

Cerebro-Spinal Fluid Lab Test

None of us is as good as all of us

Value of Collaboration

Expectations of Clinicians

Expectations of the Lab

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A NEED FOR

Standard Operating Procedure of the institutions

The role of (insistence and reminders) by the Lab

- A good referral/ requisition note
- Prior intimation of emergency CSF
- Need for ample volume
- Need to collect in 3 test tubes
- Separate tubes for cytology, culture
- Simultaneous Blood sample

Time is the Essence

CSF is often an emergency test

- Needle to microscope time
OR ELSE
The cells gets lysed rapidly (WBC, RBC, others)
- Needle to culture medium time
It must be Zero Seconds, at the bed side
- Needle to other chemistry time
As short as possible
- Needle the centrifuge time
Within a few minutes, in a side lab

Don't discard Traumatic Tap

- 1-2 WBC per 1000 RBCs
Exception: SAH or Meningitis ?
- Crenation of RBC
- Protein – 1 mg per 1000 RBCs
- Sugar – Still Valid and Reliable

The following should be routine but often neglected

- Centrifugation for cytology button
- Urgent Centrifugation in case of Hemorrhagic CSF
- Staining for differential cell count (WBC)
- [Wright's, H & E]
- Cytology – Preservative fluid, millipore filter, cell fixation

Can the following become part of routine while balancing the cost effectiveness?

- Special cell separation + Immuno-staining techniques
- Protein electrophoresis & Immuno chemistry
- Serology – Antigens, Antibodies
- Spectro-photometry – Pigments
- Special cultures including viruses

CSF examination headings-1

- Gross
- Number and types of cells
- Micro-organisms (before culture)
- Direct observation with and without stains – Gramis, Zeihl Neelsen, Indian ink
- Protein and glucose
- Tumor cells, cytology
- Serum and CSF protein electrophoresis, oligoclonal bands, gamma globulins, other protein fractions
- Serology (antibodies fibers)
- Pigments and other chemicals like LDH, lactate

CSF examination headings-2

- Culture – Bacteria, fungi
- Antigens – Cryptococci, Mycobacterium
- Polymerase chain reaction
- Markers of certain infections.
- 14-3-3 protein in Prion diseases
- Virus isolation

Pigments in CSF

- Oxy-hemoglobin
- Methamo-globulin
- Carotenemia
- Bilirubin
- Xanthochromia
- Froin Syndrome
- Hemoglobinemia

Spectrophotometry

Cells in CSF

- Counting chamber – total number
- Differential count
- Centrifuge or sedimented Button
- Millipore filter
- Cell Fixation
- Staining – Wright's Stain

Cytology

- Collection, Preservation, Transport
- Special Cell Separation
- Immuno-Staining techniques
 - Leukemia
 - Lymphoma
 - Glial Fibrillary Acidic protein
 - Antigens

Proteins in CSF

- Quantitative partition by Electrophoresis & Immunochemistry
- Protein with a molecular weight of less than 150-200 KDA can be demonstrated
- Glyco-proteins, Cereuloplasmin, hemopexin
- Beta Amyloid, Tau Protein
- IgG – MS, Syphilis, SSPE (anti measles)

CSF versus Plasma Proteins

- The Entity of Intra-thecal synthesis of IgG
- Oligo-clonal Bands
- Special Proteins
- Pre-Albumin—more in CSF
- Tau (b-transferrin)
- Tau to b-amyloid Ratio
- Enzymes-CK (BB), Enolase in TBI, Neopterin
- B2 Micro-globulin (Meningeal lymphomatosis)
- Alpha-fetoprotein – embryonic tumors of brain

Glucose

- CSF glucose : Plasma Glucose Ratio
- Normal Range 0.6-0.7
- During Hyper glycemia 0.5-0.6
- During Hypoglycemia – 0.85
- Time lag 1-2 hr for Equalization while fasting – CSF & Blood together
- Post Prandial – CSF about 2 hour later

Serology

- Crypto-coccal surface Antigen
- Treponema Pallidum Antibody VDRL, Slide Flocculation, RPR Agglutination
- Colloidal Gold Test – Not any more
- Lyme spirochetes

Serology for Viruses

- Long reporting time may be a damper
- Yet Retrospective is useful from epidemiological point
- PCR – during first week when viruses are multiplying

How to increase the yield of culture ?

- Zero-time lag for inoculation
- Warmer at shelf/incubator
- Large volume CSF
- Multiple culture mediums