**Csf laboratory analysis pdf**

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URL of this page: Cerebrospinal fluid (CSF) is a clear, colorless, watery fluid that flows in and around your brain and spinal cord. Your brain and spinal cord make up your central nervous system. It controls and coordinates everything you do, including your ability to move, breathe, see think, and more. Cerebrospinal fluid acts like a cushion that helps protect your brain and spinal cord from sudden impact or injury. The fluid also removes waste products from the brain and helps your central nervous system work properly. A CSF analysis is a group of tests that use a sample of your cerebrospinal fluid to help diagnose diseases of the brain and spinal cord and other conditions that affect the central nervous system. Other names: Spinal Fluid Analysis, CSF Analysis A CSF analysis is used to measure different substances in your cerebrospinal fluid. It may include tests to diagnose: Your health care provider may order a CSF analysis if you have: Symptoms of an infection or bleeding in the brain or spinal cord Symptoms of an autoimmune disorder, such as multiple sclerosis (MS) Had a brain injury or an injury to your spinal cord Have cancer that may have spread to your central nervous system Symptoms that may be from another central nervous system condition, such as headaches Symptoms of a brain or spinal cord infection include: Symptoms of MS often vary and come and go, or they may steadily get worse. They may include: Blurred or double vision Tingling, numbness, or pain in the arms, legs, body, or face Painful muscle spasms Weak muscles, often in the hands and legs Dizziness, balance problems, or clumsy movement when walking Bladder control problems Fatigue Problems thinking or learning new things To get a sample of cerebrospinal fluid, a provider will do a procedure called a spinal tap, also known as a lumbar puncture. A spinal tap is usually done in a hospital. During the procedure: You will lie on your side or sit on an exam table. A provider will clean your back and inject an anesthetic into your skin, so you won't feel pain during the procedure. Your provider may put a numbing cream on your back before this injection. When the area on your back is completely numb, your provider will insert a thin, hollow needle between two vertebrae in your lower spine. Vertebrae are the small backbones that make up your spine. Your provider will withdraw a small amount of cerebrospinal fluid for testing. This will take about five minutes. You'll need to stay very still while the fluid is being withdrawn. Your provider may ask you to lie on your back for an hour or two after the procedure. This may prevent you from getting a headache afterward. You don't need any special preparations for a CSF analysis, but you may be asked to empty your bladder (pee) and bowels (poop) before the test. There is very little risk to having a spinal tap. You may feel a little pinch or pressure when the needle is inserted. After the test, you may feel some pain or tenderness in your back at the site where the needle was inserted. You may also have some bleeding at the site or get a headache. The headache may last for several hours or up to a week or more, but your provider may suggest treatment to help relieve the pain. A CSF analysis may include a variety of different tests on your sample. So, the measurements on your test results will depend on which tests were done. Your provider can explain what your results mean. In general, your CSF analysis results may show that you have an infection, an autoimmune disorder, such as multiple sclerosis (MS), or another disease or injury of the brain or spinal cord. Your provider will likely order more tests to confirm your diagnosis. Learn more about laboratory tests, reference ranges, and understanding results. Some infections, such as meningitis caused by bacteria, are life-threatening emergencies. If your provider suspects you have bacterial meningitis or another serious infection, you may need to start medicine before you have a final diagnosis. Allina Health [Internet]. Allina Health. Cerebrospinal fluid IgG measurement, quantitative; [cited 2022 Apr 19]; [about 3 screens]. Available from: Allina Health [Internet]. Allina Health. CSF albumin/plasma albumin ratio measurement; [cited 2022 Apr 19]; [about 3 screens]. Available from: Hinkle J, Cheever K. Brunner & Suddarth's Handbook of Laboratory and Diagnostic Tests. 2nd Ed, Kindle. Philadelphia: Wolters Kluwer Health, Lippincott Williams & Wilkins; c2014. Cerebrospinal Fluid Analysis; p.144. Johns Hopkins Medicine [Internet]. Johns Hopkins Medicine; c2022. Health Library: Lumbar Puncture; [cited 2022 Apr 19]; [about 7 screens]. Available from: Mayo Clinic [Internet]. Mayo Foundation for Medical Education and Research; c1998–2022. 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Available from: Seehusen DA, Reeves MM, Fomin DA. Cerebrospinal Fluid Analysis. Am Fam Physician [Internet] 2003 Sep 15 [cited 2022 Apr 19]; 68(6):1103–1109. Available from: Testing.com [Internet]. Seattle (WA): OneCare Media; c2022. Cerebrospinal Fluid (CSF) Testing; [modified 2021 Nov 9; cited 2022 Apr 19]; [about 16 screens]. Available from: University of Rochester Medical Center [Internet]. Rochester (NY): University of Rochester Medical Center; c2022. Health Encyclopedia: Spinal Tap (Lumbar Puncture) for Children; [cited 2022 Apr 19]; [about 8 screens]. Available from: Learn how to cite this page June 13, 2022CSFLab Tests The sample is CSF fluid. Three tubes with 2 to 3 ml each of CSF are collected. These tubes are labeled as:  Sterile tube 1 for chemistry and serology. Tube 2 for microbiology studies. Tube 3 for hematology studies. CSF collected into three test tubes Don’t use the first tube for culture because this is mostly contaminated. The first tube can be used for chemistry and serology after centrifugation. The last tube is best for chemistry and microscopy because it is less hemorrhagic or contaminated. The third tube is ideal for hematological studies. Transport the sample immediately to the laboratory. The sample is taken from the spinal canal; the most common position is a lumbar puncture. Keep the patient in a lying position in the bed for 6 to 12 hours. Lumbar puncture to get CSF The patient may have a traumatic lumbar puncture. The patient may have a severe headache. A time may develop an infection at the site of puncture. To Diagnose the type of meningitis. To diagnose the cause of hemorrhage. This test is part of the patient’s workup in a coma. This test can diagnose cerebral malaria in infants and children. CSF electrophoresis is done to diagnose multiple sclerosis where there is an oligoclonal band. CSF pressure. Volume. Appearance Biochemical tests include: The microscopic examination gives the idea about: A total number of cells. Type of cells, Neutrophils, Lymphocytes, or RBC. To rule out the presence of malignant cells. Special stains to find bacteria (Gram stain). Culture. Special studies include: CSF electrophoresis for the oligoclonal band. Lactate dehydrogenase (LDH). Lactic acid. Chloride. Serology to rule out syphilis. Glutamine for hepatic encephalopathy in liver failure. Normal pressure is 50 to 180 mm of water. CSF pressure is increased in: Congestive heart failure. Obstruction of superior vena cava. Cryptococcal meningitis. Intracranial tumors. Meningitis of all types. Cerebral edema. Subarachnoid hemorrhage. Thrombosis of venous sinuses. CSF pressure is decreased in: Circulatory collapse. Leakage of spinal fluid. Severe dehydration. Spinal subarachnoid block. Normal CSF is crystal clear like water. The initial color of CSF is due to: Inflammatory diseases. Traumatic tap. Hemorrhage. Tumors. The appearance can be compared to water. Hold the tube containing CSF against the paper, and it can be read. How to judge the CSF appearance The appearance of CSF in various conditions: Appearance Pathological reason Viscous CSF Due to metastatic mucinous adenocarcinoma Due to a large number of cryptococci Severe meningeal infection Turbidity It may be due to: Increased WBCs >200/cmm Increased RBCs >400/cmm Presence of bacteria >105/mL Presence of fungi or amebae Contrast media Clots Indicates protein >150 mg/dL CSF with RBCs Grossly bloody = >6,000/µL Cloudy = 500 to 6,000/µL Xanthochromasia Hb producing bilirubin Oxy-Hb Met-Hb Bleeding within 2 to 36 hours Causes of various appearances of Cerebrospinal Fluid Analysis (CSF) Blood-like appearance: Subarachnoid hemorrhage. If the sample is collected in three tubes, then all the tubes will show the same color. Traumatic tap. Now the third tube will be clear or less in color. Cloudy (Turbid) may be due to: The presence of WBCs. Increased protein. The presence of the microorganism. RBCs. Contrast media. Xanthochromia is pale pink to yellow color, and it depends upon the presence of protein. This may be due to: Increased protein when more than 150 mg/dL. Bilirubin when > 6 mg/dL. The presence of methemoglobin. Systemic carotenemia. Oxyhemoglobin due to hemolysis of RBCs. Melanin in meningeal melanoma. The yellow color may be seen in hemorrhage 10 hours to 4 weeks before the tap. The yellow color may also be seen if bilirubin is> 10mg/dL. CSF Xanthochromasia The difference between Subarachnoid hemorrhage(SH) and Traumatic tap: The traumatic tap may form clots while SH does not form a clot. Traumatic tap negative for xanthochromia while SH is positive. An immediate repeat at a higher level will show blood in SH while clear in the case of the Traumatic tap. Cerebrospinal Fluid Analysis (CSF) Glucose Glucose is utilized by the bacteria (pyogenic or mycobacterium bacilli). Glucose may be utilized by the WBCs or occasionally by the cancer cells in CSF. This will take place after one hour of the blood glucose. It becomes normal after the start of the antibiotics. It decreases  ~50% of bacterial meningitis. CSF glucose 500 (1000 to 10,000) increased 10 to 200 increased 10 to 200 40 to 400 DLC >75 % polys >75 % lymphocytes more lymphocytes Lymphocytes and monocytes Gram stain positive negative negative Can see fungal bodies Bacterial Culture positive positive for TB negative negative Other tests pellicle or coagulum formation normal lactate Indian ink  Normal/Abnormal findings of CSF Lab findings Source 1 Normal Source 2 Normal  Abnormal findings Volume  Adult = 90 to 150 mL Child = 60 to 100 mL Pressure 200 WBCs/µL Yellow = jaundice Brown = methemoglobin Pink = oxyhemoglobin Orange = Carotene Clotted = Seen in traumatic tap Blood (RBC) Nil  >400  /µL = Hemorrhage or traumatic White cell count Neonates = 0 to 30 cell/µL 1 to 5 years = 0 to 20 cells/ µL 6 to 18 years = 0 to 10 cells/  µL Adult = 0 to 5 cells/ µL  0 to 5 cells/ µL WBCs >1000 /µL = Bacterial or fungal infection WBC  neonates >100 µL = Viral meningitis  Differential count  Neutrophils 0 to 6%  Adult = 0 to 6% Newborn = 0 to 8% Increased = Bacterial, fungal, and early TB meningitis  Lymphocytes 40 to 80%  Adult = 40 to 80% Newborn = 5 to 35% Increased = Viral meningitis, TB, multiple sclerosis, lymphoma, leukemia, drug abuse, Guillain-Barre syndrome, chronic alcoholism  Monocytes 15 to 45%  Adult = 15 to 45% Newborn = 50 to 90% Increased = Chronic bacterial meningitis, partial treatment of meningitis, and tumor Macrophages Increased = TB and fungal meningitis, after hemorrhage, and blood contamination Eosinophils Increased = Parasitic and fungal meningitis, allergic reaction to shunts, medication, and dyes  Chemistry  Protein lumbar = 15 to 45 mg/dL cisternal = 15 to 25 mg/dL ventricular = 5 to 15 mg/dL  Increased = bacterial or viral meningitis, cerebral hemorrhage, trauma,  increased the synthesis of immunoglobulins, contamination, and increased absorption due to obstruction Decreased = loss of fluid from trauma, and increased reabsorption  Lumbar  area  Adult = 15 to 45 mg/dL Neonates = 15 to 100 mg/dL >60 years = 15 to 60 mg/dL  Cisternal area  15 to 25 mg/dL  Ventricular area  5 to 10 mg/dL higher than lumbar area 5 to 15 mg/dL Albumin 56 to 76%  10 to 35 mg/dL IgG 0 to 4.5 mg/dL  γ-globulins 5 to 12% of total proteins  Oligoclonal band  Negative  Glucose 50 to 75 mg/dL (20 mg/dL less than the blood glucose level)  60 to 80 mg/dL Increased = hyperglycemia, traumatic puncture, and peripheral blood contamination Decreased = hypoglycemia, meningitis, and tumors pH  7.35 to 7.40 Lumbar area= 7.28 to 7.32 Cisternal area = 7.32 to 7.34 Sodium  140 to 150 meq/L  135 to 160 meq/L Potassium  2.2 to 3.3 meq/L  2.6 to 3.0 meq/L Chloride 700 to 750 mg/dL  115 to 130 meq/L (20 meq/L higher than serum) CO2 25 meq/L  LDH

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