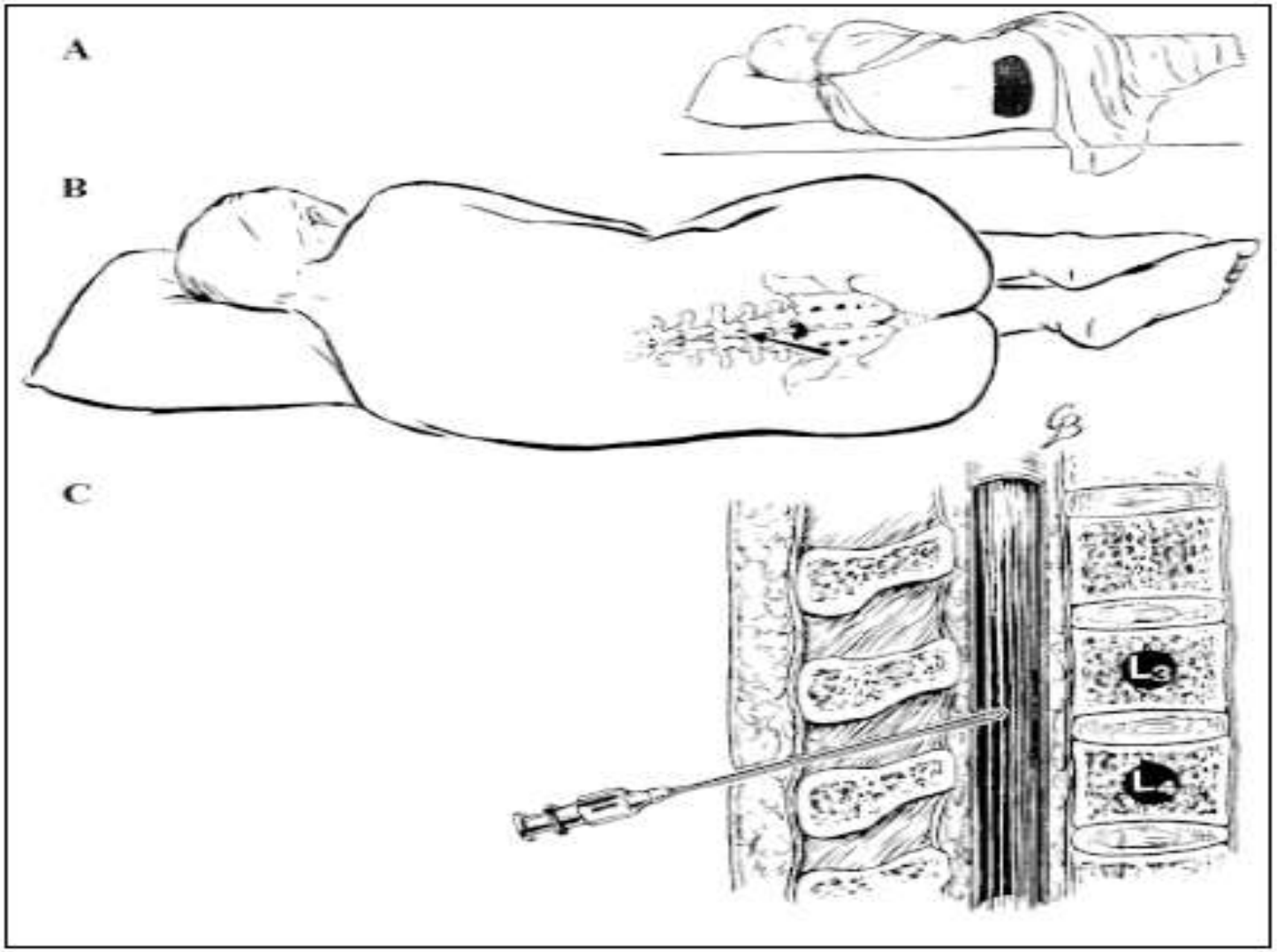
# WELCOME TO THIS EMS ECHO SESSION

# Collection of CSF



# Collection of CSF

CSF is collected under aseptic conditions by experienced personnel

- Biosafety
  - Potentially infectious
    - Hepatitis
    - HIV
- Protective gear
    - Change Gloves in-between patients
    - Do not Recap
  - Wipe the surface of the sample bottle with 70% alcohol

  (Higher concentrations reduce bacterial-cidal activity)

# Collection of CSF

- Skin disinfectant 70% alcohol
- Sterile Gloves
- Surgical Mask
- Adhesive Bandage
- Lumbar Puncture Needle
  - 22gauge / 89mm for adults
  - 23 gauge / 64mm for children

# Collection of CSF

- 3 tubes (1 ml each)
  - Microbiology
  - Chemistry
  - Cytology
- Traumatic Samples with blood should not be sent for Microbiology

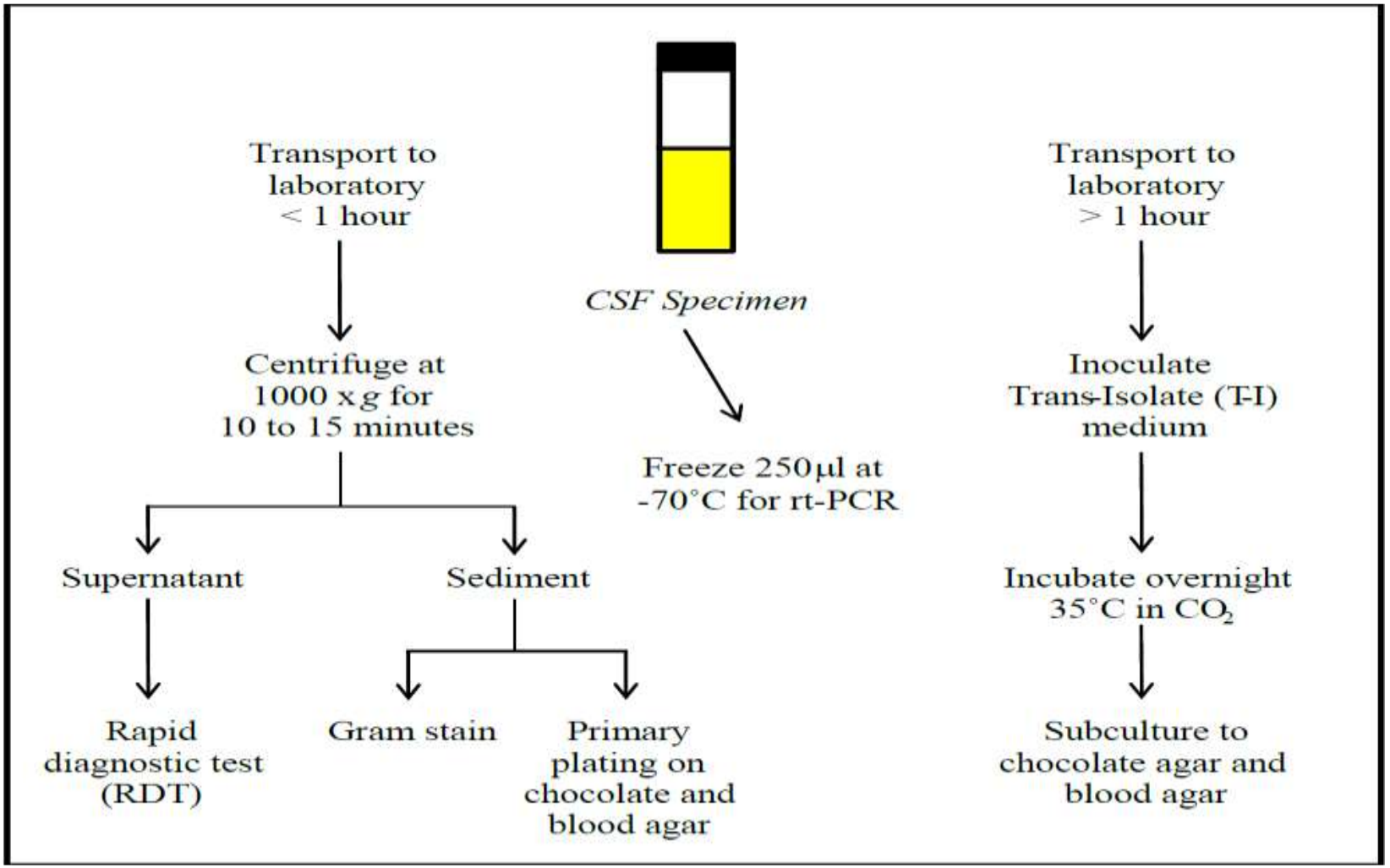
Note!!!

- Great care must be taken when handling c.s.f. because the specimen is obtained by lumbar puncture.
  - Only a limited amount of fluid can be withdrawn from a patient at any one time.

# Processing CSF

- For Glucose, collect 0.5–1.0 ml of the fluid into fluoride-oxalate preservative
- *For measuring protein* collect about 1 ml of fluid into a dry tube or bottle.
  - Total protein can also be measured using the supernatant fluid which remains after the bacteriological tests have been completed.

# Processing CSF



# Sample Rejection

- Incorrect container
  - Preservative
- Insufficient sample
- Improper Labeling
- CSF- Blood stained
  - Chemistry
  - Microbiology

# Cerebrospinal Fluid (CSF) Analysis and Interpretation in Neurocritical Care for Acute Neurological Conditions

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# Normal Composition of CSF

| | *Normal range* |
|---|---|
| Color | Clear |
| Specific gravity/pH | 1.006–1.007/7.4 |
| Opening pressure | 50–200 mm $H_2O$ |
| RBCs count | Nil |
| WBC count | 0–5 (upto 30 in neonates) |
| WBC types | Lymphocytes |
| CSF Proteins | 15–40 mg/dL |
| CSF lactate | 1–3 mmol/ L |
| CSF glucose | 50–80 mg/dL (two thirds of blood glucose |
| Microbial examination | No microorganism |

# Indications for LP

| *Diagnostic* |
| --- |
| CNS infections |
| Autoimmune CNS diseases like Guilliain Barrie syndrome |
| CNS vasculitis |
| CT negative subarachnoid hemorrhage |
| Malignant cells in metastasis |
| For injection of dye like fluorescin to identify site of CSF leaks |
| *Therapeutic* |
| Benign intracranial hypertension |
| Acute communicating hydrocephalus |
| Cryptococcal meningitis in HIV infections |
| For CSF leaks |
| *Delivery of intrathecal drugs* |
| Delivery of antibiotics |
| Delivery of antineoplastic drugs |

# Contraindications for LP

Relative contraindications

- Platelet count of less than 20000–40000/cu mm
- Thienopyridines therapy

Absolute contraindications

- Non-communicating obstructive hydrocephalus
- Uncorrected bleeding diathesis
- Anticoagulant therapy (timing of LP depends on the stopping of anticoagulant drug)
- Platelet count less than 20000/ cu mm
- Spinal canal stenosis or spinal cord compression above level of puncture
- Local skin infections

# Various Types of Meningitis

| *CSF analysis* | *Bacterial* | *Tuberculosis* | *Viral* | *Fungal* | *Aseptic* |
|---|---|---|---|---|---|
| Pressure | Increased | Increased | Normal to elevated | Normal to mild increase | Increased |
| Color | Turbid | Turbid | Clear | Clear | Clear to turbid |
| Glucose | < 40 mg% | Low | Normal to mild less | Low to normal | Low |
| Proteins | Elevated | Greatly elevated | Normal to mild elevation | Normal to mild increase | Elevated |
| Lactate | Elevated (> 6 mmol/L) | Elevated | 0–6 mmol/L | Normal | Normal |
| RBCs | Elevated | Elevated | Normal | Normal | Elevated |
| WBCs | 10-2000/ cu mm | Elevated, but < 500 | >100/ cu mm | 10–50/. cu mm | Mildly elevated |
| WBC types | Neutrophils | Lymphocytes | Lymphocytes | Lymphocytes | Neutrophils |
| Gram stain | Positive | Acid fast bacilli | Negative | Negative India ink for spores/fungi | Negative |
| Microbial Culture | Positive | Positive (yield is high in early stages) | Negative | Positive | Negative |
| Biomarkers | Elevated C-reactive proteins | Antibodies in CSF (detection of anti-M37Ra, anti-antigen 5, and anti-M37Rv) | | | |
| | | Elevated CSF procalcitonin, Adenosine deaminase | Low CRP and adenosine deaminase | | Seen following neurosurgery or antibiotic use |
| PCR test | | Help in identification of organisms even after antibiotics are started | Helps in identification of the organisms | | |

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