CEREBROSPINAL FLUID
[CSF]
1. Full form of
   a) CSF = _____________________
   b) LDH = _____________________
   c) ADA = _____________________
2. If patient serum glucose level is 300 mg%, than expected csf glucose level is _______ mg%
3. Normal CSF LDH level is _______ IU/L.
4. For diagnosis of tuberculosis, _______ is most sensitive parameter.
5. CSF is turbid in case of
   1. Pyogenic meningitis
   2. Tuberculos meningitis
   3. Viral meningitis
   4. A & B
6. Red colour of CSF indicate presence of _______ cells
7. CSF lactate is indicator of
   7. Infection
   8. Trauma
   9. Hypoxic injury
   10. Malignancy

8. Most common cause of very low glucose level in CSF is ________ .

9. Write 3 cause of high protein level in CSF.

10. Higher neutrophilic cells in CSF is suggestive of ________ infection.

11. Lumber puncture is mostly done between ____ & _____ vertebra .
The cerebrospinal fluid (CSF) is a clear, colorless transparent, tissue fluid present in the cerebral ventricles, spinal canal, and subarachnoid spaces.
FUNCTIONS OF CSF

1. Shock absorber
2. Mechanical buffer
3. Act as cushion between the brain and cranium
4. Act as a reservoir and regulates the contents of the cranium
5. Serves as a medium for nutritional exchange in CNS
6. Transport hormones and hormone releasing factors
7. Removes the metabolic waste products.
CEREBROSPINAL FLUID FORMATION

FORMED BY THE CHOROID PLEXUS OF THE LATERAL VENTRICLE & THIRD AND FOURTH VENTRICLES.

THE CHOROID PLEXUS OF THE VENTRICLES ACTIVELY SECRETE CEREBROSPINAL FLUID.
MECHANISM OF FORMATION OF CSF

Rate of formation:
20-25 ml/hour
550 ml/day in adults.
Turns over 3.7 times a day

Total quantity:
150 ml
30-40 ml = ventricles
110-120 ml = subarachnoid space
[75-80 ml in spinal & 25-30 ml in the cranial part].
PHYSICAL CHARACTERISTIC OF CSF

Normal

Colour = Colourless
Appearance = Transparent, Clear
Specific gravity = 1.004 - 1.007
Reaction = Alkaline and does not coagulate
Pressure = 60-150 mm of H2O
**PHYSICAL CHARACTERISTICS:**

1) **COLOUR:**
- **Normal:** Colourless
- **Abnormal:**
  - Pink: slight amount of oxyhemoglobin
  - Orange: heavy hemolysis
  - Yellow: Bilirubin

2) **APPEARANCE:**
- **Normal:** Clear
- **Crystal clear:** Viral infection
- **Turbid:** Presence of WBC/Protein/Pus cell
  : Presence of any infection
- **Bloody:** Hemolyzed RBC
  : Lumber puncture trauma, Haemorrhage, Cerebral Maligancy
COMPOSITION OF CSF

Proteins = 20-40 mg%
Glucose = 2/3 of plasma or 50-65 mg%
LDH = 1/5 of serum or 20 – 80 IU/L
Lactic acid = 18.0 mg%
Chloride = 116 – 122 mmol/l
ADA = upto 5 IU/l
CSF MICROSCOPIC EXAMINATION

**WBC**

Normal = 4 -- 5 cells

Increase = infection, inflammation

Neutrophil = bacterial infection,
  acute suppurative meningitis.

Lymphocyte = viral infections
  encephalitis
  syphilis
  tuberculous meningitis
CSF MICROSCOPIC EXAMINATION

RBC
Normal = 4 – 5 cells
Increase = haemorrhage – stroke
malignancy
traumatic
trauma during Lumber Puncture

TRAUMA DURING LUMBER PUNCTURE
Such blood stains the fluid that is drawn initially and clears gradually. If it does not clear, blood indicates subarachnoid hemorrhage.
# CSF IN VARIOUS CLINICAL CONDITIONS

<table>
<thead>
<tr>
<th>Cause</th>
<th>Appearance</th>
<th>Cells</th>
<th>Protein</th>
<th>Glucose</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pyogenic Bacterial infection</strong></td>
<td>Yellowish, turbid</td>
<td>Neutrophil increased</td>
<td>Very High</td>
<td>Decreased nearly zero</td>
</tr>
<tr>
<td><strong>Viral infection</strong></td>
<td>Clear fluid</td>
<td>Lymphocyte increased</td>
<td>Slightly increased or normal</td>
<td>Normal</td>
</tr>
<tr>
<td><strong>Tuberculous infection</strong></td>
<td>Yellowish and viscous</td>
<td>Lymphocyte increased</td>
<td>Increased</td>
<td>Border line low</td>
</tr>
</tbody>
</table>
CSF PROTEINS

Normal Protein: 20 – 40 mg%

Moderate increase (150-200 mg/dl)
• Inflammatory diseases of meninges (bacterial/viral meningitis, encephalitis),
• Intracranial tumors
• Subarachnoid hemorrhage,
• Cerebral infarction.

Severe increase
• Guillain-Barré syndrome
**CSF GLUCOSE**

**NORMAL**

**Viral meningitis**

**LOW GLUCOSE**

**Bacterial meningitis (nearly zero)**

**Tuberculosis meningitis**

**Fungal infection**

**Dissemination of tumors.**

Glucose is consumed by leukocytes and tumor cells.
CSF ADA
Normal
Upto 5 iu/l

Higher
Tuberculosis meningitis

CSF LACTATE
Higher LEVEL
Birth asphyxia
Hypoxic brain injury
LUMBAR PUNCTURE

Procedure to collect a sample of cerebrospinal fluid.

CSF is mainly used to diagnose

- meningitis [an infection of the meninges].
- some other conditions of the brain and spinal cord.
PRECAUTIONS FOR LUMBAR PUNCTURE

- Asked to sign a consent form
- Ask about taking any medicines
- Are allergic to any medicines
- Have / had any bleeding problems
- Ask about medications such as aspirin or warfarin
- Ask the female patient might be pregnant
- Empty the bladder before the procedure
COMPLICATION OF LUMBAR PUNCTURE

Post lumbar puncture headache for 2 to 7 days.

The pain is relieved by lying flat.

Treatment consists of bed rest and fluid with simple analgesics.
Cerebrospinal fluid drawn from between two vertebrae
SITE FOR LUMBER PUNCTURE

Lumbar puncture

CSF

Spinal cord
Meninges

L3
L4
SITE FOR LUMBER PUNCTURE
THANK YOU FOR START WRITING QUESTION BEST OF LUCK