMENS in core lab processing and microbiology to maintain sterility and to have a central location for all excess CSF.

- Policy Statements**
- CSF is collected by lumbar puncture and considered an irretrievable specimen.
 - This policy applies to all staff who works in core lab processing and microbiology.

Materials	Supplies
	<ul style="list-style-type: none"> • Aliquot tubes • Sterile pipettes

Sample Generally, three to four numbered tubes of CSF are obtained from one lumbar puncture collection. Tubes are numbered 1, 2, 3 and 4, with tube one representing the first portion of the sample collected. Do not transport CSF through pneumatic tube station. Refer to SCM 8.0 Pneumatic Tube Transport System. CSF without orders should be kept at ambient temperature until orders are received.

Stability

CSFC: Process immediately. Counts must be performed as soon as possible after the specimen has been received. Any cells present disintegrate within a short time.

CSF protein: Cerebrospinal fluid stable at 4°C for up to 3 days or <-20°C for 6 months.

CSF glucose: If testing is to be delayed, the specimen should be centrifuged and stored at 4°C.

CSF culture: **DO NOT refrigerate.** If the specimen cannot be processed immediately, it should be kept at room temperature or placed in an incubator. Refrigeration may prevent the recovery of *Neisseria meningitidis* and *Haemophilus influenzae*.

Procedure Follow the activities in the table below for RECEIVING CEREBRAL SPINAL FLUID (CSF) SPECIMENS in **Core Laboratory Processing**.

	Processing Action	Related Document
1.	Verify all specimens are labeled per Children’s specimen labeling policy.	Policy 630.00 Laboratory Specimen Labeling GL 2.0 Unlabeled/Mislabeled Specimen Challenge Form and Procedure
2.	Receive orders using function ORM. In ORM, enter 14 under Day(s) of activity. Receive orders using function ORM. Ensure unrestricted MBAT orders are received. These will have a “C” listed under specimen type. See step 3 if there are no orders in ORM. NOTE: If CSFC and CYTM are ordered, cancel CSFC as duplicate.	LIS 1.26 Order Receipt Modify (GUI ORM)

3.	<p>If there are no orders in ORM, review patient's chart in Cerner to see if there are Future Orders that are not activated. If there are orders, activate them.</p> <p>If no orders, contact the ordering provider or nursing unit and request for orders to be placed. Specimen should be maintained at ambient temperature until orders are placed. Notify the provider that CSF testing is time sensitive and orders need to be placed immediately. If the provider/nursing unit doesn't place orders in 15 minutes, notify the operations supervisor or the charge tech.</p>	<p>GL 1.20 Laboratory Escalation Policy</p> <p>GL 2.1 Irretrievable Specimens With No Orders</p> <p>LIS 1.22 Activating Future On-Hold Orders</p>
4.	Write the original volume on each tube below the tube number with a black Sharpie.	
5.	<p>In order entry, add LCOM to an accession number associated with the first tube. Free text original volume for each tube received. EX: Tube 1: 2 mL Tube 2: 2 mL Tube 3: 2 mL Tube 4: 2 mL</p>	LIS 1.2 Order Entry in Sunquest
6.	Place all CSF tubes and labels in a biohazard bag. Walk specimen to microbiology. Verbally inform microbiologist of specimen drop-off.	
7.	Microbiology will aliquot testing and return chemistry testing to processing for centrifugation.	
8.	Once chemistry aliquot is received, centrifuge the aliquot in either the STAT Spin Express 4 centrifuge for 5 minutes at 5000 rpm, or the Eppendorf Centrifuge 5430 for 3 minutes at 7500 rcf. Label pilot tube with corresponding primary barcode label.	
9.	Pour off centrifuged CSF into labeled pilot tube and place in Alinity testing rack for autocell.	
See below for Microbiology Processing of CSF		

Follow the activities in the table below for PROCESSING CEREBRAL SPINAL FLUID (CSF) SPECIMENS in Microbiology Department .		
	Microbiology Action	Related Document
1.	Place tubes in numerical order (Tubes are labeled 1-4). If the labels on the CSF tubes do not correspond to the correct testing, relabel the CSF tubes with the correct testing. Ensure that the patient identifiers are visible on the original label.	
2.	Write volume below tube number using a Sharpie if not already done so by the processing department.	
3.	Decant specimen. Aliquot labels will print for each test.	LIS 1.27 Decanting Specimens
4.	<p>Aliquot CSF per instructions below. When CSF is aliquoted, use aseptic technique to maintain sterility within a biosafety cabinet.</p> <ul style="list-style-type: none"> If the corresponding tube has insufficient volume, aliquot from the lower numbered tube to obtain minimum volume. If any testing has insufficient volume, the provider must be contacted to determine priority of testing. <p>NOTE: The LCOM should be modified if testing deviates from the norm. Add the test codes that were aliquoted from each tube in Order Entry and searching for the accession number with LCOM order code.</p>	LIS 1.2 Order Entry in Sunquest
5.	<p>Prepare gram stain from aliquot of tube 2.</p> <ul style="list-style-type: none"> St Paul Microbiology: Prepare tracker and send culture to Minneapolis Microbiology 	MC 1.11 Cerebrospinal Fluid Culture LIS 1.6 Transport Batches in Sunquest
6.	Place all original CSF tubes in designated rack in the micro refrigerator.	
7.	Distribute testing to corresponding departments. CSF should not be transported in the pneumatic tube system.	
8.	Set up culture and read gram stain.	MC 1.11 Cerebrospinal Fluid Culture MC 2.0 Gram Stain
9.	<p>Specimen will be racked in batches on the night shift.</p> <p>Use MINCSF and STPCSF for rack locations on each campus.</p> <p>NOTE: If time allows, specimen racking can be done at any time. Ensure, racked specimen are kept separate from unracked specimen and the night shift is informed that the batch for the day has been started.</p>	LIS 1.28 Racking, Unracking, Tracking Specimen
10.	Store CSF for 7 days in the refrigerator. Move to freezer and store for 21 days. Discard CSF 28 days after collection.	
See below for processing of common CSF tests		

IF	Then (if test is ordered)
4 tubes received	Tube 1-Glucose, Protein, Tube 2-Gram Stain, CSF Culture, Molecular Tube 3-Cell Count Tube 4-CSF Save, Other
3 tubes received	Tube 1-Glucose, Protein Tube 2-Gram Stain, CSF Culture, Molecular Tube 3-Cell Count, Other
1-2 tubes received with minimal volume or QNS	Contact ordering provider or unit to prioritize testing.

Glucose (CGL)/Protein (CTP): Label bullet tube with foot label containing CTP/CGL accession number. Aliquot 0.2 mL from tube 1 into labeled bullet tube. Place bullet tube and pilot tube label in biohazard bag. Place in core lab processing bin for centrifugation. Verbally confirm drop-off.

NOTE: If CTP and CGL are order together, 0.2 mL of CSF is sufficient for both tests.

Culture CSF (CSC) and Gram Stain: Aliquot 1 mL (Minimum 0.5 mL) from tube 2 into labeled screw cap tube for culture and Gram stain. Label slide and cytocentrifuge 0.25 mL of CSF for gram stain from aliquot.

MEPNL: Aliquot 0.5 mL (Minimum 0.3 mL) of CSF from tube 2 into labeled screw capped tube.

EVPCR: Aliquot 0.5 mL (Minimum 0.3 mL) of CSF from tube 2 into labeled screw capped tube.

HSVPP: Aliquot 0.5 mL (Minimum 0.3 mL) of CSF from tube 2 into labeled screw capped tube.

CSF Count/Diff (CSFC): Label screw cap tube with foot label containing CSFC accession number. Aliquot 1 mL (Minimum 0.5 mL) from tube 3 into labeled screw cap tube. Place in hematology specimen receiving rack. Verbally confirm drop-off.

Cytology for Malignant Cells (CYTM): Label screw cap tube with foot label containing CSFC accession number. Aliquot 1 mL from tube 3 into labeled screw cap tube. Place in hematology specimen receiving rack. Verbally confirm drop-off.

Referral Testing/MBAT/Other: Tubes 3 or 4 are used for referral testing, MBATs, and all other testing. See Lab Test Directory for proper processing of orderable test codes. If MBAT is ordered and no clear instructions are written with the order, consult with a Referral Testing Tech before processing.

CSF Save (SFS): Receive SFS if tube 4 is not used for testing. Place SFS primary barcode label on tube 4. If no testing is done on tube 4 but a SFS was not ordered, order a SFS and place SFS primary barcode label on tube 4. These should be stored in the micro refrigerator. If testing was done on all tubes but a SFS was ordered, cancel the order as QNS.

Sample Rejection

Unlabeled or Mislabeled Specimens

References

Bishop, Fody and Schoeff. *Clinical Chemistry Principles, Procedures, Correlations*. 5th edition ©2005
 CLSI. *Body Fluid Analysis for Cellular Composition; Approved Guideline*. CLSI document H56-A. Wayne, PA: Clinical Laboratory Standards Institute; 2006.

Historical Record

Version	Written/Revised by	Effective Date	Summary of Revisions
1	Daniel Gebrekidan	07/10/2009	
2	Daniel Gebrekidan & Jennifer Johnson	08/11/2011	
3	Lisa Kappenman & Daniel Shaw	12/01/2015	Major revisions: added tests and processing of each; clarified distribution of tubes; included volumes
4	Dawit Getachew	06/10/2019	Added step 2, minor revisions
5	Dawit Getachew	11/22/2021	Biennial Review: Minor revisions and changes. Removed OER and CVIS from steps 2, 3, and 4.
6.	Miranda Berry	02/08/2024	Major revisions: Updated processing to follow CLSI guidelines. Processing performed in micro dept within biosafety cabinet. Racking specimens and storage instructions added.