

CSF examination

General:

Guidelines for the microbiological CSF diagnostics (cerebral spinal fluid diagnosis) in adults and children: Acute meningitis or encephalitis can be caused by bacteria and viruses and very rarely by mycobacteria, fungi or parasites in immunocompetent persons. In hematological-oncogenic and in AIDS-patients, Tb, parasites and fungi occur more often. In immunocompetent patients, CSF cell count, cytology and protein constellation (Reiber scheme, see Immunofixation in CSF) provide important information about viral or bacterial origin or inflammation. According to these results it can be decided if further viral or bacterial diagnostics have to be requested. In immunosuppressed patients characteristic modifications are often missing. Please contact the lab in order to discuss those important points prior to requesting different tests.

The application of nucleic acid amplification techniques (NAT: PCR, LCR) is recommended in the following cases: M. tuberculosis, HSV, VZV, CMV, HIV, enteroviruses. NAT tests in CSF are not indicated if CSF cytology is normal. In case of a known bacterial meningitis blood cultures are mandatory along with CSF investigations (in order to increase the sensitivity, at least 2 separate blood cultures, second puncture after 15 min). CSF must be collected – if possible – before antibiotic treatment. Virus detection in CSF should be done exclusively by PCR investigation.

Material: 5 ml CSF and serum. Required sample quantity: bacteria detection (culture) min. 5 ml. Additional separate detection of fungi: additionally 2 ml
bacteria plus mycobacteria (TB-PCR) min. 10 ml
serological investigations in CSF min. 5 ml
photometry
PCR investigations in CSF min. 5 ml

CSF investigations in children: According to the regulations of blood culture diagnostics, a CSF quantity of 0.5 - 1 ml is sufficient. As with sepsis a considerably higher bacterial load is expected in CSF of children, so that the sensitivity of microbiological CSF diagnostics is not affected by microscopy and cultivation.

Pre-analytics: Cell count and cell differentiation: For cell count and cell differentiation, CSF must arrive in the laboratory within 2 hours! Send immediately!

Storage of samples: bacteriological samples (CSF and blood cultures) at room temperature, virological and serum samples in the refrigerator.

Completing request form: the more clinical information is provided, the more specific we can test or recommend investigations.

Analysis	Indication	Material	Comments
Clinical Chemistry			
Albumin and immunoglobulin quotient in CSF/serum	Investigation of barrier function and intrathecal Ig-syn-thesis	CSF + serum	Serum must be collected on the same day as CSF. Decreased in meningitis, Guillain-Barré syn-drome, tumor processes in spinal channel or brain.
Total protein*	inflammation, Guil-lain-Barré syn-drome	CSF	
Glucose i. CSF*	DD. of inflammatory CNS-processes	CSF + serum	Normal value >50% of the serum value, decreased in bacterial meningitis, normal in viral meningitis.
Lactate i. CSF	DD. of inflammatory CNS-processes		
Oligoclonal bands	MS (encephalomyeli-tis diss.)	CSF + serum	Absence of oligoclonal bands excludes MS to 95 %. Detection of oligoclonal bands should be confirmed by Magnetic Reso-nance Imaging (MRI) in case of suspicion of MS, also positive in some autoimmune diseases and other inflammatory disorders.
Cell count, cell sediment*		CSF	Should be carried out as fast as possible latest 2 hrs after puncture. Please indicate where (lumbal? drain?) CSF has been collected!

* recommended basic program for CSF

Analysis	Indication	Material	Comments
Specific diagnostics CSF			
Borrelia, mumps, meas-les, rubella, HSV, VZV, CMV, EBV, HIV, toxoplasmosis, lues	Inflammatory CNS processes	CSF	Method: PCR
FSME		Serum	According to the regulations of the DGHM (German Institution for Hygiene and Microbiology) the PCR or Ab-detection in CSF is not longer recommended; the antibody determination in serum should be performed.
Tuberculosis PCR	Meningitis tuberculo-sa	CSF + sputum, BAL, urine	
PCR enterovirus PCR		CSF + EDTA-blood	
Borrelia PCR	Neuroborreliosis, DD. dementia /MS	CSF + serum	Pleocytosis, barrier dysfunction, detection of intrathecal Ig syn-thesis. In acute neuroborreliosis IgM>> IgG, in chron. neurobor-reliosis IgG >> IgM. Increased Abs can persist for several months until years after treat-ment.
Other parameters			
Acetylcholine receptor Ab	Myasthenia gravis, thymoma	Serum	
Angiotensin Converting Enzyme	Sarcoidosis, neuro-sarcoidosis	CSF + Serum	Sample-specific normal range, albumin dependent

Analysis	Indication	Material	Comments
Asialo-(β2)transferrin	CSF fistula, CSF rhinorrhea	Collect with cotton swab do not let it dry	Immunoblot, highly specific, requires 2 –3 days Extra serum vial required
CEA in CSF	CNS malignant tumor	CSF	Also possible as L /S quotient
Ferritin in CSF	Exclusion subarach-noidal bleeding	CSF	
MOG antibody	Predictive marker in MS	CSF	
Neurone speci-fic enolase	DD. Creutzfeld-Jakob disease vs. M. Alzheimer, tumor marker neuroblasto-ma, CNS-metastases; cerebral ataxia	CSF + serum	Do not deep-freeze the samples!
Neurone and Purkinje cell autoABS	Among others para-neoplastic cerebellar syndrome	CSF + serum	
S100-B-protein	Activity marker of the glia cells, tumor marker, melanoma and others	CSF + serum	Please deep-freeze the serum within 24 hours!
β-amyloid	M. Alzheimer, Creutzfeld-Jakob, other dementias	CSF	Please request with tau-protein in CSF
β-trace-protein, beta2 transfer-rin, (prosta-glandin D-	CSF fistula, CSF rhinorrhea	Nasal discharge (collect with	Nephelometry, highly sensitive and specific, immunofixation

synthetase)		cotton swab; do not let it dry)	
Tau-protein	M. Alzheimer, Creutzfeld-Jakob, other dementias	CSF	Please request with β -amyloid in CSF

For complete list of laboratory test offered at Freiburg Medical Laboratory, please visit <http://www.fml-dubai.com/parameter-listings/>