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| **Processing Cerebral Spinal Fluid (CSF) Specimens** |
| **Purpose** | This procedure provides instructions for PROCESSING CEREBRAL SPINAL FLUID (CSF) SPECIMENS in core lab processing. |
| **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.
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| **Supplies** |
| **Materials** | * Aliquot tubes
* Sterile pipettes
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| **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. When aliquotting CSF, use aseptic technique to maintain sterility. Refer to SCM 8.0 Pneumatic Tube Transport System. |
| **IF** | **Then (if test is ordered)** |
| 4 tubes received | Tube 1-SaveTube 2-Referral testingTube 3-MicrobiologyTube 4-Cell Count/Diff and Glucose, Protein |
| 3 tubes received | Tube 1- Referral Testing/SaveTube 2- MicrobiologyTube 3- Cell Count/Diff and Glucose, Protein |
| 1-2 tubes received with minimal volume | Contact ordering provider or unit to prioritize testing. |
| **Culture CSF (CSC):** Volume = 2 mL CSF (minimum 0.5 mL); A gram stain is included and is considered a Critical/STAT test.**Protein (CTP):** Volume = 0.6 mL CSF (minimum 0.2 mL, centrifuged)Cerebrospinal fluid (CSF) specimens should be collected with care to avoid contamination with plasma proteins. Blood present in the cerebrospinal fluid invalidates the protein values since it reflects contamination with plasma proteins. Optimally, protein analysis should be performed on the same tube as the cell count. CSF specimens should be free of particulate matter and centrifuged according to Specimen Processing procedures prior to analysis. See Processing Procedure Manual.**Glucose (CGL):** Volume = 0.6 mL CSF (minimum 0.2 mL, centrifuged)Cerebrospinal fluid (CSF) specimens may contain bacteria or red blood cells and should be analyzed for glucose immediately. Glucose should be measured on the same sample used to report the cell count. A simultaneous blood specimen is needed for proper CSF glucose interpretation.NOTE: If CTP and CGL are order together, 0.2 mL CSF is sufficient for both tests.**CSF Count/Diff (CSFC):** Volume = 1 mL CSF (minimum 0.5 mL)**Cytology for Malignant Cells (CYTM):** Volume = 1-3 mL CSF (minimum 0.5 mL)NOTE: If CSFC and CYTM are ordered, clarify with ordering provider if he/she is looking for malignant cells and/or infection. |
| **Stability** | 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.* |
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| **Procedure** | Follow the activities in the table below for PROCESSING CEREBRAL SPINAL FLUID (CSF) SPECIMENS in core lab processing. |
|  | **Action** | **Related Document** |
| 1 | Verify all specimens are labeled per Children’s specimen labeling policy. | [Policy 630.00](http://khan.childrensmn.org/manuals/policy/600/033257.asp) Laboratory Specimen Labeling[GL 2.0](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/Gen/207584.pdf) Unlabeled/Mislabeled Specimen Challenge Form and Procedure |
| 2 | If there is no order in ORM or OER, log in to Cerner to see if there are orders that are not activated. If there are orders, activate them. If no orders, contact the ordering provider or nursing unit and request for orders to be 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.  | GL 1.20 Laboratory [Escalation](https://starnet.childrenshc.org/References/labsop/index.php?view=folder&folder=gen) Policy[GL 2.1 Irretrievable Specimens with no orders policy](https://starnet.childrenshc.org/References/labsop/gen/gen/gl-2.1-irretrievable-specimens-with-no-orders.pdf) |
| 2 | Receive specimens using function OER/ORM. In OER, At prompt: [DATE/DAYS/(E)VENTS:] enter “O14” to capture all unreceived restricted orders for 14 days. In ORM, enter 14 under Day(s) of activity |  |
| 3 | After receipt in “OER/ORM”, check again for unrestricted MBAT orders. These will have a “C” listed under specimen type. MBAT orders are received in function CVIS or ORM. | SCM 5.0 [Collection Verification (CVIS)](http://khan.childrensmn.org/Manuals/Lab/SOP/Gen/SpecCol/205648.pdf) |
| 4 | Determine how many tubes were received and place in numerical order (Tubes are labeled 1-4). |  |
| 5 | Place a small label “foot” on each tube without covering the original label or the tube number. |  |
| 6 | The last tube collected or the least hazy/bloody specimen is used for the cell count and chemistries. Record the original volume of CSF in the tube. | [HEM 2.5 CSFC Cell Count Of Cerebrospinal Fluid](http://khan.childrensmn.org/Manuals/Lab/SOP/Heme/BF/199077.pdf) |
| 7 | Tubes 2 or 3 (second to last tube collected) is used for microbiology. Tubes 2 or 3 are less likely to be contaminated by normal skin flora. Transport to microbiology immediately (<15 minutes) at room temperature and give to a technologist. DO NOT send specimen through the pneumatic tube station. This is a Critical/STAT test.NOTE: If only one tube of CSF is collected, contact ordering provider to prioritize testing. | [MC 1.11 Cerebrospinal Fluid / Ventricular Fluid/ Shunt Fluid](http://khan.childrensmn.org/Manuals/Lab/SOP/Micro/CultPro/209753.pdf) CulturePolicy 220.00 [Critical Results of Tests and Diagnostic procedures](http://khan.childrensmn.org/manuals/policy/200/125523.asp) |
|  | **IF** | **THEN** | [HEM 3.10 CYTM Cytology for Malignant Cells in Body Fluids](http://khan.childrensmn.org/Manuals/Lab/SOP/Heme/BF/199078.pdf) |
| 8 | Only test “CYTM” (Cytology for Malignant Cells) is ordered | Pass the specimen and labels to manual hematology |
| 9 | Test “CYTM” is not ordered | Proceed to step 11 |
| 10 | Test CYTM is ordered along with other testing | Proceed to step 11 |
|  | 11 | The last tube collected/the least hazy/cloudy tube has >or= to 1ml | Use a sterile pipette to aliquot a minimum of 200 mL into an aliquot tube for chemistry. Proceed to step 13. | [CH 6.39 Glucose in Plasma/Serum, Urine and Body Fluid](http://khan.childrensmn.org/Manuals/Lab/SOP/Chem/Assays/201829.pdf)[CH 6.37 CSF and Urine Protein](http://khan.childrensmn.org/Manuals/Lab/SOP/Chem/Assays/201821.pdf) |
| 12 | The last tube collected or the least hazy/cloudy tube has <1 mL CSF | Pass the specimen to manual hematology with the chemistry test labels. Perform hematology tests and pass specimen back to processing.  |
| 13 | Spin the chemistry 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. |
| 14 | Transfer supernatant to a properly labeled Siemens Vista sample cup nested in a bar-coded pilot tube and deliver the sample to the auto cell. |
|  | 15 | Tube 1 or 2 is used for referral testing. See Sunquest Function MIQ for proper processing of specific test. If MBAT is ordered and no clear instructions are written with the order, consult with a send outs tech before processing. |  |
|  | 16 | If ordered, use tube 1 or remaining specimen for spinal fluid save (SFS). |  |
|  | 17 | Store remaining CSF for one week:Minneapolis - hematology refrigeratorSt. Paul - microbiology refrigerator |  |
| **Sample Rejection** | Unlabeled or Mislabeled Specimens |
| **References** | Bishop, Fody and Schoeff. *Clinical Chemistry Principles, Procedures, Correlations*. 5th edition ©2005 |
| **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 |