

CEREBROSPINAL FLUID

Q. 1 Approximately how much CSF is produced daily ?

- 500 ml (0.3-0.4 ml/min)

Q. 2 Where is CSF found in the brain ?

- Approximately 25 ml in ventricles.
- Approximately 90-125 ml in sub arachnoid space.

Q. 3 Where does filtration and secretion of CSF occur?

- 70 % in choroid plexuses.
- Rest of it in ventricular ependymal lining and cerebral arachnoid space.

Q. 4 What are the functions of CSF ?

- Physical support to the brain : 1500 gms brain weighs in 50 gms of suspended CSF.
- Protective effect against sudden changes in acute venous and arterial blood pressure
- Excretory waste function pathway for hypothalamus releasing factors transported to cells.
- Maintains ionic homeostasis of brain.

Q. 5 What is meant by Blood Brain Barrier ?

- Consists of two morphologically distinct components :
 1. Unique capillary endothelium held together by intercellular tight junctions
 2. Choroid plexus, where single layer of specialized choroidal ependymal cells are connected by tight junctions overlying fenestrated capillaries.

Q. 6 Which ionic substances are tightly regulated by transport systems?

- H⁺, K⁺, Ca⁺, Mg⁺, Bicarbonate

Q. 7 Which constituents move freely across the blood brain barrier ?

- Glucose, urea , creatinine.

Q. 8 How does proteins cross the blood brain barrier ?

- Cross by passive diffusion.
- At a rate dependent on plasma to CSF concentration gradient.
- Inversely proportional to their molecular weight and hydrodynamic volume.

Q. 9 From which sites CSF can be obtained ?

- Lumbar
- Cisternal
- Lateral cervical puncture
- Ventricular cannulas or shunts

Q. 10 What precaution should be taken prior to CSF removal ?

- CSF opening pressure should be measured by a manometer.

Q. 11 In which conditions CSF pressure varies ?

- Postural changes
- Blood pressure
- Venous return
- Factors altering cerebral blood flow

Q. 12 What is normal opening CSF pressure in adults?

- 90 – 180 mm of water in lateral decubitus position with neck and legs in neutral position.
- Slightly higher in sitting position
- Varies 10 mm with respiration

Q. 13 What can be the limit of CSF pressure in obese patients ?

- Upto 250 mm of water.

Q. 14 What is the normal range of CSF pressure in infants and young children?

- 10 – 100 mm of water.

Q. 15 What is the significance of opening CSF pressure above 250 mm of water?

- Diagnostic of intracranial hypertension due to meningitis, intracranial hemorrhage and tumors.
- In such cases only 2 ml of CSF should be withdrawn.

Q. 16 In which condition idiopathic intracranial hypertension is commonly seen?

- Obese women during child bearing age.

Q. 17 In which cases elevated CSF pressure is seen?

- Congestive heart failure
- Meningitis
- Superior vena cava syndrome
- Thrombosis of venous sinuses
- Cerebral edema.

Q. 18 In which conditions opening pressure elevation is the only abnormality ?

- Cryptococcal meningitis
- Pseudotumor cerebri

Q. 19 In which cases decreased CSF pressure can be seen ?

- Spinal -Subarachnoid block
- Dehydration
- Circulatory collapse
- CSF leakage

Q. 20 What does a significant pressure drop indicate after removal of 1-2 ml of CSF?

- Herniation
- Spinal block above puncture site
- No fluid should be withdrawn then.

Q. 21 How much CSF is normally removed for CSF examination ?

- Upto 20 ml.

Q. 22 If serum glucose has to be done then when the sample should be collected before lumbar puncture ?

- 2 – 4 hours before lumbar puncture due to delay in CSF – serum equilibrium.

Q. 23 How is the CSF specimen divided?

- In three sterile tubes :
 1. For chemistry and immunology studies.
 2. For microbiology studies.
 3. For cytology, if suspected for malignancy.

Q. 24 In which conditions, variations in CSF sample collected tubes should be done?

- When 1st tube is hemorrhagic, cannot be used for protein studies in cases like multiple sclerosis
- Instead, 3rd tube should be examined.

Q. 25 Why 1st tube of CSF collection cannot be used for microbiology exams?

- It may be contaminated with skin bacteria.

Q. 26 Why glass tubes should be avoided for CSF examination ?

- This is because cells adhere to the glass and it will affect cell count and differential count.

Q. 27 How soon should be CSF specimen processed in the laboratory ?

- Within 1 hour to minimize cellular degradation.

Q. 28 Why refrigeration of CSF sample is contraindicated for culture specimens?

- This is because fastidious organisms (eg : Haemophilus Influenzae and Neisseria Meningitidis) will not survive.

Q. 29 How indications of lumbar puncture are divided?

- Meningeal infection
- Subarachnoid hemorrhage
- Primary or metastatic malignancy
- Demyelinating disease.

Q. 30 Which is the most important indication of CSF examination ?

- Infectious meningitis.

Q. 31 Which are routine recommended CSF laboratory tests ?

- Opening CSF pressure
- Total cell count (RBCs & WBCs)
- Differential cell count (Stained smear)
- Glucose (CSF/Plasma ratio)
- Total proteins.

Q. 32 What is the significance of gross examination ?

- Normal CSF : Crystal clear, colourless, viscosity similar to water
- Abnormal CSF : Maybe cloudy, purulent or pigment tinged.

Q. 33 What are the causes of cloudy or turbid CSF ?

- Leucocyte count more than 200 cells/ul or RBCs more than 400/ul.
- Microorganisms i.e. fungi, bacteria and amoeba
- Radiographic contrast material
- Aspirated epidural fat.
- Protein greater than 150 ug/ml

Q. 34 What is Tyndall's effect ?

- Direct sunlight is directed on the tube of CSF at 90 degree angle from observer
- Imparts sparkling or snowy appearance as suspended particles scatter the light .
- Helps to detect cell count when cells are less than 50 cells/ul

Q. 35 In which conditions clot formation is seen in CSF ?

- Traumatic taps
- Complete spinal block (Froin's syndrome)
- Suppurative or tuberculous meningitis.

Q. 36 In which condition clot formation is not seen in CSF ?

- Subarachnoid hemorrhage.

Q. 37 How does clot formation in CSF look like ?

- Fine surface pellicles are seen after refrigeration for 12-24 hours.

Q. 38 How does clots in CSF affect results ?

- The clots may interfere with cell count accuracy by entrapping inflammatory cells.

Q. 39 In which conditions viscous CSF is seen ?

- Metastatic mucin producing adenocarcinoma
- Cryptococcal meningitis due to capsular polysaccharide
- Liquid nucleus pulposus due to needle injury to annulus fibrosus.

Q. 40 What is significance of pink-red CSF ?

- Presence of blood
- Grossly bloody then RBC count more than 6000/ul
- Originates from Subarachnoid hemorrhage, intracranial hemorrhage, cerebral infarct
- Traumatic spinal tap.

Q. 41 What is the significance of pink CSF supernatant color ?

- RBC lysis
- Hb breakdown

Q. 42 What is the significance of yellow CSF supernatant color ?

- RBC lysis
- Hb breakdown products
- Hyperbilirubinemia
- CSF protein > 150 mg/dl (1.5 g/lit)

Q. 43 What is the significance of orange CSF supernatant color ?

- RBC lysis
- Hb breakdown products
- Hypervitaminosis A (Carotenoids)

Q. 44 What is the significance of yellow green CSF supernatant ?

- Hyperbilirubinemia (biliverdin)

Q. 45 What is the significance of brown CSF supernatant ?

- Meningeal metastatic melanoma

Q. 46 What is xanthochromia ?

- Pale pink to yellow color in the supernatant of centrifuged CSF.

Q. 47 How is xanthochromia detected ?

- CSF is centrifuged
- Supernatant fluid is compared with a tube of distilled water.

Q. 48 How is subarachnoid hemorrhage diagnosed from Xanthochromia ?

- Pale pink to orange xanthochromia is seen from released oxyhaemoglobin by lumbar puncture 2-4 hours after subarachnoid hemorrhage.
- Peak intensity is seen after 24-36 hours.
- Disappears over next 4-8 days.

Q. 49 What is pink to orange xanthochromia ?

- Seen in subarachnoid hemorrhage, released from oxyhaemoglobin.

Q. 50 What is yellow xanthochromia ?

- It is derived from bilirubin.
- Develops 12 hours after subarachnoid hemorrhage.
- Persists for 2-4 weeks.

Q. 51 In which conditions visible CSF xanthochromia is seen ?

1. Oxyhaemoglobin due to artifactual red cell lysis caused by detergent contamination of needle or collecting tube .
2. Delay of more than 1 hour without refrigeration before examination.
3. Bilirubin in jaundice patients.
4. CSF protein levels over 150 mg/dl seen in bloody traumatic taps and pathologic states (eg : Spinal block, polyneuritis and meningitis)
5. Carotenoids – orange color seen in people with hypercarotenemia (Hypervitaminosis A)
6. Merthiolate disinfectant contamination
7. Melanin (Brown) from Metastatic meningeal melanoma
8. Rifampicin therapy (red/orange color)

Q. 52 How will you differentiate Hb derived substances from Xanthochromic pigments ?

- By spectrophotometry

Q. 53 How will you differentiate between traumatic tap and subarachnoid hemorrhage?

1. Traumatic tap : Hemorrhagic fluid clears between first and third collected tubes.

Subarachnoid hemorrhage : Remains relatively uniform.

2. Xanthochromia
3. Microscopic evidence of erythrophagocytolysis
4. Hemosiderin laden macrophages
5. RBC lysis in 1-2 hours in traumatic tap of CSF, so early evaluation is necessary.
6. Latex agglutination immunoassay for D-dimer is positive in Subarachnoid hemorrhage but negative in traumatic tap.

Q.54 In which conditions false positive results for D-dimer are expected ?

- DIC
- Fibrinolysis
- Trauma from repeated punctures

Q. 55 How total cell count is done in CSF ?

- Undiluted CSF in manual counting chamber.

Q. 56 Why automated leucocyte and erythrocyte count is not preferred?

- As precision is poor in low count.

Q. 57 Which are manual methods of counting CSF cell counts?

- Rosenthal type chamber
- Neubauer's chamber
- Flow cytometry

Q. 58 What is the normal leucocyte count of CSF in neonates ?

- 0-30 cells/ul

Q. 59 What is the significance of RBC in CSF ?

- Normally no RBCs are seen.
- If present – pathologic process eg; Trauma, malignancy and traumatic tap.
- Gives useful approximation of true CSF WBC or total protein of traumatic puncture by correcting.
- All parameters should be done in a single tube.

Q. 60 What are the methods to do differential WBC counts in CSF ?

1. Counting chamber : Unsatisfactory as low cell numbers have poor precision.
2. Direct smear of centrifuged CSF sediment : Subject to error from cellular distortions fragmentation.
3. Cytocentrifuge

Q. 61 What are the advantages of cytocentrifuge ?

1. Requires minimal training.
2. Allows Wright's staining of air dried cytopins.
3. Cell yield and preservations are better.
4. 30-50 cells can be concentrated from 0.5ml of normal CSF.

Q. 62 How variable artifactual distortions in cytopin for differential count in CSF be avoided ?

1. Fresh specimen
2. Albumin added to specimen (2 drops of 22% bovine serum albumin)
3. Cell concentration is adjusted to about 300 WBCs/lit prior to centrifugation.

Q. 63 What is the benefit of filtration and sedimentation methods of CSF?

1. Allow concentration of large volumes of CSF for cytological examination or culture.
2. Retain fluid filtration for additional studies

Q. 64 What is the normal lymphocyte monocyte ratio in CSF ?

- 70 : 30

Q. 65 When are more number of monocytes seen in CSF ?

- In young children upto 80%

Q. 66 What is the normal range of neutrophils in CSF ?

- 7 % with normal WBC count.

Q. 67 What are the causes of increased CSF neutrophils ?

1. Meningitis (Bacterial, Viral , Tuberculous and mycotic)
2. Amoebic encephalopathy
3. Other infections like cerebral abscess, subdural empyema, etc.
4. Following seizures
5. Following subarachnoid or intracerebral hemorrhage.
6. Following infarct.
7. Due to repeated lumbar puncture
8. Injection of drugs.
9. Metastatic tumor in contact with CSF.

Q. 68 Which other cells are seen in traumatic puncture ?

1. Bone marrow cells
2. Cartilage cells
3. Squamous cells
4. Ganglion cells
5. Soft tissue element
6. Ependymal and choroidal plexus cells.

Q. 69 What proportion of neutrophils can increase in bacterial meningitis ?

- Upto 60 %

Q. 70 How viral meningitis is suspected ?

- Neutrophilia changes to lymphocytic pleocytosis within 2-3 days.

Q. 71 What is the significance of persistent neutrophilia ?

- Persistent neutrophilic meningitis may be non-infectious or due to less common pathogens like Nocardia, Actinomyces, etc.

Q. 72 In which cases lymphocytosis is seen in CSF ?

1. Meningitis : Viral, tuberculous and fungal.
2. Early bacterial meningitis
3. Parasitic infections eg: Cysticercosis.
4. Degenerative disorders.
5. Sarcoidosis.

Q. 73 When blast like lymphocytes are admixed with normal lymphocytes ?

- In neonates.

Q. 74 In which conditions plasma cells are seen in CSF ?

1. Acute viral infection
2. Multiple sclerosis
3. Parasitic CNS infestations.
4. Sarcoidosis
5. Tuberculosis

Q. 75 What is the suggestive criteria of eosinophilic meningitis in CSF ?

- 10 % eosinophils.

Q. 76 What are the causes of Eosinophilia in CSF ?

1. Acute polyneuritis
2. CNS reaction within foreign material
3. Fungal Infections
4. Parasitic infections
5. Hypereosinophilic syndrome

Q. 77 When mixed cells without neutrophils are seen in CSF and what can be the interpretation?

- Viral & syphilitic meningitis.

Q. 78 In which condition macrophages are seen in CSF ?

- 12-48 hours after subarachnoid hemorrhage or traumatic tap.

Q. 79 In which carcinoma, cells are seen in CSF ?

1. Leukemia
2. Metastatic carcinoma
3. Primary CNS malignancy

Q. 80 In which type of leukemia, involvement of meninges is more common ?

- Acute lymphoblastic leukemia : Leucocyte count over 5 cells/ul with unequivocal lymphoblasts.

Q.81 Which tests increase sensitivity of lymphoma detection in CSF ?

- PCR
- Flow cytometry

Q. 82 Which proteins are found in CSF ?

- Prealbumin
- Transferrin
- Nerve tissue specific proteins

Q. 83 What is the normal CSF protein level ?

- 15-45 mg/dl

Q. 84 Enumerate different methods of measuring protein in CSF .

1. Lowry method
2. Trichloroacetic acid- poncue-S method
3. Biuret method

Q. 85 What is the normal range of CSF protein in infants ?

- Approximately 90 ug/dl for infants.
- Approximately 115 ug/dl for preterm infants.

Q. 86 What are the causes of increased protein levels in CSF ?

1. Increased permeability of blood brain barrier.
2. Decreased resorption at arachnoid villi.
3. Mechanical obstruction of CSF flow due to spinal block above puncture site.
4. Increase in intrathecal immunoglobulin synthesis.

Q. 87 What is low lumbar CSF protein level ?

- Less than 20 mg/dl

Q. 88 In which conditions low protein levels are seen in CSF ?

1. Young children between 6 months to 2 years.
2. Removal of large volumes of CSF
3. CSF leaks induced by trauma or lumbar puncture
4. Increased intracranial pressure
5. Hyperthyroidism

Q. 89 What does protein electrophoresis of CSF reveal ?

1. A prominent prealbumin band (Transthyretin)
2. Two transferrin bands

Q. 90 Which are turbidometric methods of CSF protein estimation ?

1. Trichloroacetic acid
2. Sulphosalicylic acid
3. Sodium sulfate for protein precipitation

Q. 91 What are the advantages of turbidometric methods of measuring CSF proteins ?

- Simple
- Rapid
- Requires no special instrumentation.

Q. 92 What are the disadvantages of turbidometric methods of CSF protein estimation ?

- Temperature sensitive method
- Requires much large volume of specimen
- Prone to significant variations from changes in albumin/globulin ratio.

Q. 93 In which condition, false positive elevation of protein is observed in CSF in TCA method ?

- In the presence of methotrexate.

Q. 94 Which reagents are used as precipitating agents in automated and micromethods?

1. Benzethonium chloride
2. Benzalkonium chloride

Q. 95 Which colorimetric methods are used for measuring CSF proteins ?

1. Lowry method
2. Dye binding methods (Eg : Coomassie Brilliant blue, Poncue S)
3. Modified biuret method

Q. 96 What are the advantages of colorimetric methods of measuring CSF proteins?

- Rapid
- Highly sensitive
- Can be used on small samples

Q. 97 What are the advantages of mixing Immunologic methods of measuring CSF proteins ?

1. Can measure specific proteins
2. Requires only 25-50 ul of CSF
3. Relatively simple to perform
4. Reagents are standardized.

Q. 98 How is the permeability of blood brain barrier assessed ?

- By immunochemical quantification of CSF albumin to serum albumin ratio in grams per deciliter.
- Normal is 1 : 230

Q. 99 What is the CSF / Serum Albumin index ?

- It assesses the permeability of blood brain barrier.
- It is measured as:

$$\text{CSF/Serum Albumin Index} = \frac{\text{CSF Albumin (mg/dl)}}{\text{Serum Albumin(g/dl)}}$$

Q. 100 How is the interpretation of intactness of Blood brain barrier is done ?

By CSF / Serum Albumin index

- Intact barrier :- less than 9
- Slight impairment :- 9-14
- Moderate impairment :- 14-30
- Severe impairment :- Greater than 3

Q. 101 In which condition blood brain barrier is not intact normally ?

- In infants upto 6 months of age reflecting the immaturity of the blood brain barrier.

Q. 102 By which other methods the intactness of blood brain barrier is measured?

- By CSF/Serum IgG

Q. 103 Which investigations of CSF are important for diagnosis of Multiple Sclerosis ?

1. CSF protein
2. CSF gamma globulin fraction on electrophoresis
3. CSF IgG /Albumin ratio by electroimmunodiffusion.

Q. 104 What is the interpretation of CSF levels of Beta –amyloid and Tau proteins if increased ?

- Subdural hemorrhage
- Bacterial meningitis

Q. 105 What is the interpretation of Beta-2-microglobulin if increased in CSF ?

- Leukaemia / Lymphoma

Q.106 What is the interpretation in C-reactive protein if increased in CSF ?

- Bacterial meningitis
- Viral meningitis.

Q. 107 What is the interpretation if fibronectin is increased in CSF ?

- Lymphoblastic leukaemia
- AIDS
- Meningitis

Q. 108 What is the interpretation if methemoglobin is increased in CSF ?

- Mild subarachnoid / subdural hemorrhage.

Q. 109 In which conditions myelin basic protein is increased in CSF ?

- Multiple Sclerosis
- Tumors

Q. 110 In which conditions Transferrin is increased in CSF ?

- CSF leakage

Q. 111 What is the normal range of CSF fasting glucose levels ?

- 50-80 mg/dl

Q. 112 What is the normal CSF/Plasma glucose ratio ?

- 0.3-0.9

Q. 113 Which values of CSF glucose are considered abnormal ?

1. Below 40 mg/dl in CSF
2. CSF/ Plasma glucose ratio is less than 0.3

Q. 114 In which conditions generally hypoglycorrhachia (low glucose level is seen)

1. Bacterial , Tuberculous and fungal meningitis (However, normal levels do not exclude the above conditions)
2. Malignant tumor
3. Sarcoidosis
4. Cysticercosis
5. Subarachnoid hemorrhage

Q. 115 Why glucose level in CSF is decreased ?

- It results from increased anaerobic glycolysis in brain tissue and leucocytes and impaired transport into CSF.

Q. 116 How is CSF glucose level useful parameter in assessing response to treatment?

- It normalizes before protein levels and cell counts normalize during recovery from meningitis.

Q. 117 What is significance of increased CSF glucose level ?

1. Clinically, no significance.
2. It reflects increased blood glucose levels within 2 hours of lumbar puncture.
3. Traumatic tap.

Q. 118 What is the significance of lactate measured in CSF ?

- It has been used to differentiate between viral and bacterial meningitis.
- It can also be used to differentiate between viral, fungal, mycoplasma and tuberculous meningitis
- In viral meningitis, levels less than 35 mg/dl are seen
- In bacterial meningitis it is more than 35 mg/dl

Q. 119 What is the significance of persistently high level of lactate in CSF ?

- Poor prognosis in head injury.

Q. 120 What is increased in CSF in Alzheimer's disease ?

- F2-Isoprostanes.

Q. 121 What is the significance of increased Adenosine deaminase (ADA) enzyme in CSF ?

- Indication of tuberculous meningitis
- Helps in differentiating tuberculous from other types of meningitis.

Q. 122 What is the significance of increased Creatinine Kinase in CSF ?

- Increased in Subarachnoid hemorrhage
- Correlates severity of the injury

Q. 123 What is the significance of lactate dehydrogenase enzyme in CSF ?

- Differentiates traumatic tap from intracranial hemorrhage as recent traumatic tap with intact RBCs does not significantly elevate LDH.
- It is much higher in bacterial meningitis than in aseptic meningitis.

Q. 124 In which conditions the CSF Lactate dehydrogenase is increased ?

- CNS Leukaemia / Lymphoma
- Metastatic carcinoma
- Bacterial meningitis
- Subarachnoid hemorrhage

Q. 125 How do Lactate dehydrogenase isoenzymes in CSF help in diagnosis ?

- LD 5 to total LD ratio is increased in leptomeningeal metastasis from Ca breast, lungs and metastatic melanoma.

Q. 126 What is the significance of increased ammonia levels in CSF ?

- It indicates hepatic encephalopathy.

Q. 127 In which conditions CSF amino acids are elevated ?

- In infants.

Q. 128 Which tumor markers are increased in CSF ?

1. CEA : Metastatic brain tumors
2. HCG : Metastatic choriocarcinoma
3. Alpha fetoprotein : Germ cell tumors (Diagnosis and monitoring)
4. Ferritin : CNS malignancy

Q. 129 Which stain is significant for diagnosing CNS infections ?

- Gram stain.

Q. 130 Which organisms in CSF are responsible for causing bacterial meningitis ?

1. B. Streptococcus (Neonates)
2. Neisseria (3 months and older)
3. Streptococcus pneumoniae (3 months and older)
4. E. coli and other gram negative bacteria (1 month and older)
5. H. Influenzae (Upto 18 years)

Q. 131 Which are the methods to diagnose bacteria in CSF ?

1. Gram stain
2. Culture
3. Latex agglutination
4. Limulus lysate assay in Gram negative bacteria
5. PCR
6. NAT

Q. 132 Which investigations are useful for diagnosing Neurosyphilis?

1. Abnormality in CSF proteins and cell counts.
2. VDRL (Nonspecific, less sensitive)
3. Treponemal antibody test (FTA-ABS) (Sensitive and specific, but chances of false positive are more)

Q. 133 Which viruses are responsible for viral meningitis ?

- Echovirus
- Coxsackievirus
- Poliovirus

Q. 134 Which investigations are done to diagnose Viral meningitis ?

1. CSF cell count : Lymphocytes predominate neutrophils.
2. Exclusion of growth in culture
3. RT-PCR

Q. 135 What changes are seen in CSF in HIV ?

1. Lymphocytosis
2. Elevated IgG
3. Opportunistic fungi in CSF.

Q. 136 Which fungus is most commonly seen in CSF ?

- Cryptococcus, diagnosed by :
 1. India ink or Nitrogen stains
 2. Latex agglutination
 3. Culture

Q. 137 What are the hallmark features of Tuberculous meningitis in CSF ?

1. Elevated proteins
2. Lymphocytic predominance

Q. 138 How is Tuberculous meningitis diagnosed in CSF ?

1. Acid fast stain
2. PCR
3. DOT ELISA
4. Adenosine Deaminase level

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PERICARDIAL FLUID

Q. 1 What is the significance of LDH and Creatinine Kinase in pericardial fluid ?

- It is more important in post mortem
- If it is more within 48 hours of death, it indicates Acute Myocardial infarction
- Troponin and myoglobin also rise after myocardial infarction.

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PERITONEAL FLUID

ASCITES

Q. 1 What is ascites ?

- Pathologic accumulation of excess fluid in peritoneal cavity.
- Normal upto 50 ml
- Produced as an ultrafiltrate of plasma dependent on vascular permeability and hydrostatic and oncotic starling forces.

Q. 2 What are common causes of ascites having transudate ?

- Congestive heart failure.
- Hepatic cirrhosis
- Nephrotic syndrome (Hypoproteinemia)

Q. 3 What are the common causes of ascites with exudate formation ?

1. Primary infection like bacterial peritonitis, tuberculosis etc.
2. Neoplasms like : - Hematoma
Lymphoma
Mesothelioma
Ovarian Carcinoma
Prostatic Carcinoma
3. Trauma
4. Pancreatitis

Q. 4 What are the causes of ascites showing chylous effusion ?

- It is due to the damage to thoracic duct (Eg: Trauma, Lymphoma, Carcinoma, Prostatic infection, etc.)

Q. 5 How will you differentiate blood tinged ascites from traumatic tap ?

- Blood clears with continuous paracentesis
- As little as 15 ml of blood does not allow to read newsprint.

Q. 6 How subacute bacterial peritonitis is differentiated from uncomplicated cirrhosis ?

- In subacute bacterial peritonitis, leucocyte count is more than 500 / ul with more than 50 % neutrophils.

Q. 7 What is the significance of eosinophilia in ascites ?

- It is mostly inflammatory process associated with chronic peritoneal dialysis.
- Also seen in Congestive heart failure, lymphoma and vasculitis.

Q. 8 What is the significance of protein in ascitic fluid ?

- In bacterial peritonitis : Low protein
High Serum Albumin

Helps in differentiating from Cirrhosis.

Q.9 In which condition low glucose levels are seen in ascitic fluid ?

- Tuberculosis

Q. 10 What is the significance of different enzymes in ascitic fluid ?

1. Increased Amylase :- Acute Pancreatitis
Abdominal trauma
2. Increased Alkaline phosphatase :- Differentiating primary from secondary
bacterial peritonitis.
3. Increased LDH : Malignancy
Differentiating Cirrhosis from Hepatocarcinoma
4. Increased Adenosine Deaminase : Tuberculosis

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PLEURAL FLUID

Q. 1 What is pleural effusion ?

- Accumulation of fluid in pleura resulting from imbalance of fluid production and resorption
- Also known as serous effusion.

Q. 2 In which tubes pleural fluid is collected ?

- For total differential count : EDTA tube
- For other assessments : Heparinised tubes (To avoid clotting)

Q. 3 In which condition pleural effusion is called transudate ?

- When it is usually bilateral
- Due to increased hydrostatic pressure
- Or due to decreased plasma oncotic pressure
- Eg : Congestive heart failure, Hepatic cirrhosis , Malignancy, Hypoproteinaemia, Nephrotic syndrome.

Q. 4 When is pleural effusion called exudates ?

- Usually unilateral
- Due to localized disorders
- Due to increased vascular permeability
- Or due to decreased lymphatic resorption
- Eg : Infections : Bacterial, viral and tuberculosis
Neoplasms : Bronchogenic Ca, Metastatic Ca, Lymphoma etc.

Q. 5 Enumerate noninfectious inflammatory disease causing pleural effusion ?

- Rheumatoid disease
- SLE (LE cells)

Q.6 Enumerate extrapleural sources of pleural effusion ?

1. Pancreatitis : Increased amylase in effusion fluid
2. Ruptured esophagus : Increased amylase and low pH in effusion fluid
3. Urinothorax : Increased creatinine in effusion fluid

Q. 7 Which criteria is used to differentiate between transudate and exudate ?

- Light's criteria

Q. 8 What is Light's criteria for pleural fluid to be exudate ?

1. Fluid/Serum Protein ratio ≥ 0.5
2. Fluid/Serum LD ratio ≥ 0.6
3. Fluid LD $\geq 1/3^{\text{rd}}$ Upper limit of serum LD
4. Fluid Cholesterol ≥ 45 mg/dl
5. Fluid/Serum cholesterol ratio ≥ 0.3
6. Serum/Fluid Albumin gradient ≤ 1.2 g/dl
7. Fluid/Serum bilirubin ratio ≥ 0.6

Q. 9 What are the characteristics of pleural transudate ?

- Pale yellow to straw colored
- Odorless
- Does not clot

Q. 10 What does bloody pleural effusion indicate ?

- Trauma
- Malignancy
- Pulmonary infarction

Q. 11 How is traumatic tap differentiated ?

- Uneven blood distribution
- Fluid clearing with continued aspiration
- Formation of small blood clots

Q. 12 What is the evidence of hemothorax ?

- Fluid haematocrit greater than 50 % of blood haematocrit.

Q. 13 What are the characteristics of pleural exudates ?

- Variable degrees of cloudiness or turbidity.
- Can clot if not heparinised.

Q. 14 What is the significance of turbidity in pleural effusion ?

- Firstly, specimen is centrifuged
- If supernatant is clear : Turbidity is due to cellular elements or debris
- If supernatant is turbid : Chylous or pseudo-chylous effusion.

Q. 15 What are true chylous effusions ?

1. Produced by leakage from the thoracic duct from obstruction by lymphoma, carcinoma, etc.
2. Creamy top layer of chylomicrons are formed on standing.

Q. 16 What are pseudo chylous or chyliform effusions ?

1. Have milky, greenish or gold paint appearance
2. Accumulate through breakdown of cellular lipids in long standing effusions.

Eg : Rheumatoid pleuritis, Tuberculosis, Myxedema

Q. 17 How will you differentiate between chylous and pseudo chylous effusions?

| | CHYLOUS EFFUSION | PSEUDO CHYLOUS EFFUSION |
|---------------------------------------|---------------------------------|--------------------------------------------|
| 1. Onset | Sudden | Gradual |
| 2. Appearance | Milky white or yellow to bloody | Milky or greenish, metallic sheen |
| 3. Microscopy | Lymphocytes seen | Mixed cellular, cholesterol crystals seen. |
| 4. Triglycerides | ≥ 110 mg/dl | ≤ 50 mg/dl |
| 5. Lipoprotein electrophoresis | Chylomicrons present | Chylomicrons absent |

Q. 18 How is differential count of pleural effusion done ?

1. Stained , air dried Romanowski's stained cytocentrifuged smear.
2. Filtration or automated concentration method by Pap stain.

Q. 19 Which malignancies can be diagnosed by the cytologic study of effusion ?

- Metastatic carcinoma
- Mesothelioma
- Squamous cell carcinoma
- Lymphoma

Q. 20 What is the significance of presence of mesothelial cells in pleural fluid?

- Commonly seen in inflammatory processes .

Q. 21 In which conditions mesothelial cells are seen scarce in effusion ?

- Tuberculosis
- Empyema
- Rheumatoid pleuritis

Due to fibrin deposition and fibrosis occurring in these conditions, mesothelial cells are prevented from exfoliation.

Q. 22 How can lymphoma be differentiated from leukaemia in effusion ?

- Immunophenotyping by flow cytometry
- Immunocytochemistry

Q. 23 In which conditions neutrophils predominate in effusion ?

> 50 % seen in :

- Bacterial Pneumonia
- Pulmonary Infarction
- Pancreatitis

Q. 24 In which conditions lymphocytes predominate in effusion ?

> 50 % seen in :

- Tuberculosis
- Viral Infection
- Malignancy
- SLE

Q. 25 In which conditions, eosinophils predominate in effusion ?

> 10 % seen in :

- Pneumothorax
- Pulmonary Infarction
- Hypersensitivity
- Parasitic infections
- Congestive heart failure

Q. 26 What is the significance of amylase in pleural effusion ?

Indicates the presence of :

- Pancreatitis
- Esophageal rupture
- Malignant effusion

Can be differentiated by salivary, which is often seen in esophageal rupture and malignant effusion but not in pancreatitis.

DR. CHERRY SHAH

SYNOVIAL FLUID

Q. 1 What is the significance of doing synovial fluid examination?

- To differentiate between inflammatory and non-inflammatory conditions.

Q. 2 Which are the non inflammatory effusions?

- Osteoarthritis
- Traumatic arthritis
- Early rheumatic fever

Q. 3 Which are the inflammatory effusions ?

- Rheumatoid arthritis
- SLE
- Arthritis with inflammatory bowel disease
- Rheumatic fever

Q. 4 How will you differentiate between non inflammatory and inflammatory effusions in synovial fluid?

- Non inflammatory : Leucocyte count less than 3000/ul
- Inflammatory : Leucocyte count more than 3000/ul upto 75000/ul

Q. 5 Which anticoagulant should be used for synovial fluid collection ?

- Heparinized syringe.

Q.6 Why other anticoagulants such as EDTA, oxalate, etc. are not used for synovial fluid collection?

- As they form artifact crystals which may mislead in microscopy.

Q. 7 What changes can be seen in doing gross examination of synovial fluid?

Color: Evaluated against clear glass

- Normal : Clear
- Yellow : In sepsis
- Traumatic tap : Reddish brown
- Oily appearance : Cholesterol crystals

Q. 8 What is done to evaluate microscopic examination of synovial fluid?

- Total cell count : Performed within 1 hour .
- More than 10,000-50,000 indicates : Gout, Chronic arthritis (eg: Rheumatoid arthritis) , SLE and Septic arthritis.

Q. 9 What is observed in doing differential count of synovial fluid ?

- Neutrophils more than 50% : Gout, Rheumatoid arthritis
- Neutrophils more than 75% : Acute bacterial arthritis
- LE cells : Lupus arthritis
- Lymphocytes : Early Rheumatoid arthritis, Collagen disorders.
- Monocytes and macrophages : Viral arthritis
- Eosinophilia : Parasitic infection, Lyme's disease
- Lipid bodies : Trauma, Aseptic necrosis.

Q. 10 Which types of crystals are seen in synovial fluid ?

1. Monosodium urate monohydrate
2. Calcium phosphate

Seen in a polarized microscope

Q. 11 What are cholesterol crystals ?

- Cholesterol crystals are seen in synovial fluid in :
 1. Rheumatoid arthritis
 2. Tuberculous arthritis
 3. SLE

Q. 12 What is the significance of RA factor in synovial fluid?

- It is found in about 60 % patients of Rheumatoid arthritis.

Q. 13 What is the significance of ANA antibodies in synovial fluid ?

- They are found in SLE and Rheumatoid arthritis.

URINE

Q.1 What does basic urinalysis consist of ?

- Gross examination
- Dipstick analysis either manually or by urine analysis
- Analysis for blood, white cells, sugar and other substances.

Q.2 What is the significance & microscopic examination of urine ?

- To detect cellular elements, casts and crystals.

Q.3 What is the significance of dysmorphic red cells in urine ?

- It is sign of glomerular disease.

Q.4 Which urine specimen is best for analysis? Why?

- First morning sample because it is the most concentrated.

Q.5 What does osmolality and specific gravity of urine indicate?

- Concentrating ability of kidney.

Q.6 What does proteinuria more than 4 g / day indicate ?

- Nephrotic Syndrome.

Q.7 In which conditions ketonuria is seen ?

- Diabetis
- Febrile illness
- Cachexia

Q.8 Which urine tests are useful in diagnosing urinary tract infection ?

- Dipstick nitrite and leucocyte esterase.

Q.9 Why the colour of urine is yellow ?

- Due to urochrome.

Q.10 What are the physiological causes of extra yellow urine ?

- Fever
- Starvation

Q.11 What is cause of pale urine ?

- Low specific gravity
- High fluid intake.

Q.12 In which condition pale urine with high specific gravity is seen ?

- Diabetes mellitus.

Q.13 What are the causes of red urine?

- Hematuria
- Hemoglobinuria
- Myoglobinuria
- Congenital erythropoetic porphyria
- Drugs like phenolsulfonphthalein

Q.14 Which vegetable may be the cause of red urine ?

- Beet

Q.15 In which type of porphyria the colour of urine changes to red from normal ?

- Acute Intermittent Hepatic Porphyria.

Q.16 In which condition yellow – brown or green – brown urine is seen ?

- Is associated with Bile pigments chiefly bilirubin.
- Severe obstructive jaundice.

Q.17 How will you differentiate concentrated yellow urine from that of yellow urine due to bilirubin ?

- 1) On shaking urine
 - Yellow foam – due to bilirubin
 - White foam – concentrated urine

Q.18 What are the causes of Dark Brown or Black urine or 'Cola' coloured urine ?

- Acid urine contain Hemoglobin will darken on standing due to function of methemoglobin.
- Seen in Rhabdomyolysis
- Patients taking L-dopa
- Alkaptonuria due to homogentisic acid
- Melanin

Q.19 Which infections cause the colour of urine to be blue green ?

- Pseudomonas.

Q.20 What are the causes of milky urine ?

- Pyuria
- Lipiduria
- Chyluria
- Emulsified Cream

Q.21 Which chemical can cause blue green urine ?

- Chlorophyll present in mouth deodorants.

Q.22 What is differential diagnosis of cloudy urine ?

- Due to precipitation of crystals or non pathogenic salts (Amorphous salts)
- Phosphate , Carbonate - Dilute on adding acetic acid
- Urate / uric acid – re dissolve on warming to 60°C.
- Leucocytes / bacterial growth – does not dilute on adding acetic acid.
- Also due to RBCs, epithelial cells, spermatozoa or prostatic fluid.

Q. 23 What does fecal matter in urine indicate ?

- Fistulous connection between colon or rectum and bladder.

Q. 24 What is Chyluria ?

- Urine contains lymph.

Q. 25 What are the causes of chyluria ?

- Associated with obstruction of lymph flow.
- Rupture of lymphatic vessels in renal pelvis, ureters, bladder, urethra
- W. Bancrofti Infection

Q. 26 How chylomicrons can be extracted from urine ?

- By using equal volume of ether or chloroform.

Q. 27 When pseudo-chyluria is seen ?

- With use of paraffin based vaginal cream for treatment of candida infections.

Q. 28 What is Lipiduria ?

- Fat globules mainly of triglycerides and cholesterol are found in urine.

Q. 29 In which conditions Lipiduria is seen ?

- Nephrotic Syndrome.
- Sustained skeletal trauma with fractures of long bones of pelvis.

Q. 30 What is differential diagnosis of the odours of urine ?

- Sweaty feet – Isovaleric and glutaric academia
- Maple syrup – Maple syrup urine disease
- Cabbage – hops – methionine malabsorption
- Mousy – Phenylketonuria

- Rotting fish – Trimethylaminuria
- Rancid - Tyrosinemia

Q. 31 What does lack of odor in urine suggests ?

- Lack of odor in urine in acute renal failure suggest Acute tubular necrosis.

Q. 32 What is the average urine production by adults per day ?

- 600 – 2000 ml

Q. 33 What is average urine production by adult at night ?

- Less than 400 ml

Q. 34 What is polyuria ?

- Excessive production of urine more than 2000 ml / 24 hours.

Q. 35 What is nocturia ?

- Excretion of more than 500 ml of urine at night with specific gravity less than 1.018.

Q. 36 What are physiological causes of polyuria ?

- Excessive intake of water
- Consumption of certain drugs with diuretic effect
- Caffeine, Alcohol, Thiazides
- Intravenous solution

Q. 37 What are the causes of pathological polyuria ?

- Defective hormonal regulation – eg. Diabetes insipidus
- Defective Renal salt / water Absorption
- Osmotic dilutions – diabetes mellitus

Q. 38 What is Oliguria ?

- Excretion of less than 500 ml of urine per 24 hours.

Q. 39 What is Anuria ?

- Near complete suppression of urine formation.

Q. 40 What is cause of oliguria ?

- Acute Renal Failure or chronic progressive renal disease

Q. 41 Which are prerenal causes of Acute Renal Failure ?

- Loss of intravascular volume from hemorrhage, dehydration
- Diarrhea, vomiting, excess sweating, severe burns
- Congestive heart failure
- Sepsis
- Anaphylaxis

Q. 42 Which are post renal causes of Acute Renal Failure ?

- Bilateral Hydronephrosis may be due to prostatic hyperplasia or carcinoma

- Due to stones, clots
- Stricture of valve

Q. 43 Which drug can cause anuria ? How ?

- Sulfonamide therapy due to obstruction caused by precipitation of crystals renal tubules when urinary pH is acidic.

Q. 44 Which conditions of renal parenchyma causes oliguria ?

- Acute glomerulonephritis
- Interstitial nephritis
- Acute Tubular Necrosis due to renal ischemia
- ATN due to antibiotics, CCl₂, glycerol
- Chronic Renal Failure

Q. 45 What does specific gravity and osmolality of urine reflect ?

- It reflects relative degree of concentration or dilution of urine.

Q. 46 What does specific gravity of urine specimen indicates ?

- Relative proportion of dissolved solid components to total volume of specimen.

Q. 47 What does osmolality of urine specimen indicates ?

- Number of particles of solution per unit of solution.
- Preferred over specific gravity

Q. 48 Which are the reliable indicators of hydration status of a person ?

- Specific gravity

- Osmolality
- Urine color

Q. 49 Which substance mainly contribute to specific gravity of urine ?

- Urea, sodium chloride sulfate, phosphate

Q. 50 What is the normal specific gravity of urine ?

- 1.016 – 1.022

Q. 51 What are hyposthenuric urine ?

- Urine with low specific gravity being less than 1.007
eg. Diabetes insipidus
 Pyelonephritis
 Glomerulonephritis

Q. 52 In which condition high specific gravity urine is seen ?

- Dehydration
- Adrenal Insufficiency
- Hepatic disease
- Congestive Heart Failure

Q. 53 What is isotheruric urine ?

- When specific gravity of urine is fixed at 1.010 – indicative of severe renal

damage with disruption of both concentrating and diluting abilities.

Q. 54 Which are different methods of measuring specific gravity of urine ?

- Reagent strip
- Refraction meter
- Urino meter
- Falling drop method

Q. 55 What is the principle of reagent strip method to measure specific gravity of urine ?

- Principle is based on pKa changes of pretreated polyelectrolytes in relation to ionic concentration of urine.
- When ionic concentration is high pKa is decreased – indication changes colour relative to ionic concentration and is translated to specific gravity values.

Q. 56 What is the advantage of reagent strip of measuring specific gravity of urine ?

- It is not affected by high amounts of glucose, protein or radiographic contrast material.

Q. 57 How urinometer is used to measure specific gravity of urine ?

- Direct method
- Should be checked daily by measuring specific gravity of distilled water every day

Q. 58 What is the normal osmolality of urine ?

- 500 – 800 mosm / kg water

Q. 59 By which method osmolality of urine is measured ?

- Freezing point depression method

Q. 60 What is indication of loss of reactivity of dipstick ?

- Discolouration

Q. 61 What is time duration of dipping reagent strip in urine ?

- 1 Second

Q. 62 What is normal pH of urine ?

- 4.6 – 8

Q. 63 In which conditions acidic urine is produced ?

- Meat protein ingestion
- Fruits like cranberries
- Drugs

Q. 64 In which condition alkaline urine is produced ?

- Citrus fruits ingestion
- Drugs

Q. 65 Which indicators are used on Reagent strip for pH of urine ?

- Methyl red
- Bromothymol blue

Q. 66 Which are the methods to measure pH of urine ?

- Reagent strip
- pH Electrode
- Titrable acidity of urine

Q. 67 How much protein is excreted in urine daily ?

- Approx 2 – 10 mg/dl

Q. 68 Which proteins are excreted in urine?

- Albumin is main
Remaining are plasma proteins including globulins

Q. 69 What is limitation of reagent strip method for detecting protein in urine ?

- It is sensitive mainly for albumin only.

Q. 70 What are the limitations of screening methods to detect protein in urine ?

- Proteins are detected only if they are in high concentration.

Q. 71 What is the cause of false negative in protein detection of urine ?

- Very diluted urine

Q. 72 What is functional proteinuria ?

- Less than 0.5 gm / day
- Seen in dehydration
- Congestive Heart Failure
- Cold exposure
- Fever

Q. 73 What is intermittent or transient proteinuria ?

- Occasional proteinuria with normal urinalysis, normal renal function tests.

Q. 74 What is Heavy proteinuria ?

- More than 4 gm / day protein excretion
- Seen in Nephrotic syndrome

Q. 75 What is Moderate proteinuria ?

- Protein excretion in urine between 1.0 – 4.0 g / day
- Seen in Nephrosclerosis

Multiple myeloma

Q. 76 What is Minimal proteinuria ?

- Protein excretion in urine less than 1.0g / day
- Seen in chronic pyelonephritis mainly
- Also seen in nephrosclerosis, polycystic disease

Q. 77 What is Overflow proteinuria ?

- It is due to overflow of excess level of protein in circulation eg. Hemoglobin, myoglobin and immunoglobulin loss in urine
- Myoglobin may cause acute tubular necrosis

Q. 78 In which conditions Bence Jones proteins are seen in urine ?

- Multiple myeloma
- Macroglobulinemia
- Malignant lymphoma

Q. 79 By which method of protein estimation, Bence Jones proteins are missed ?

- Reagent strip method

Q. 80 Which are the best detection and quantification methods of Bence Jones

Protein detection ?

- Immunofixation
- Electrophoresis

Q. 81 What is myeloma Kidney ?

- When excess of Bence Jones and other proteins are excreted in urine, the damaged Kidney is called myeloma Kidney.

Q. 82 What is microalbuminuria ?

- Presence of albumin in urine above the normal level but below the detectable range of conventional urine dipstick methods.

Q. 83 Which levels of albumin are the indications of reversible glomerular Damage ?

- 20 – 200 mg / lit

Q. 84 Which are the screening methods for doing quantitative tests of proteins?

- Colorimetric reagent strip method
- Precipitation based test - Heat acetic acid
 - Sulphosalicylic acid

Q. 85 What is limitation of reagent strip method for protein measurement of Urine ?

- Do not measure globulin

Q. 86 What are the advantages of reagent strip method for urine

protein estimation ?

- Avoid false positive reactions with organic iodides and drugs

Q. 87 Reagent strips are more sensitive to which protein ?

- Albumin

Q. 88 What are causes of false positive results in reagent strip method for Proteins ?

- Ammonium compounds
- Chlorhexidine

Q. 89 How quantitative interpretation of protein is done in sulphosalicylic Method ?

- Negative – no turbidity (5 mg/dl)
- Trace – perceptible turbidity (20 mg/dl)
- 1+ - Distinct turbidity with no discrete granulation (50 mg/dl)
- 2+ - Turbidity with granulation but no flocculation (200 mg/dl)
- 3+ - Turbidity with granulation and flocculation (500 mg/dl)
- 4+ - Clumps of precipitated protein or solid precipitate (1.0 g/dl or more)

Q. 90 Which reagent are used as precipitants for protein estimation in urine ?

- SSA and Trichloroacetic acid

Q. 91 Which are the methods to determine Bence Jones Proteinuria ?

- Protein electrophoresis by Amido black stain
- Modified coomassie brilliant blue stain
- Heat precipitation method

Q. 92 When does Heat precipitation test shows false positivity for Bence Jones Proteins ?

- When other globulins are precipitated by acetic acid

Q. 93 When does Heat precipitation test shows false negativity for Bence Jones Proteins ?

- When Bence Jones proteins are too concentrated so precipitate does not redissolve on heating.

Q. 94 Which sugars are found in urine ?

- Glucose, fructose, galactose, lactose, maltose, pentose and sucrose.

Q. 95 What is Glycosuria ?

- Presence of detectable amounts of glucose in urine
- Occurs when glucose level in blood surpasses the renal tubule capacity for reabsorption.

Q. 96 At what level of glucose in blood, glycosuria occurs ?

- 180 – 200 mg/dl

Q. 97 In which conditions glycosuria is seen in urine ?

- Diabetes mellitus
- Acromegaly
- Cushing syndrome
- Pancreatic tumors
- Hyperthyroidism
- Pheochromocytoma

Q. 98 Why glycosuria is seen sometimes in pregnancy ?

- In pregnancy there is increased glomerular filtration rate and all filtered Glucose is not absorbed, there fore glucosuria may appear at relatively low glucose level.

Q. 99 In which condition glycosuria is seen without hyperglycemia ?

- Renal tubular function

Q. 100 What is Renal Glycosuria ?

- In Renal tubular function defect glycosuria is seen without hyperglycemia. This is known as Renal Glycosuria.

Q. 101 In which conditions Renal Glycosuria is seen ?

- Fanconi's syndrome
- Galactosemia
- Cystinosis
- Lead poisoning
- Myeloma

Q. 102 Apart from glucose, how other sugars are identified in urine ?

- Thin layer chromatography

Q. 103 In which conditions fructouria is seen in urine ?

- Inherited enzyme deficiency
- Parenteral feeding of fructose

Q. 104 In which conditions Galactosuria is seen in urine ?

- Genetic disorder with deficiency of galactose – 1 – phosphate uridyl transferase or galactokinase.

Q. 105 In which conditions lactosuria is seen in urine ?

- Normal pregnancy
- During lactation

Q. 106 In which condition pentosuria is seen ?

- Ingestion of large amount of fruits

Q. 107 Which sugar is excreted in urine when large amount of fruits are ingested?

- Pentose

Q. 108 In which conditions sucrosuria is seen ?

- Deficiency of enzyme sucrase
- Sprue

Q. 109 On which principle reagent strip method for glucosuria is based on ?

- Glucose oxidase and peroxidase method
- Specific for glucose

Q. 110 What are the causes of false positive results in reagent strip method for glucose ?

- Strongly oxidising agents in urine container
- Low specific gravity of urine

Q. 111 What are the causes of false negative results in reagent strip method for glucose ?

- Presence of sodium fluoride as preservative
- High specific gravity
- Ascorbic acid

Q. 112 Which chromogens are used in glucose dipstick reagent strips ?

- O-toluidine
- Potassium iodide
- Aminopropyl – carbazol

Q. 113 Which method will detect all reducing sugar in urine ?

- Copper Reduction method

Q. 114 What are causes of false positive copper reduction method for glucose ?

- Neonatal infants of 10-14 day
- Normal pregnant women
- Postpartum women due to presence of lactose
- Presence of strong reducing substances like ascorbic acid, gentisic acid, etc.

Q. 115 Which is the most sensitive copper reduction test for glucose ?

- Quantitative Benedict method

Q. 116 Which method is used to differentiate various sugars in urine ?

- Thin layer chromatography

Q. 117 What are Ketone bodies ?

- In case of defect in carbohydrate metabolism or absorption, body compensates by metabolizing increased amounts of fatty acids.
- When this increase is large, ketone bodies are produced due to incomplete fat metabolism.

Q. 118 Which Ketone bodies are present in urine ?

- Acetoacetic acid
- Acetone
- 3 – Hydroxybutyrate

Q. 119 How acetone is formed ?

- From acetoacetic acid nonreversibly

Q. 120 How β – hydroxybutyric acid is formed ?

- From acetoacetic acid reversibly

Q. 121 What are the causes of Nondiabetic Ketonuria ?

- In infants and children in acute febrile diseases
- Hyperemesis in pregnancy
- Cachexia
- Following anesthesia

Q. 122 What are different methods to detect ketonuria ?

- Rothera's
- Gerhart's

Q. 123 Which method exclusively detect acetoacetic acid in urine ?

- Gerhart's

Q. 124 What are the causes of false negative results in ketone bodies ?

- Unstable reagents
- Bacterial action
- Acetone is lost at room temperature so blood should be refrigerated before testing in closed container

Q. 125 On what is reagent strip method for ketone bodies base on ?

- Nitroprusside reaction for ketones

Q. 126 What are the causes of false positive results in ketone bodies by strip method ?

- Use of phthalein dyes
- Extremely large amounts of phenylketones
- Antihypertensive drugs like methyldropa

Q. 127 What is Hematuria ?

- Presence of abnormal number of blood cells in urine.

Q. 128 What is Hemoglobinamia ?

- Presence of free hemoglobin in solution in urine.

Q. 129 What are the causes of hematuria ?

- Nephropathies
- Glomerulosclerosis
- Trauma due to calculi
- Neoplastic disease of kidney
- Bleeding disorders
- anticoagulant

Q. 130 In which condition hematuria is seen in normal person ?

- person undertaking excessive exercise (marathon runners)

Q. 131 Which is gold standard test for detecting Hematuria ?

- Urine routine microscopic examination.

Q. 132 Why reagent strip method for hematuria is not considered standard ?

- Due to interference by substances like Ascorbic acid

Q. 133 What is cause of Hemoglobinuria ?

- Any Hemolysis but mainly intravascular rather than extra vascular.

Q. 134 Which are the main causes of hemoglobinuria ?

- Erythrocyte trauma eg. Severe exercise
- Organisms eg. Malaria
- Erythrocyte enzymes deficiency eg. G6PD deficiency
- Unstable Hb
- Immune mediated eg. HUS
 - TTP
 - Incompatible Blood transfusion
 - Warm and cold antibodies
- Normal subjects – Drugs.
 - Exposure to naphthalene (moth balls)

Q. 135 In which conditions G6PD deficiency is aggravated causing hemolysis ?

- Exposure to oxidant drugs, antimalarial
- Favabeans
- Diabetic acidosis

Q. 136 Which food aggravates hemolysis in G6PD deficient individual ?

- Favabeans

Q. 137 What is the color of urine in individual having unstable Hb ?

- Brown pigmented due to dipyrrole of bilifuscin.

Q. 138 At what level of Hb plasma appears pink ?

- 50 mg/dl

Q. 139 What does Hemosidenuria indicate ?

- Chronic hemolytic state
- Hemochromatosis

Q. 140 In which conditions myoglobinuria is seen ?

- Strenuous exercises
- Dermato myositis

Q. 141 In which condition dark to red brown urine with presence of RBCs in urine is seen ?

- Hematuria
- Hemoglobinuria
- Myoglobinuria

Q. 142 How will you distinguish between Hematuria, Hemoglobinuria and Myoglobinuria ?

- Serum – pink to red in Hemoglobinuria and Hematuria
- Serum – clear in myoglobinuria
- Serum creatinine increased in myoglobinuria

Q. 143 What are the causes of false negativity in reagent strip method for Hemoglobinuria ?

- High specific gravity of urine in which RBC lysis do not occur
- High protein levels
- Ascorbic acid
- Formalin as urine preservative

Q. 144 What are the causes of false positive in reagent strip method for hemoglobinuria ?

- Hypochlorites or iodines present on skin from skin cleansing preparations
- Microbial peroxidase associated with UTI

Q. 145 Enumerate causes of hemolysis and hemoglobinuria.

- 1) Erythrocyte trauma
- 2) Organisms like malaria
- 3) Erythrocyte enzyme deficiency eg. G6PD
- 4) Unstable hemoglobins
- 5) Immune mediated

Q. 146 Which drugs causes hemolysis or hemoglobinuria in normal subjects ?

- Sulphonamides
- Nitrofurantoin
- Naphthalene balls

Q. 147 What is hemosiderinuria ?

- Free Hemoglobin is catalysed into hemosiderin, when it is present in urine it indicates chronic hemolytic state.
- It is seen as yellow brown granules in epithelial cells or as casts.

Q. 148 What is myoglobinuria ?

- In acute destruction of muscle fibers as in trauma myoglobin is excreted in urine as red brown pigment
- Seen after strenuous exercises, dermatomyositis

Q. 149 How will you differentiate between myoglobin and haemoglobin in Urine ?

- Salt precipitation method of Blenheim
- Specific immunoassays for myoglobin

Q. 150 Which method is used for detection of hemosiderin in urine ?

- Prussian blue reaction – Hemosiderin appears as blue granules

Q. 151 Which type of bilirubin passes in urine ?

- Conjugated, as it is water soluble
- Normal is 0.02 mg/dl

Q. 152 In which conditions conjugated bilirubin is excreted in urine ?

- Obstruction to bile flow from liver eg. Gall stones
- Hepatocellular disease eg. Acute viral disease, Hepatotoxic drugs

Q. 153 Which congenital disease show bilirubinuria ?

- Dubin Johnson
- Rotor

Q. 154 What will be the interpretation ?

Positive urine bilirubin

Negative urobilinogen.

- Indicates intra or extrahepatic biliary obstruction
- D/D of jaundice as bilirubinuria is not seen in hemolytic disease.

Q. 155 What is the principle of reagent strip method for bilirubin ?

- Coupling reaction of bilirubin with a diazonium salt in acid medium

Q. 156 Which substances interfere with reagent strip method for bilirubin ?

- Ascorbic acid
- Nitrite
- Drugs like phenazopyridine

Q. 157 Which drugs give false positive results for bilirubin in urine ?

- Rifampicin
- Chlorpromazine

Q. 158 What is normal out put of urobilinogen in urine ?

- 0.5 – 2.5 mg/ 24 hrs

Q. 159 In which conditions urobilinogen is increased in urine ?

- Hepatocellular damage due to viral hepatitis, cirrhosis, etc
- Cholangitis
- Congestive heart failure
- Fever with dehydration

Q. 160 In which condition urobilinogen is excreted in urine but not bilirubin ?

- Associated with hemolysis

Q. 161 In which conditions there is complete absence of urobilinogen in urine ?

- When there is complete obstruction of the outflow of bile into intestine
- Broad spectrum antibiotics suppressing intestinal flora

Q. 162 On what principle test of urobilinogen in urine is based on ?

- Enrich aldehyde reaction or formation of red azo dye from diazonium compound

Q. 163 Which are indirect tests for detecting urinary tract infection ?

- Reagent strip nitrite
- Leucocyte esterase
- Measurement of urinary lactoferrin by immunochromatographic test strip method

Q. 164 What is significance of neutrophils in urinary tract infection ?

- Cut off of 10 neutrophils/ μ l in fresh urine is suggestive of infection.

Q. 165 What is significance of nitrite test in UTI ?

- Pathogenic bacteria in urinary tract reduced nitrate to nitrite causing positive nitrite test.
False positive - in poorly collected samples
 - Stored samples
 - Medication
- False negative - Ascorbic acid
 - Low pH < 6
 - Urobilinogen

Q. 166 Why ascorbic acid interferes and inhibit several reagent strip methods ?

- Because of its reducing properties

Q. 167 What is significance of serotonin in urine ?

- It is produced by argentaffin cells of intestines from tryptophan
- Excess is seen in carcinoid tumors especially metastatic
- Analysed by HPLC

Q. 168 What is significance of 24 hours urine collection ?

- Used in diagnosis of carcinoid tumor
- Normal excretion of 5-hydroxyindoleacetic acid in 24 hours is 1-5 mg
- Increased in carcinoid

Q. 169 What precautions are taken while performing urinary test for 5-hydroxyindoleacetic acid ?

- 24 hours urine collections
- Boric acid to be added as preservative
- No drugs before 72 hours

Q. 170 In which conditions melanin metabolites are seen in urine ?

- Melanin metabolites include indoles, catechols and catecholamines
- Generally seen in causes of malignant melanoma which is metastasing

Q. 171 In which conditions porphyrin is excreted in urine ?

- Porphyrias and lead poisoning
- HIV with HCV infection

Q. 172 Which test is done for porphyrins in urine ?

- Watson – Schwartz test
- Hoesch's test
- Fluorescence screening

Q. 173 Which things are seen in urinary sediment ?

- Cells of hematogenous origin
- Cellular or non cellular casts
- Crystals
- Organisms

Q. 174 What are the sources of cellular elements of urine ?

- 1) Desquamated exfoliated epithelial lining cells of kidney or lower urinary tract

2) Cells of hematogenous origin

Q. 175 Where are cellular and non cellular casts of urine formed ?

- In renal tubular and collecting ducts

Q. 176 After how much time casts and crystals lyse in urine sample ?

- 2 hours

Q. 177 What are disadvantages of refrigerating urine specimen ?

- May increase precipitation of various amorphous and crystalline materials.

Q. 178 Why midstream urine sample is recommended for females ?

- To reduce contamination of vaginal elements.

Q. 179 Enumerate different methods of examining urine sediment.

- a) Brightfield microscopy (hyaline casts)
- b) Phase contrast microscopy (for casts)
- c) Polarized microscopy (distinguish crystal from cast)
- d) Quantitative counts

Q. 180 How quantitative count of urine is done ?

- By haemocytometer

Q. 181 What is normal range of various sediments in urine ?

- Neutrophils – 5-30 / μ l
- Erythrocytes – 3-20 / μ l
- Casts – 1-2 / μ l

Q. 182 What is the advantage of counting cells from uncentrifuged urine over centrifuged urine ?

- Decrease in variability caused by centrifugation
- Fixed volume available by centrifugation
- Marked visual field

Q. 183 What are shadow cells ?

- If urine specimen is not fresh, erythrocytes appear as faint colourless circles or shadow cells as haemoglobin may dissolve.

Q. 184 What happens to RBCs in hypertonic urine ?

- Become crenated, appear small rough cells with crinkled edges.

Q. 185 What are ghost cells ?

- In dilute urine cells will swell and rapidly lyse releasing Haemoglobin and leaving empty cell membranes referred as ghost cells.

Q. 186 How erythrocytes are differentiated from oil droplets and yeast cells ?

- Oil droplets – exhibit great variation in size and are highly retractile
- Yeast cells – show budding
- If still identification is difficult two preparations are made and few drops of acetic acid is added – RBCs lyse.

Q. 187 Normal number of erythrocytes in urine.

- 0-2 cells / hpf

Q. 188 In which conditions increased erythrocytes are seen in urine ?

- 1) Renal disease – glomerulonephritis, lupus nephritis, calculus etc.
- 2) Lower urinary tract disease – acute and chronic infection, tumor, calculus etc
- 3) Extra renal disease – malaria, acute appendicitis, malignant hypertension, etc
- 4) Toxic reaction to drugs – sulfonamides
- 5) Physiological causes – exercise

Q. 189 Renal origin of increased erythrocytes is confirmed if ?

- Accompanying erythrocyte casts are seen.

Q. 190 What are dysmorphic erythrocytes in urine ?

- Red cells with cellular protrusion or fragmentation are called dysmorphic RBCs. They are suggestive of glomerular bleeding.

Q. 191 What are G1 cells ?

- Doughnut shaped RBCs with one or more membrane blebs are more

specific of dysmorphic cells diagnosing glomerular hematuria.

Q. 192 What happens to neutrophils in urine in cellular degeneration ?

- Nuclear details are lost and they become difficult to distinguish from renal tubular epithelial cells.

Q. 193 Which stains help in emphasizing nuclear details in neutrophils ?

- Crystal violet – differentiate neutrophils from tubular cells.
- Safranin cytochemical reaction.

Q. 194 What are Glitter cells ?

- In diluted or hypotonic urine, neutrophils swell and their cytoplasmic granules exhibit Brownian movement
- Due to refractibility of many granules, neutrophils are known as Glitter cells
- Stain poorly with supra vital stains
- Show loss of nuclear segmentation

Q. 195 What is pyuria ?

- Increased number of leucocytes (more than 5) seen in urine is pyuria
- Indicates presence of infection in urinary tract
- If casts are also seen with leukocytes, it is of renal origin.

Q. 196 What is acute urethral syndrome ?

- In women there is dysuria / pyuria syndrome associated with greater than 8 neutrophils/ μ l
- Causative agents – Chlamydia, Staphylococci

Q. 197 Sterile urine in presence of leukocytes suggest tuberculosis.

Q. 198 What are other causes of increased leucocytes ?

- Glomerulonephritis
- SLE
- Calculous disease
- Bladder tumours

Q. 199 In which condition eosinophils are seen in urine ?

- Tuberculo-intestinal disease associated with hypersensitivity of drugs.

Q. 200 Which stains are used for staining eosinophil in urine ?

- Cyto-centrifuge preparation with Wright's or PAP's stain

Q. 201 What concentration of lymphocytes or mononuclear cells indicate chronic Inflammation?

- More than 30 % of differential count.

Q. 202 Which type of epithelial cells can be found in urine ?

- Squamous
- Transitional (urothelial)
- Renal tubular

Q. 203 What is significance of squamous epithelial cells in urine ?

- They line distal one third of urethra
- Most frequent in normal urine
- In female may be derived from vagina or vulva

Q. 204 What is significance of transitional (urothelial) epithelial cells in urine ?

- They line from the renal pelvis to the lower third of urethra.
- Their characteristic is endo-ecto cytoplasmic rim.
- Few indicates normal desquamation
- Seen more in catheterization

Q. 205 What is significance of renal tubular epithelial cells in urine ?

- Increased in renal tubular damage
- Physiologically more in urine of newborns
- Pap stain distinguishes tubular cells from other mononuclear cells

Q. 206 Which different type of renal tubular epithelial cells are seen in urine & what is their significance ?

- Epithelial cells from proximal and distal convoluted tubules
 - Seen in acute tubular necrosis & drug and metal toxicity
- Epithelial cells from collecting ducts
 - Seen in renal transplant rejection and acute tubular necrosis
 - Also in Acute glomerulonephritis, Malignant nephrosclerosis, Salicylate intoxication
- Epithelial fragments of collecting duct
 - Severe form of renal tubular injury, ischemic necrosis

Q. 207 What are oval fat bodies in urine ?

- They are tubular cells that have absorbed lipoproteins with cholesterol and triglycerides leaked from nephritic glomeruli

Q. 208 In which form lipids are seen in urine ?

- a) Oval fat bodies
- b) Free fatty droplets
- c) Within histiocytes are ingested material

Q. 209 Presence of lipid in any form in urine along with proteinuria is characteristic of NEPHROTIC SYNDROME.

Q. 210 How lipid is identified in urine ?

- If cholesterol is incorporated they exhibit maltese cross formation under polarized light
- If triglycerides are there fat stains, Oil Red O or Sudan III are required for positive identification.

Q. 211 Which pigment is found in renal tubular epithelial cells ?

- With hemoglobinuria or myoglobinuria heme pigment is absorbed into cells and converted into hemosiderin
- These iron laden cells are desquamated and found in urine sediment
- Stained by Prussian blue cytoplasmic granules as yellow brown.

Q. 212 Which are pigments found in renal tubular cells ?

- 1) Hemosiderin
- 2) Melanin in metastatic melanoma
- 3) Bilirubin

Q. 213 Which pigment colours urinary cast ?

- Bilirubin
- Urobilin does not give color

Q. 214 What are urinary casts ?

- Only formed elements of urine having kidney as their sole site of origin.

Q. 215 What is matrix of urinary casts formed of ?

- Tamm – Horstall protein.

Q. 216 What are Tamm-Horsfall protein ?

- Glycoprotein secreted by thick part of ascending loop of Henle mainly constitutes one third of urinary protein
- Forms matrix of urinary casts by forming a matrix of fibrils that can trap any elements present in tubular filtrate eg. cells, cell fragment or granular material.

Q. 217 On what does the width of cast dependent ?

- On the size of tubule where it is formed.
- Broad casts – in dilated tubules or with stasis in collecting ducts
- Thin casts – in tubules compressed by swollen interstitial tissue

Q. 218 In which conditions urinary casts are seen in healthy person ?

- After strenuous exercise accompanied by proteinuria

Q. 219 In which conditions urinary cast formation increases ?

- Low pH
- Increased ionic concentration
- Stasis or obstruction of nephron by cells
- Larger than normal amounts of proteins enter tubules.

Q. 220 Which proteins cause urinary cast formation ?

- Albumin
- Globulin eg. Bence Jones proteins
- Hemoglobin
- Myoglobin

Q. 221 How granular casts are formed ?

- When plasma proteins combined with Tamm – Horsfall proteins, they form granular casts.

Q. 222 How casts are classified ?

- According to their
 - 1) Matrix – Hyaline , waxy
 - 2) Inclusions – granules – proteins, cell debris
 - Fat globules – triglycerides cholesterol esters.
 - Hemosiderin granules
 - Melanin granules
 - 3) Pigments – Hemoglobin, Myoglobin, bilirubin
 - 4) Cells – RBCs
 - WBCs

Renal tubular epithelial cells
Bacteria

Q. 223 What are Hyaline casts ?

- Mostly of Tamm – Horsfall protein
- Supravital staining
- Increased in Renal diseases
- Transiently - with exercise
 - Heat exposure
 - Dehydration
 - Fever
 - CCF

Q. 224 What is significance of waxy casts ?

- Denser than hyaline
- Differentiated form hyaline due to high refractive index
- Associated with - chronic renal disease
 - Allograft rejection
- Early phase of granular casts

Q. 225 What is significance of RBC cast in urine ?

- Indicate bleeding in nephron due to glomerular damage
- Appears yellow under low power in urine
- Prerequisite for identification of RBC cast is RBC outlines sharply defined
- Visualized by phase contrast or supravital staining.

Q. 226 In which condition RBC cast appear in urine ?

- Acute glomerulonephritis
- IgA nephropathy
- Lupus nephritis
- Subacute bacterial endocarditis
- Renal infarction

Q. 227 In which condition RBC and WBC casts are seen in urine simultaneously?

- Renal relapse in patient with SLE.

Q. 228 What is significance of leucocyte cast ?

- They reflect tubulointerstitial disease eg pyelonephritis
- May be present in glomerular disease owing to chemotactic effect of complement
- Also seen in Interstitial nephritis
Lupus nephritis

Q. 229 What is significance of renal tubular epithelial casts ?

- Seen in Acute tubular necrosis
Viral disease eg cytomegalo virus
Exposure to variety of drugs
Heavy metal poisoning

Q. 230 How will you differentiate between Leucocyte cast and Renal tubular epithelial cast ?

- By 1 – supravital staining
Phase contrast microscopy
Pap stain
2 – nuclei in renal tubular epithelial cast is single round while in leucocyte cast has multilobulated nuclei

Q. 231 What are the mixed casts ?

- Two distinct cell types present in single cast forms mixed cast
eg leukocyte / renal
erythrocyte / leukocyte

Q. 232 What are granular casts ?

- Granular casts are with small or large granules.
- Original from plasma protein aggregates that pass into tubules of damaged glomeruli
- Also originate from cellular remnants of leukocytes, erythrocytes or damaged renal tubular cells

Q. 233 How granules of granular cast composed of ?

- Fine salt precipitates
- Lysosomes
- Protein aggregates including fibrinogen, globulins, etc.

Q. 234 What is significance of granular casts ?

- Appear in glomerular, tubular and tubulointerstitial diseases
- Also seen in pyelonephritis, viral infection and CHRONIC LEAD POISONING.

Q. 235 What is significance of granular casts with hematuria ?

- Indicate Renal Papillary Necrosis

Q. 236 What is significance of granular casts in hyperparathyroidism ?

- Some fine granules might be of calcium phosphate precipitants.

Q. 237 In which physiological conditions granular casts are seen?

- Extreme stress
- Strenuous exercise

Q. 238 What is significance of fatty casts ?

- Incorporated in to cast matrix from renal tubular cells
- Seen in NEPHROTIC SYNDROME

Q. 239 What are crystal casts ?

- Casts containing urates, calcium oxalate and sulphonamides
- Indicate deposition of crystals in tubule or collecting duct
- Hematuria usually accompanies

Q. 240 Enumerate Pigmented casts.

- Hemoglobin cast
- Hemosiderin casts
- Myoglobin casts
- Bilirubin and Drug casts

Q. 241 What is significance of Hemoglobin casts?

- Appear yellow to red
- Also known as blood casts
- Seen in glomerular disease along with erythrocyte cast

Q. 242 What are Hemosiderin casts?

- Hemosiderin granules in casts are derived from pigment laden renal tubular cells.

Q. 243 What is significance of myoglobin casts?

- Red Brown in colour
- Occurs with myoglobinuria after acute muscle damage
- Associated with renal failure

Q. 244 What is significance of bilirubin cast?

- Seen in Obstructive Jaundice
- Deep yellow colour

Q. 245 Which drugs can form cast?

- Phenazopyridine

Q. 246 What are Broad casts ?

- Have diameter two to six times that of normal casts.
- Indicates tubular dilation or stasis in distal collecting duct
- Seen in CHRONIC RENAL FAILURE
- Indicate poor prognosis

Q. 247 What is meant by Miscellaneous casts?

- Bacteria in cast – but they appear dark purple on supravital stains
- Mucous threads – but they are larger, long, ribbon like with poorly defined edges and pointed or split ends

Q. 248 What is meant by telescoped sediment ?

- Describe simultaneous occurrence of elements of glomerulonephritis as well as nephritic syndrome in same urine specimen
- May include red cells, red cell casts, broad waxy casts, lipid droplets, oval fat bodies

- May be found in collagen vascular disease and sub acute bacterial endocarditis

Q. 249 What are urinary crystals ?

- They form by precipitation of urinary salts when alterations in multiple factors affect their solubilities.

Eg changes in pH

Temperature

Concentration

Q. 250 In which urine specimens generally crystal formation occurs ?

- In refrigerated specimens
- In specimen which remain at room temperature for several hours.
- Increased solute concentration

Q. 251 What is significance of pH in crystal formation ?

- Urine pH determines which chemical will precipitate to form crystal

Q. 252 Enumerate crystals found in normal acid urine.

- Amorphous urates (calcium, magnesium, sodium, potassium)
- Crystalline urates (sodium, potassium, ammonium)
- Crystalline uric acid
- Calcium oxalates

Q. 253 What is significance of amorphous urate crystals in urine?

- Precipitated upon standing of concentrated urine at acid pH.
- If in large amount give pink orange or reddish brown colour to urine – BRICK DUST APPEARANCE
- Convert to uric acid crystals with acidification with acetic acid and dissolve with 60°C heat

Q. 254 What is shape of crystalline urates?

- Form small brown spheres or colourless needles

Q. 255 What are different form of uric acid crystals ?

- Occurs at low pH
- Rhombic or four sided flat plates
- Prisms
- Oval form from pointed ends (lemon shaped)
- Wedges
- Rosettes
- Irregular plates
- Hexagonal
- May be coloured – yellow, brown or colourless

Q. 256 How will you differentiate hexagonal uric acid crystals from cystine Crystals?

- Uric acid crystals show birefringence with polarized light.

Q. 257 What dose large number of uric acid crystals in urine indicate?

- Increased nucleoprotein turnover
eg in chemotherapy of leukemia or lymphoma
- Lesch – Nyhan syndrome
small stones located in ureters due to raised serum uric acid levels
- Urate nephropathy of gout

Q. 258 What are different form of calcium oxalate crystals ?

- Appear at pH 6 or in neutral urine (Dihydrate form)
- Small, colourless, octahedron resembling envelope
- Ovoid form
- Monohydrate form are large

Q. 259 What is significance of calcium oxalate crystals ?

- Reflect
 1. severe chronic renal disease
 2. ethylene glycol or methoxyflurane toxicity
 3. Crohn's disease – reflection of increased absorption of oxalates
 4. Genetically susceptible persons following large dose of ascorbic acid.

Q. 260 Which crystals are found in alkaline urine ?

- Are colourless
- Produce fine lacy appearance
- Seen on light microscope

- Monohydrogen phosphates are less soluble while dihydrogen phosphates are soluble
- Dissolve in acids eg. HCL, Nitric acid.

Q. 261 What is significance of amorphous phosphates in alkaline urine ?

- Are colourless
- Produce fine lacy appearance
- Seen on light microscope
- Monohydrogen phosphates are less soluble while dihydrogen phosphates are soluble
- Dissolve in acid eg. HCL, Nitric acid

Q. 262 What is significance of crystalline phosphates in alkaline urine ?

- Most easily identified
- Colourless, vary in size
- Three to six sided prisms with oblique ends
- Reformed as COFFIN LIDS
- Can form Rhomboids

Q. 263 Which are dumbbell shaped crystals seen in alkaline urine ?

- Calcium Carbonate
- Produce CO₂ in presence of acetic acid

Q. 264 Which crystals have projections or thorns ?

- Ammoniums Biurate
- Referred as THORN APPLES

Q. 265 Enumerate crystals found in abnormal urine.

- Cystine

- Tyrosine
- Leucine
- Sulfonamide (sulfadiazine)
- Ampicillin

Q. 266 How will you differentiate cystine crystals from uric acid crystals in urine?

- Uric acid crystals polarize, cystine crystal do not
- Cystine dissolves in dilute HCL, uric acid do not

Q. 267 In which condition cystine crystals are seen in urine ?

- Cystinuria
- Cystine calculi
- Can be confirmed by cyanide – nitroprusside reaction

Q. 268 What is significance of tyrosine crystals ?

- They form fine silky needle arranged in sheaves or clumps
- Soluble in alkali or acid not soluble in alcohol
- Seen in urine of severe liver disease

Q. 269 What is significance of leucine crystals ?

- Appear as yellow, oily appearing spheres
- Seen in urine of severe liver disease

Q. 270 What is significance of sulphonamide or sulphadiazine crystals ?

- Seen in urine at acid pH.
- Various forms seen
 - Yellow brown sheaves of wheat with central bindings
 - Striated sheaves with eccentric binding
 - Rosettes, arrowhead petals needles
- Confirmed by Diazo Reaction, HPLC or colorimetric methods.

Q. 271 Which urinary crystals are seen following radiographic examination ?

- Diatrizoate dyes crystals if patient is not properly hydrated

Q. 272 Which abdominal cells and other formed elements are found in urine ?

- Tumor cells
- Viral inclusion cells
- Platelets
- Bacteria
- Fungus
- Parasites

Q. 273 Which tumor cells are identified in urine ?

- Malignant tumor cells from renal pelvis, ureter, bladder wall, urethra
- Myeloma cells

Q. 274 In which condition viral inclusion cells are seen in urine ?

- Herpes
- Cytomegalovirus in children & immunosuppressed patients
- Polio virus

Q. 275 In which conditions platelets are seen in urine ?

- Hemolytic Uremic Syndrome
- By phase contrast & electron microscopy if they are up to 30000/ μ l

Q. 276 What is significance of bacteria in urine ?

- If bacteria are identified in urine with gram's stain in an uncentrifuged specimen under oil immersion lens, they are more than 100,000 organism/ml

Q. 277 What is significance of fungi in urine ?

- Candidia common in urine of diabetes mellitus patient
- Confused with erythrocytes but BUDDING helps to differentiate

Q. 278 Which parasites can be seen in urine ?

- May be seen as result of fecal or vaginal contamination
- TRICHOMONAS due to vaginal contamination
- Should be searched on wet preparation for motility
- SCHISTOSOMA – accompanied by erythrocytes
- AMEBAE – fecal contamination or lymphocytes
- E. HISTOLYTICA

Q. 279 Which contaminants and artifacts are seen in urine?

- Muscle fibres and vegetable cells in fecal contamination.
- Spermatozoa
- Pollen grains- Seasonally
- Fibers of cotton and wool diapers
- Starch granules from gloves.
- Oil droplets from catheter lubricants.
- Lipid material from Vaginal creams.

Q. 280 How are contaminant fibers different from casts ?

- Fibers polarize, where as casts do not polarize.

Q. 281 What changes are seen in urine of Acute Glomerulonephritis?

- Macroscopic : - Hematuria
- Smoky turbidity
- Microscopic : - RBCs, RBC casts
- Epithelial casts
- Hyaline casts
- Waxy Casts
- Neutrophils

Q. 282 What changes are seen in urine of Chronic Glomerulonephritis ?

- Macroscopic : - Proteinuria
- Hematuria
- Microscopic : - Granular casts
- Waxy casts
- Epithelial casts
- RBCs
- WBCs
- Lipid droplets.

Q. 283 What changes are seen in urine of Acute Pyelonephritis ?

- Macroscopic : - Proteinuria
 - Turbidity

- Microscopic : - Neutrophils
 - Lymphocytes
 - Histiocytes
 - Renal epithelial cells
 - Leucocytes
 - Epithelial casts
 - Bacteria

Q. 284 What changes are seen in urine of Chronic Pyelonephritis?

- Macroscopic : - Occasional proteinuria

- Microscopic : - Leucocytes
 - Erythrocytes
 - Waxy casts
 - Granular casts
 - Bacteria

Q. 285 Which changes are seen in urine with Nephrotic Syndrome ?

- Macroscopic : - Proteinuria
 - Fat droplets

- Microscopic : - Fatty waxy casts
 - Oval fat bodies
 - Vacuolated renal epithelial cells (Single or clumps)

Q. 286 Which changes are seen in urine in Acute tubular necrosis ?

- Macroscopic : - Hematuria
- Occasional proteinuria
- Microscopic : - Necrosed, degenerated renal epithelial cells
- RBCs
- Leucocytes
- Granular, waxy broad casts

Q. 287 Which changes are seen in urine in Cystitis?

- Macroscopic : - Hematuria
- Microscopic : - RBCs
- WBCs
- Transitional epithelial cells
- Histiocytes, giant cells

Q. 288 In which kidney infections, casts are not seen at all ?

- Cystitis

Q. 289 Which changes are seen in urine with urinary tract malignancy ?

- Macroscopic : - Gross hematuria
- Microscopic: - Atypical mononuclear cells with enlarged, irregular hyperchromatic nuclei and prominent nucleoli.

Q. 290 What are the advantages of automated urinalysis ?

- Enhance work flow
- Standardize some aspects of manual urinalysis

Q. 291 How automated urinalyser works ?

- Specific work is measured by mass gravity meter
- Urine chemistries are measured by standard reflectance spectrophotometer.
- Microscopic analysis is by automated intelligent microscopy system.

Q. 292 What is one of the main advantage of automated urinalyser?

- No centrifugation is needed.
- Handling of sample is minimized.

Q. 293 Apart from automated urinalyser which other instrument can be used to analyze casts and crystals in urine ?

- Flow cytometry : Stains DNA and membranes of formed elements - passes through laminar flow – measures the light scattered – fluorescence and impedance.

Q. 294 What is nephrolithiasis?

- It is a heterogenous condition with stones developing from wide variety of metabolic and environmental disturbances.
- May be found concentrated of nonorganic components, containing lipids or proteins.

Q. 295 With which conditions generally calcium stones are associated with?

- Hyperparathyroidism : As parathyroid hormone affects bone resorption.

Q. 296 In which metabolic conditions urinary screening is done?

- Phenylketonuria
- Alkaptonuria
- Tyrosinuria

- Maple Syrup Urine Disease
- Cystinuria

DR. CHERRY SHAH

FREQUENTLY ASKED QUESTIONS (FAQs)

URINE AND OTHER BODY FLUIDS

-BY DR. CHERRY SHAH

Dr. CHERRY SHAH

URINE

Q.1 What does basic urinalysis consist of ?

- Gross examination
- Dipstick analysis either manually or by urine analysis
- Analysis for blood, white cells, sugar and other substances.

Q.2 What is the significance & microscopic examination of urine ?

- To detect cellular elements, casts and crystals.

Q.3 What is the significance of dysmorphic red cells in urine ?

- It is sign of glomerular disease.

Q.4 Which urine specimen is best for analysis? Why?

- First morning sample because it is the most concentrated.

Q.5 What does osmolality and specific gravity of urine indicate?

- Concentrating ability of kidney.

Q.6 What does proteinuria more than 4 g / day indicate ?

- Nephrotic Syndrome.

Q.7 In which conditions ketonuria is seen ?

- Diabetis
- Febrile illness
- Cachexia

Q.8 Which urine tests are useful in diagnosing urinary tract infection ?

- Dipstick nitrite and leucocyte esterase.

Q.9 Why the colour of urine is yellow ?

- Due to urochrome.

Q.10 What are the physiological causes of extra yellow urine ?

- Fever
- Starvation

Q.11 What is cause of pale urine ?

- Low specific gravity
- High fluid intake.

Q.12 In which condition pale urine with high specific gravity is seen ?

- Diabetes mellitus.

Q.13 What are the causes of red urine?

- Hematuria
- Hemoglobinuria
- Myoglobinuria
- Congenital erythropoetic porphyria
- Drugs like phenolsufonphthalein

Q.14 Which vegetable may be the cause of red urine ?

- Beet

Q.15 In which type of porphyria the colour of urine changes to red from normal ?

- Acute Intermittent Hepatic Porphyria.

Q.16 In which condition yellow – brown or green – brown urine is seen ?

- Is associated with Bile pigments chiefly bilirubin.
- Severe obstructive jaundice.

Q.17 How will you differentiate concentrated yellow urine from that of yellow urine due to bilirubin ?

1) On shaking urine

Yellow foam – due to bilirubin

White foam – concentrated urine

Q.18 What are the causes of Dark Brown or Black urine or 'Cola' coloured urine ?

- Acid urine contain Hemoglobin will darken on standing due to function of methemoglobin.
- Seen in Rhabdomyolysis
- Patients taking L-dopa
- Alkaptonuria due to homogentisic acid
- Melanin

Q.19 Which infections cause the colour of urine to be blue green ?

- Pseudomonas.

Q.20 What are the causes of milky urine ?

- Pyuria
- Lipiduria
- Chyluria
- Emulsified Cream

Q.21 Which chemical can cause blue green urine ?

- Chlorophyll present in mouth deodorants.

Q.22 What is differential diagnosis of cloudy urine ?

- Due to precipitation of crystals or non pathogenic salts (Amorphous salts)
- Phosphate , Carbonate - Dilute on adding acetic acid
- Urate / uric acid – re dissolve on warming to 60°C.
- Leucocytes / bacterial growth – does not dilute on adding acetic acid.
- Also due to RBCs, epithelial cells, spermatozoa or prostatic fluid.

Q. 23 What does fecal matter in urine indicate ?

- Fistulous connection between colon or rectum and bladder.

Q. 24 What is Chyluria ?

- Urine contains lymph.

Q. 25 What are the causes of chyluria ?

- Associated with obstruction of lymph flow.
- Rupture of lymphatic vessels in renal pelvis, ureters, bladder, urethra
- W. Bancrofti Infection

Q. 26 How chylomicrons can be extracted from urine ?

- By using equal volume of ether or chloroform.

Q. 27 When pseudo-chyluria is seen ?

- With use of paraffin based vaginal cream for treatment of candida infections.

Q. 28 What is Lipiduria ?

- Fat globules mainly of triglycerides and cholesterol are found in urine.

Q. 29 In which conditions Lipiduria is seen ?

- Nephrotic Syndrome.
- Sustained skeletal trauma with fractures of long bones of pelvis.

Q. 30 What is differential diagnosis of the odours of urine ?

- Sweaty feet – Isovaleric and glutaric academia
- Maple syrup – Maple syrup urine disease
- Cabbage – hops – methionine malabsorption
- Mousy – Phenylketonuria
- Rotting fish – Trimethylaminuria
- Rancid - Tyrosinemia

Q. 31 What does lack of odor in urine suggests ?

- Lack of odor in urine in acute renal failure suggest Acute tubular necrosis.

Q. 32 What is the average urine production by adults per day ?

- 600 – 2000 ml

Q. 33 What is average urine production by adult at night ?

- Less than 400 ml

Q. 34 What is polyuria ?

- Excessive production of urine more than 2000 ml / 24 hours.

Q. 35 What is nocturia ?

- Excretion of more than 500 ml of urine at night with specific gravity less than 1.018.

Q. 36 What are physiological causes of polyuria ?

- Excessive intake of water
- Consumption of certain drugs with diuretic effect
- Caffeine, Alcohol, Thiazides
- Intravenous solution

Q. 37 What are the causes of pathological polyuria ?

- Defective hormonal regulation – eg. Diabetes insipidus
- Defective Renal salt / water Absorption
- Osmotic dilutions – diabetes mellitus

Q. 38 What is Oliguria ?

- Excretion of less than 500 ml of urine per 24 hours.

Q. 39 What is Anuria ?

- Near complete suppression of urine formation.

Q. 40 What is cause of oliguria ?

- Acute Renal Failure or chronic progressive renal disease

Q. 41 Which are prerenal causes of Acute Renal Failure ?

- Loss of intravascular volume from hemorrhage, dehydration
- Diarrhea, vomiting, excess sweating, severe burns
- Congestive heart failure
- Sepsis
- Anaphylaxis

Q. 42 Which are post renal causes of Acute Renal Failure ?

- Bilateral Hydronephrosis may be due to prostatic hyperplasia or carcinoma
- Due to stones, clots
- Stricture of valve

Q. 43 Which drug can cause anuria ? How ?

- Sulfonamide therapy due to obstruction caused by precipitation of crystals renal tubules when urinary pH is acidic.

Q. 44 Which conditions of renal parenchyma causes oliguria ?

- Acute glomerulonephritis
- Interstitial nephritis
- Acute Tubular Necrosis due to renal ischemia
- ATN due to antibiotics, CCl₂, glycerol
- Chronic Renal Failure

Q. 45 What does specific gravity and osmolality of urine reflect ?

- It reflects relative degree of concentration or dilution of urine.

Q. 46 What does specific gravity of urine specimen indicates ?

- Relative proportion of dissolved solid components to total volume of specimen.

Q. 47 What does osmolality of urine specimen indicates ?

- Number of particles of solution per unit of solution.
- Preferred over specific gravity

Q. 48 Which are the reliable indicators of hydration status of a person ?

- Specific gravity
- Osmolality
- Urine color

Q. 49 Which substance mainly contribute to specific gravity of urine ?

- Urea, sodium chloride sulfate, phosphate

Q. 50 What is the normal specific gravity of urine ?

- 1.016 – 1.022

Q. 51 What are hyposthenuric urine ?

- Urine with low specific gravity being less than 1.007
eg. Diabetes insipidus
 Pyelonephritis
 Glomerulonephritis

Q. 52 In which condition high specific gravity urine is seen ?

- Dehydration
- Adrenal Insufficiency
- Hepatic disease
- Congestive Heart Failure

Q. 53 What is isotheruric urine ?

- When specific gravity of urine is fixed at 1.010 – indicative of severe renal damage with disruption of both concentrating and diluting abilities.

Q. 54 Which are different methods of measuring specific gravity of urine ?

- Reagent strip
- Refraction meter
- Urino meter
- Falling drop method

Q. 55 What is the principle of reagent strip method to measure specific gravity of urine ?

- Principle is based on pKa changes of pretreated polyelectrolytes in relation to ionic concentration of urine.
- When ionic concentration is high pKa is decreased – indication changes colour relative to ionic concentration and is translated to specific gravity values.

Q. 56 What is the advantage of reagent strip of measuring specific gravity of urine ?

- It is not affected by high amounts of glucose, protein or radiographic contrast material.

Q. 57 How urinometer is used to measure specific gravity of urine ?

- Direct method
- Should be checked daily by measuring specific gravity of distilled water every day

Q. 58 What is the normal osmolality of urine ?

- 500 – 800 mosm / kg water

Q. 59 By which method osmolality of urine is measured ?

- Freezing point depression method

Q. 60 What is indication of loss of reactivity of dipstick ?

- Discolouration

Q. 61 What is time duration of dipping reagent strip in urine ?

- 1 Second

Q. 62 What is normal pH of urine ?

- 4.6 – 8

Q. 63 In which conditions acidic urine is produced ?

- Meat protein ingestion
- Fruits like cranberries
- Drugs

Q. 64 In which condition alkaline urine is produced ?

- Citrus fruits ingestion
- Drugs

Q. 65 Which indicators are used on Reagent strip for pH of urine ?

- Methyl red
- Bromothymol blue

Q. 66 Which are the methods to measure pH of urine ?

- Reagent strip
- pH Electrode
- Titrable acidity of urine

Q. 67 How much protein is extracted in urine daily ?

- Approx 2 – 10 mg/dl

Q. 68 Which proteins are excreted in urine?

- Albumin is main
Remaining are plasma proteins including globulins

Q. 69 What is limitation of reagent strip method for detecting protein in urine ?

- It is sensitive mainly for albumin only.

Q. 70 What are the limitations of screening methods to detect protein in urine ?

- Proteins are detected only if they are in high concentration.

Q. 71 What is the cause of false negative in protein detection of urine ?

- Very diluted urine

Q. 72 What is functional proteinuria ?

- Less than 0.5 gm / day
- Seen in dehydration
- Congestive Heart Failure
- Cold exposure
- Fever

Q. 73 What is intermittent or transient proteinuria ?

- Occasional proteinuria with normal urinalysis, normal renal function tests.

Q. 74 What is Heavy proteinuria ?

- More than 4 gm / day protein excretion
- Seen in Nephrotic syndrome

Q. 75 What is Moderate proteinuria ?

- Protein excretion in urine between 1.0 – 4.0 g / day
- Seen in Nephrosclerosis

Multiple myeloma

Q. 76 What is Minimal proteinuria ?

- Protein excretion in urine less than 1.0g / day
- Seen in chronic pyelonephritis mainly
- Also seen in nephrosclerosis, polycystic disease

Q. 77 What is Overflow proteinuria ?

- It is due to overflow of excess level of protein in circulation eg. Hemoglobin, myoglobin and immunoglobulin loss in urine
- Myoglobin may cause acute tubular necrosis

Q. 78 In which conditions Bence Jones proteins are seen in urine ?

- Multiple myeloma
- Macroglobulinemia
- Malignant lymphoma

Q. 79 By which method of protein estimation, Bence Jones proteins are missed ?

- Reagent strip method

Q. 80 Which are the best detection and quantification methods of Bence Jones

Protein detection ?

- Immunofixation
- Electrophoresis

Q. 81 What is myeloma Kidney ?

- When excess of Bence Jones and other proteins are excreted in urine, the damaged Kidney is called myeloma Kidney.

Q. 82 What is microalbuminuria ?

- Presence of albumin in urine above the normal level but below the detectable range of conventional urine dipstick methods.

Q. 83 Which levels of albumin are the indications of reversible glomerular

Damage ?

- 20 – 200 mg / lit

Q. 84 Which are the screening methods for doing quantitative tests of proteins?

- Colorimetric reagent strip method
- Precipitation based test - Heat acetic acid
 - Sulphosalicylic acid

Q. 85 What is limitation of reagent strip method for protein measurement of Urine ?

- Do not measure globulin

Q. 86 What are the advantages of reagent strip method for urine protein estimation ?

- Avoid false positive reactions with organic iodides and drugs

Q. 87 Reagent strips are more sensitive to which protein ?

- Albumin

Q. 88 What are causes of false positive results in reagent strip method for Proteins ?

- Ammonium compounds
- Chlorhexidine

Q. 89 How quantitative interpretation of protein is done in sulphosalicylic Method ?

- Negative – no turbidity (5 mg/dl)
- Trace – perceptible turbidity (20 mg/dl)
- 1+ - Distinct turbidity with no discrete granulation (50 mg/dl)
- 2+ - Turbidity with granulation but no flocculation (200 mg/dl)
- 3+ - Turbidity with granulation and flocculation (500 mg/dl)
- 4+ - Clumps of precipitated protein or solid precipitate (1.0 g/dl or more)

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Q. 90 Which reagent are used as precipitants for protein estimation in urine ?

- SSA and Trichloroacetic acid

Q. 91 Which are the methods to determine Bence Jones Proteinuria ?

- Protein electrophoresis by Amido black stain
- Modified coomassie brilliant blue stain
- Heat precipitation method

Q. 92 When does Heat precipitation test shows false positivity for Bence Jones Proteins ?

- When other globulins are precipitated by acetic acid

Q. 93 When does Heat precipitation test shows false negativity for Bence Jones Proteins ?

- When Bence Jones proteins are too concentrated so precipitate does not redissolve on heating.

Q. 94 Which sugars are found in urine ?

- Glucose, fructose, galactose, lactose, maltose, pentose and sucrose.

Q. 95 What is Glycosuria ?

- Presence of detectable amounts of glucose in urine
- Occurs when glucose level in blood surpasses the renal tubule capacity for reabsorption.

Q. 96 At what level of glucose in blood, glycosuria occurs ?

- 180 – 200 mg/dl

Q. 97 In which conditions glycosuria is seen in urine ?

- Diabetes mellitus
- Acromegaly
- Cushing syndrome
- Pancreatic tumors
- Hyperthyroidism
- Pheochromocytoma

Q. 98 Why glycosuria is seen sometimes in pregnancy ?

- In pregnancy there is increased glomerular filtration rate and all filtered Glucose is not absorbed, there fore glucosuria may appear at relatively low glucose level.

Q. 99 In which condition glycosuria is seen whithout hyperglycemia ?

- Renal tubular function

Q. 100 What is Renal Glycosuria ?

- In Renal tubular function defect glycosuria is seen without hyper glycemia. This is known as Renal Glycosuria.

Q. 101 In which conditions Renal Glycosuria is seen ?

- Fanconi's syndrome
- Galactosemia
- Cystinosis
- Lead poisoning
- Myeloma

Q. 102 Apart from glucose, how other sugars are identified in urine ?

- Thin layer chromatography

Q. 103 In which conditions fructouria is seen in urine ?

- Inherited enzyme deficiency
- Parenteral feeding of fructose

Q. 104 In which conditions Galactosuria is seen in urine ?

- Genetic disorder with deficiency of galactose – 1 – phosphate uridyl transferase or galactokinase.

Q. 105 In which conditions lactosuria is seen in urine ?

- Normal pregnancy
- During lactation

Q. 106 In which condition pentosuria is seen ?

- Ingestion of large amount of fruits

Q. 107 Which sugar is excreted in urine when large amount of fruits are ingested?

- Pentose

Q. 108 In which conditions sucrosuria is seen ?

- Deficiency of enzyme sucrase
- Sprue

Q. 109 On which principle reagent strip method for glucosuria is based on ?

- Glucose oxidase and peroxidase method
- Specific for glucose

Q. 110 What are the causes of false positive results in reagent strip method for glucose ?

- Strongly oxidising agents in urine container
- Low specific gravity of urine

Q. 111 What are the causes of false negative results in reagent strip method for glucose ?

- Presence of sodium fluoride as preservative
- High specific gravity
- Ascorbic acid

Q. 112 Which chromogens are used in glucose dipstick reagent strips ?

- O-toluidine
- Potassium iodide
- Aminopropyl – carbazol

Q. 113 Which method will detect all reducing sugar in urine ?

- Copper Reduction method

Q. 114 What are causes of false positive copper reduction method for glucose ?

- Neonatal infants of 10-14 day
- Normal pregnant women
- Postpartum women due to presence of lactose
- Presence of strong reducing substances like ascorbic acid, gentisic acid, etc.

Q. 115 Which is the most sensitive copper reduction test for glucose ?

- Quantitative Benedict method

Q. 116 Which method is used to differentiate various sugars in urine ?

- Thin layer chromatography

Q. 117 What are Ketone bodies ?

- In case of defect in carbohydrate metabolism or absorption, body compensates by metabolizing increased amounts of fatty acids.
- When this increase is large, ketone bodies are produced due to incomplete fat metabolism.

Q. 118 Which Ketone bodies are present in urine ?

- Acetoacetic acid
- Acetone
- 3 – Hydroxybutyrate

Q. 119 How acetone is formed ?

- From acetoacetic acid nonreversibly

Q. 120 How β – hydroxybutyric acid is formed ?

- From acetoacetic acid reversibly

Q. 121 What are the causes of Nondiabetic Ketonuria ?

- In infants and children in acute febrile diseases
- Hyperemesis in pregnancy
- Cachexia
- Following anesthesia

Q. 122 What are different methods to detect ketonuria ?

- Rothera's
- Gerhart's

Q. 123 Which method exclusively detect acetoacetic acid in urine ?

- Gerhart's

Q. 124 What are the causes of false negative results in ketone bodies ?

- Unstable reagents
- Bacterial action
- Acetone is lost at room temperature so blood should be refrigerated before testing in closed container

Q. 125 On what is reagent strip method for ketone bodies base on ?

- Nitroprusside reaction for ketones

Q. 126 What are the causes of false positive results in ketone bodies by strip method ?

- Use of phthalein dyes
- Extremely large amounts of phenylketones
- Antihypertensive drugs like methyldropa

Q. 127 What is Hematuria ?

- Presence of abnormal number of blood cells in urine.

Q. 128 What is Hemoglobinamia ?

- Presence of free hemoglobin in solution in urine.

Q. 129 What are the causes of hematuria ?

- Nephropathies
- Glomerulosclerosis
- Trauma due to calculi
- Neoplastic disease of kidney
- Bleeding disorders
- anticoagulant

Q. 130 In which condition hematuria is seen in normal person ?

- It is seen in a person undertaking excessive exercise (marathon runners)

Q. 131 Which is gold standard test for detecting Hematuria ?

- Urine routine microscopic examination.

Q. 132 Why reagent strip method for hematuria is not considered standard ?

- Due to interference by substances like Ascorbic acid

Q. 133 What is cause of Hemoglobinuria ?

- Any Hemolysis but mainly intravascular rather than extra vascular.

Q. 134 Which are the main causes of hemoglobinuria ?

- Erythrocyte trauma eg. Severe exercise
- Organisms eg. Malaria
- Erythrocyte enzymes deficiency eg. G6PD deficiency
- Unstable Hb
- Immune mediated eg. HUS
TTP
Incompatible Blood transfusion
Warm and cold antibodies
- Normal subjects – Drugs.
Exposure to naphthalene (moth balls)

Q. 135 In which conditions G6PD deficiency is aggravated causing hemolysis ?

- Exposure to oxidant drugs, antimalarial
- Favabeans
- Diabetic acidosis

Q. 136 Which food aggravates hemolysis in G6PD deficient individual ?

- Favabeans

Q. 137 What is the color of urine in individual having unstable Hb ?

- Brown pigmented due to dipyrrole of bilifuscin.

Q. 138 At what level of Hb plasma appears pink ?

- 50 mg/dl

Q. 139 What does Hemosidenuria indicate ?

- Chronic hemolytic state
- Hemochromatosis

Q. 140 In which conditions myoglobinuria is seen ?

- Strenuous exercises
- Dermato myositis

Q. 141 In which condition dark to red brown urine with presence of RBCs in urine is seen ?

- Hematuria
- Hemoglobinuria
- Myoglobinuria

Q. 142 How will you distinguish between Hematuria, Hemoglobinuria and Myoglobinuria ?

- Serum – pink to red in Hemoglobinuria and Hematuria
- Serum – clear in myoglobinuria
- Serum creatinine increased in myoglobinuria

Q. 143 What are the causes of false negativity in reagent strip method for Hemoglobinuria ?

- High specific gravity of urine in which RBC lysis do not occur
- High protein levels
- Ascorbic acid
- Formalin as urine preservative

Q. 144 What are the causes of false positive in reagent strip method for hemoglobinuria ?

- Hypochlorites or iodines present on skin from skin cleansing preparations
- Microbial peroxidase associated with UTI

Q. 145 Enumerate causes of hemolysis and hemoglobinuria.

- 1) Erythrocyte trauma
- 2) Organisms like malaria
- 3) Erythrocyte enzyme deficiency eg. G6PD
- 4) Unstable hemoglobins
- 5) Immune mediated

Q. 146 Which drugs causes hemolysis or hemoglobinuria in normal subjects ?

- Sulphonamides
- Nitrofurantoin
- Naphthalene balls

Q. 147 What is hemosiderinuria ?

- Free Hemoglobin is catalysed into hemosiderin, when it is present in urine it indicates chronic hemolytic state.
- It is seen as yellow brown granules in epithelial cells or as casts.

Q. 148 What is myoglobinuria ?

- In acute destruction of muscle fibers as in trauma myoglobin is excreted in urine as red brown pigment
- Seen after strenuous exercises, dermatomyositis

Q. 149 How will you differentiate between myoglobin and haemoglobin in Urine ?

- Salt precipitation method of Blenheim
- Specific immunoassays for myoglobin

Q. 150 Which method is used for detection of hemosiderin in urine ?

- Prussian blue reaction – Hemosiderin appears as blue granules

Q. 151 Which type of bilirubin passes in urine ?

- Conjugated, as it is water soluble
- Normal is 0.02 mg/dl

Q. 152 In which conditions conjugated bilirubin is excreted in urine ?

- Obstruction to bile flow from liver eg. Gall stones
- Hepatocellular disease eg. Acute viral disease, Hepatotoxic drugs

Q. 153 Which congenital disease show bilirubinuria ?

- Dubin Johnson
- Rotor

Q. 154 What will be the interpretation ?

Positive urine bilirubin

Negative urobilinogen.

- Indicates intra or extrahepatic biliary obstruction
- D/D of jaundice as bilirubinuria is not seen in hemolytic disease.

Q. 155 What is the principle of reagent strip method for bilirubin ?

- Coupling reaction of bilirubin with a diazonium salt in acid medium

Q. 156 Which substances interfere with reagent strip method for bilirubin ?

- Ascorbic acid
- Nitrite
- Drugs like phenazopyridine

Q. 157 Which drugs give false positive results for bilirubin in urine ?

- Rifampicin
- Chlorpromazine

Q. 158 What is normal out put of urobilinogen in urine ?

- 0.5 – 2.5 mg/ 24 hrs

Q. 159 In which conditions urobilinogen is increased in urine ?

- Hepatocellular damage due to viral hepatitis, cirrhosis, etc
- Cholangitis
- Congestive heart failure
- Fever with dehydration

Q. 160 In which condition urobilinogen is excreted in urine but not bilirubin ?

- Associated with hemolysis

Q. 161 In which conditions there is complete absence of urobilinogen in urine ?

- When there is complete obstruction of the outflow of bile into intestine
- Broad spectrum antibiotics suppressing intestinal flora

Q. 162 On what principle test of urobilinogen in urine is based on ?

- Enrich aldehyde reaction or formation of red azo dye from diazonium compound

Q. 163 Which are indirect tests for detecting urinary tract infection ?

- Reagent strip nitrite
- Leucocyte esterase
- Measurement of urinary lactoferrin by immunochromatographic test strip method

Q. 164 What is significance of neutrophils in urinary tract infection ?

- Cut off of 10 neutrophils/ μ l in fresh urine is suggestive of infection.

Q. 165 What is significance of nitrite test in UTI ?

- Pathogenic bacteria in urinary tract reduced nitrate to nitrite causing positive nitrite test.
False positive - in poorly collected samples
 - Stored samples
 - Medication
- False negative - Ascorbic acid
 - Low pH < 6
 - Urobilinogen

Q. 166 Why ascorbic acid interferes and inhibit several reagent strip methods ?

- Because of its reducing properties

Q. 167 What is significance of serotonin in urine ?

- It is produced by argentaffin cells of intestines from tryptophan
- Excess is seen in carcinoid tumors especially metastatic
- Analysed by HPLC

Q. 168 What is significance of 24 hours urine collection ?

- Used in diagnosis of carcinoid tumor
- Normal excretion of 5-hydroxyindoleacetic acid in 24 hours is 1-5 mg
- Increased in carcinoid

Q. 169 What precautions are taken while performing urinary test for 5-hydroxyindoleacetic acid ?

- 24 hours urine collections
- Boric acid to be added as preservative
- No drugs before 72 hours

Q. 170 In which conditions melanin metabolites are seen in urine ?

- Melanin metabolites include indoles, catechols and catecholamines
- Generally seen in causes of malignant melanoma which is metastasing

Q. 171 In which conditions porphyrin is excreted in urine ?

- Porphyrins and lead poisoning
- HIV with HCV infection

Q. 172 Which test is done for porphyrins in urine ?

- Watson – Schwartz test
- Hoesch's test
- Fluorescence screening

Q. 173 Which things are seen in urinary sediment ?

- Cells of hematogenous origin
- Cellular or non cellular casts
- Crystals
- Organisms

Q. 174 What are the sources of cellular elements of urine ?

- 1) Desquamated exfoliated epithelial lining cells of kidney or lower urinary tract
- 2) Cells of hematogenous origin

Q. 175 Where are cellular and non cellular casts of urine formed ?

- In renal tubular and collecting ducts

Q. 176 After how much time casts and crystals lyse in urine sample ?

- 2 hours

Q. 177 What are disadvantages of refrigerating urine specimen ?

- May increase precipitation of various amorphous and crystalline materials.

Q. 178 Why midstream urine sample is recommended for females ?

- To reduce contamination of vaginal elements.

Q. 179 Enumerate different methods of examining urine sediment.

- a) Brightfield microscopy (hyaline casts)
- b) Phase contrast microscopy (for casts)
- c) Polarized microscopy (distinguish crystal from cast)
- d) Quantitative counts

Q. 180 How quantitative count of urine is done ?

- By haemocytometer

Q. 181 What is normal range of various sediments in urine ?

- Neutrophils – 5-30 / μ l
- Erythrocytes – 3-20 / μ l
- Casts – 1-2 / μ l

Q. 182 What is the advantage of counting cells from uncentrifuged urine over centrifuged urine ?

- Decrease in variability caused by centrifugation
- Fixed volume available by centrifugation
- Marked visual field

Q. 183 What are shadow cells ?

- If urine specimen is not fresh, erythrocytes appear as faint colourless circles or shadow cells as haemoglobin may dissolve.

Q. 184 What happens to RBCs in hypertonic urine ?

- Become crenated, appear small rough cells with crinkled edges.

Q. 185 What are ghost cells ?

- In dilute urine cells will swell and rapidly lyse releasing Haemoglobin and leaving empty cell membranes referred as ghost cells.

Q. 186 How erythrocytes are differentiated from oil droplets and yeast cells ?

- Oil droplets – exhibit great variation in size and are highly retractile
- Yeast cells – show budding
- If still identification is difficult two preparations are made and few drops of acetic acid is added – RBCs lyse.

Q. 187 Normal number of erythrocytes in urine.

- 0-2 cells / hpf

Q. 188 In which conditions increased erythrocytes are seen in urine ?

- 1) Renal disease – glomerulonephritis, lupus nephritis, calculus etc.
- 2) Lower urinary tract disease – acute and chronic infection, tumor, calculus etc
- 3) Extra renal disease – malaria, acute appendicitis, malignant hypertension, etc
- 4) Toxic reaction to drugs – sulfonamides
- 5) Physiological causes – exercise

Q. 189 Renal origin of increased erythrocytes is confirmed if ?

- Accompanying erythrocyte casts are seen.

Q. 190 What are dysmorphic erythrocytes in urine ?

- Red cells with cellular protrusion or fragmentation are called dysmorphic RBCs. They are suggestive of glomerular bleeding.

Q. 191 What are G1 cells ?

- Doughnut shaped RBCs with one or more membrane blebs are more specific of dysmorphic cells diagnosing glomerular hematuria.

Q. 192 What happens to neutrophils in urine in cellular degeneration ?

- Nuclear details are lost and they become difficult to distinguish from renal tubular epithelial cells.

Q. 193 Which stains help in emphasizing nuclear details in neutrophils ?

- Crystal violet – differentiate neutrophils from tubular cells.
- Safranin cytochemical reaction.

Q. 194 What are Glitter cells ?

- In diluted or hypotonic urine, neutrophils swell and their cytoplasmic granules exhibit Brownian movement
- Due to refractibility of many granules, neutrophils are known as Glitter cells
- Stain poorly with supra vital stains
- Show loss of nuclear segmentation

Q. 195 What is pyuria ?

- Increased number of leucocytes (more than 5) seen in urine is pyuria
- Indicates presence of infection in urinary tract
- If casts are also seen with leukocytes, it is of renal origin.

Q. 196 What is acute urethral syndrome ?

- In women there is dysuria / pyuria syndrome associated with greater than 8 neutrophils/ μl
- Causative agents – Chlamydia, Staphylococci

Q. 197 Sterile urine in presence of leukocytes suggest tuberculosis.

Q. 198 What are other causes of increased leucocytes ?

- Glomerulonephritis
- SLE
- Calculous disease
- Bladder tumours

Q. 199 In which condition eosinophils are seen in urine ?

- Tuberculo-intestinal disease associated with hypersensitivity of drugs.

Q. 200 Which stains are used for staining eosinophil in urine ?

- Cyto-centrifuge preparation with Wright's or PAP's stain

Q. 201 What concentration of lymphocytes or mononuclear cells indicate chronic Inflammation?

- More than 30 % of differential count.

Q. 202 Which type of epithelial cells can be found in urine ?

- Squamous
- Transitional (urothelial)
- Renal tubular

Q. 203 What is significance of squamous epithelial cells in urine ?

- They line distal one third of urethra
- Most frequent in normal urine
- In female may be derived from vagina or vulva

Q. 204 What is significance of transitional (urothelial) epithelial cells in urine ?

- They line from the renal pelvis to the lower third of urethra.
- Their characteristic is endo-ecto cytoplasmic rim.
- Few indicates normal desquamation
- Seen more in catheterization

Q. 205 What is significance of renal tubular epithelial cells in urine ?

- Increased in renal tubular damage
- Physiologically more in urine of newborns
- Pap stain distinguishes tubular cells from other mononuclear cells

Q. 206 Which different type of renal tubular epithelial cells are seen in urine & what is their significance ?

- a) Epithelial cells from proximal and distal convoluted tubules
 - Seen in acute tubular necrosis & drug and metal toxicity
- b) Epithelial cells from collecting ducts
 - Seen in renal transplant rejection and acute tubular necrosis
 - Also in Acute glomerulonephritis, Malignant nephrosclerosis, Salicylate intoxication
- c) Epithelial fragments of collecting duct
 - Severe form of renal tubular injury, ischemic necrosis

Q. 207 What are oval fat bodies in urine ?

- They are tubular cells that have absorbed lipoproteins with cholesterol and triglycerides leaked from nephritic glomeruli

Q. 208 In which form lipids are seen in urine ?

- a) Oval fat bodies
- b) Free fatty droplets
- c) Within histiocytes are ingested material

Q. 209 Presence of lipid in any form in urine along with proteinuria is characteristic of NEPHROTIC SYNDROME.

Q. 210 How lipid is identified in urine ?

- If cholesterol is incorporated they exhibit maltese cross formation under polarized light
- If triglycerides are there fat stains, Oil Red O or Sudan III are required for positive identification.

Q. 211 Which pigment is found in renal tubular epithelial cells ?

- With hemoglobinuria or myoglobinuria heme pigment is absorbed into cells and converted into hemosiderin
- These iron laden cells are desquamated and found in urine sediment
- Stained by Prussian blue cytoplasmic granules as yellow brown.

Q. 212 Which are pigments found in renal tubular cells ?

- 1) Hemosiderin
- 2) Melanin in metastatic melanoma
- 3) Bilirubin

Q. 213 Which pigment colours urinary cast ?

- Bilirubin
- Urobilin does not give color

Q. 214 What are urinary casts ?

- Only formed elements of urine having kidney as their sole site of origin.

Q. 215 What is matrix of urinary casts formed of ?

- Tamm – Horstall protein.

Q. 216 What are Tamm-Horsfall protein ?

- Glycoprotein secreted by thick part of ascending loop of Henle mainly constitutes one third of urinary protein
- Forms matrix of urinary casts by forming a matrix of fibrils that can trap any elements present in tubular filtrate eg. cells, cell fragment or granular material.

Q. 217 On what does the width of cast dependent ?

- On the size of tubule where it is formed.
- Broad casts – in dilated tubules or with stasis in collecting ducts
- Thin casts – in tubules compressed by swollen interstitial tissue

Q. 218 In which conditions urinary casts are seen in healthy person ?

- After strenuous exercise accompanied by proteinuria

Q. 219 In which conditions urinary cast formation increases ?

- Low pH
- Increased ionic concentration
- Stasis or obstruction of nephron by cells
- Larger than normal amounts of proteins enter tubules.

Q. 220 Which proteins cause urinary cast formation ?

- Albumin
- Globulin eg. Bence Jones proteins
- Hemoglobin
- Myoglobin

Q. 221 How granular casts are formed ?

- When plasma proteins combined with Tamm – Horsfall proteins, they form granular casts.

Q. 222 How casts are classified ?

- According to their
 - 1) Matrix – Hyaline , waxy
 - 2) Inclusions – granules – proteins, cell debris
 - Fat globules – triglycerides cholesterol esters.
 - Hemosiderin granules
 - Melanin granules
 - 3) Pigments – Hemoglobin, Myoglobin, bilirubin
 - 4) Cells – RBCs
 - WBCs
 - Renal tubular epithelial cells
 - Bacteria

Q. 223 What are Hyaline casts ?

- Mostly of Tamm – Horsfall protein
- Supravital staining
- Increased in Renal diseases
- Transiently - with exercise
 - Heat exposure
 - Dehydration
 - Fever
 - CCF

Q. 224 What is significance of waxy casts ?

- Denser than hyaline
- Differentiated from hyaline due to high refractive index
- Associated with - chronic renal disease
Allograft rejection
- Early phase of granular casts

Q. 225 What is significance of RBC cast in urine ?

- Indicate bleeding in nephron due to glomerular damage
- Appears yellow under low power in urine
- Prerequisite for identification of RBC cast is RBC outlines sharply defined
- Visualized by phase contrast or supravital staining.

Q. 226 In which condition RBC cast appear in urine ?

- Acute glomerulonephritis
- IgA nephropathy
- Lupus nephritis
- Subacute bacterial endocarditis
- Renal infarction

Q. 227 In which condition RBC and WBC casts are seen in urine simultaneously?

- Renal relapse in patient with SLE.

Q. 228 What is significance of leucocyte cast ?

- They reflect tubulointerstitial disease eg pyelonephritis
- May be present in glomerular disease owing to chemotactic effect of complement
- Also seen in Interstitial nephritis
Lupus nephritis

Q. 229 What is significance of renal tubular epithelial casts ?

- Seen in Acute tubular necrosis
 - Viral disease eg cytomegalo virus
 - Exposure to variety of drugs
 - Heavy metal poisoning

Q. 230 How will you differentiate between Leucocyte cast and Renal tubular epithelial cast ?

- By 1 – supravital staining
 - Phase contrast microscopy
 - Pap stain
- 2 – nuclei in renal tubular epithelial cast is single round while in leucocyte cast has multilobulated nuclei

Q. 231 What are the mixed casts ?

- Two distinct cell types present in single cast forms mixed cast
 - eg leukocyte / renal
 - erythrocyte / leukocyte

Q. 232 What are granular casts ?

- Granular casts are with small or large granules.
- Original from plasma protein aggregates that pass into tubules of damaged glomeruli
- Also originate from cellular remnants of leukocytes, erythrocytes or damaged renal tubular cells

Q. 233 How granules of granular cast composed of ?

- Fine salt precipitates
- Lysosomes
- Protein aggregates including fibrinogen, globulins, etc.

Q. 234 What is significance of granular casts ?

- Appear in glomerular, tubular and tubulointerstitial diseases
- Also seen in pyelonephritis, viral infection and CHRONIC LEAD POISONING.

Q. 235 What is significance of granular casts with hematuria ?

- Indicate Renal Papillary Necrosis

Q. 236 What is significance of granular casts in hyperparathyroidism ?

- Some fine granules might be of calcium phosphate precipitants.

Q. 237 In which physiological conditions granular casts are seen?

- Extreme stress
- Strenuous exercise

Q. 238 What is significance of fatty casts ?

- Incorporated in to cast matrix from renal tubular cells
- Seen in NEPHROTIC SYNDROME

Q. 239 What are crystal casts ?

- Casts containing urates, calcium oxalate and sulphonamides
- Indicate deposition of crystals in tubule or collecting duct
- Hematuria usually accompanies

Q. 240 Enumerate Pigmented casts.

- Hemoglobin cast
- Hemosiderin casts
- Myoglobin casts
- Bilirubin and Drug casts

Q. 241 What is significance of Hemoglobin casts?

- Appear yellow to red
- Also known as blood casts
- Seen in glomerular disease along with erythrocyte cast

Q. 242 What are Hemosiderin casts?

- Hemosiderin granules in casts are derived from pigment laden renal tubular cells.

Q. 243 What is significance of myoglobin casts?

- Red Brown in colour
- Occurs with myoglobinuria after acute muscle damage
- Associated with renal failure

Q. 244 What is significance of bilirubin cast?

- Seen in Obstructive Jaundice
- Deep yellow colour

Q. 245 Which drugs can form cast?

- Phenazopyridine

Q. 246 What are Broad casts ?

- Have diameter two to six times that of normal casts.
- Indicates tubular dilation or stasis in distal collecting duct
- Seen in CHRONIC RENAL FAILURE
- Indicate poor prognosis

Q. 247 What is meant by Miscellaneous casts?

- Bacteria in cast – but they appear dark purple on supravital stains
- Mucous threads – but they are larger, long, ribbon like with poorly defined edges and pointed or split ends

Q. 248 What is meant by telescoped sediment ?

- Describe simultaneous occurrence of elements of glomerulonephritis as well as nephritic syndrome in same urine specimen
- May include red cells, red cell casts, broad waxy casts, lipid droplets, oval fat bodies
- May be found in collagen vascular disease and sub acute bacterial endocarditis

Q. 249 What are urinary crystals ?

- They form by precipitation of urinary salts when alterations in multiple factors affect their solubilities.
Eg changes in pH
Temperature
Concentration

Q. 250 In which urine specimens generally crystal formation occurs ?

- In refrigerated specimens
- In specimen which remain at room temperature for several hours.
- Increased solute concentration

Q. 251 What is significance of pH in crystal formation ?

- Urine pH determines which chemical will precipitate to form crystal

Q. 252 Enumerate crystals found in normal acid urine.

- Amorphous urates (calcium, magnesium, sodium, potassium)
- Crystalline urates (sodium, potassium, ammonium)
- Crystalline uric acid
- Calcium oxalates

Q. 253 What is significance of amorphous urate crystals in urine?

- Precipitated upon standing of concentrated urine at acid pH.
- If in large amount give pink orange or reddish brown colour to urine –
BRICK DUST APPEARANCE
- Convert to uric acid crystals with acidification with acetic acid and dissolve with 60°C heat

Q. 254 What is shape of crystalline urates?

- Form small brown spheres or colourless needles

Q. 255 What are different form of uric acid crystals ?

- Occurs at low pH
- Rhombic or four sided flat plates
- Prisms
- Oval form from pointed ends (lemon shaped)
- Wedges
- Rosettes
- Irregular plates
- Hexagonal
- May be coloured – yellow, brown or colourless

Q. 256 How will you differentiate hexagonal uric acid crystals from cystine Crystals?

- Uric acid crystals show birefringence with polarized light.

Q. 257 What dose large number of uric acid crystals in urine indicate?

- Increased nucleoprotein turnover
eg in chemotherapy of leukemia or lymphoma
- Lesch – Nyhan syndrome
small stones located in ureters due to raised serum uric acid levels
- Urate nephropathy of gout

Q. 258 What are different form of calcium oxalate crystals ?

- Appear at pH 6 or in neutral urine (Dihydrate form)
- Small, colourless, octahedron resembling envelope
- Ovoid form
- Monohydrate form are large

Q. 259 What is significance of calcium oxalate crystals ?

- Reflect
 1. severe chronic renal disease
 2. ethylene glycol or methoxyflurane toxicity
 3. Crohn's disease – reflection of increased absorption of oxalates
 4. Genetically susceptible persons following large dose of ascorbic acid.

Q. 260 Which crystals are found in alkaline urine ?

- Are colourless
- Produce fine lacy appearance
- Seen on light microscope
- Monohydrogen phosphates are less soluble while dihydrogen phosphates are soluble
- Dissolve in acids eg. HCL, Nitric acid.

Q. 261 What is significance of amorphous phosphates in alkaline urine ?

- Are colourless
- Produce fine lacy appearance
- Seen on light microscope
- Monohydrogen phosphates are less soluble while dihydrogen phosphates are soluble
- Dissolve in acid eg. HCL, Nitric acid

Q. 262 What is significance of crystalline phosphates in alkaline urine ?

- Most easily identified
- Colourless, vary in size
- Three to six sided prisms with oblique ends
- Reformed as COFFIN LIDS
- Can form Rhomboids

Q. 263 Which are dumbbell shaped crystals seen in alkaline urine ?

- Calcium Carbonate
- Produce CO₂ in presence of acetic acid

Q. 264 Which crystals have projections or thorns ?

- Ammoniums Biurate
- Referred as THORN APPLES

Q. 265 Enumerate crystals found in abnormal urine.

- Cystine
- Tyrosine
- Leucine
- Sulfonamide (sulfadiazine)
- Ampicillin

Q. 266 How will you differentiate cystine crystals from uric acid crystals in urine?

- Uric acid crystals polarize, cystine crystal do not
- Cystine dissolves in dilute HCL, uric acid do not

Q. 267 In which condition cystine crystals are seen in urine ?

- Cystinuria
- Cystine calculi
- Can be confirmed by cyanide – nitroprusside reaction

Q. 268 What is significance of tyrosine crystals ?

- They form fine silky needle arranged in sheaves or clumps
- Soluble in alkali or acid not soluble in alcohol
- Seen in urine of severe liver disease

Q. 269 What is significance of leucine crystals ?

- Appear as yellow, oily appearing spheres
- Seen in urine of severe liver disease

Q. 270 What is significance of sulphonamide or sulphadiazine crystals ?

- Seen in urine at acid pH.
- Various forms seen
 - Yellow brown sheaves of wheat with central bindings
 - Striated sheaves with eccentric binding
 - Rosettes, arrowhead petals needles
- Confirmed by Diazo Reaction, HPLC or colorimetric methods.

Q. 271 Which urinary crystals are seen following radiographic examination ?

- Diatrizoate dyes crystals if patient is not properly hydrated

Q. 272 Which abdominal cells and other formed elements are found in urine ?

- Tumor cells
- Viral inclusion cells
- Platelets
- Bacteria
- Fungus
- Parasites

Q. 273 Which tumor cells are identified in urine ?

- Malignant tumor cells from renal pelvis, ureter, bladder wall, urethra
- Myeloma cells

Q. 274 In which condition viral inclusion cells are seen in urine ?

- Herpes
- Cytomegalovirus in children & immunosuppressed patients
- Polio virus

Q. 275 In which conditions platelets are seen in urine ?

- Hemolytic Uremic Syndrome
- By phase contrast & electron microscopy if they are up to 30000/ μ l

Q. 276 What is significance of bacteria in urine ?

- If bacteria are identified in urine with gram's stain in an uncentrifuged specimen under oil immersion lens, they are more than 100,000 organism/ml

Q. 277 What is significance of fungi in urine ?

- Candidia common in urine of diabetes mellitus patient
- Confused with erythrocytes but BUDDING helps to differentiate

Q. 278 Which parasites can be seen in urine ?

- May be seen as result of fecal or vaginal contamination
- TRICHOMONAS due to vaginal contamination
- Should be searched on wet preparation for motility
- SCHISTOSOMA – accompanied by erythrocytes
- AMEBAE – fecal contamination or lymphocytes
- E. HISTOLYTICA

Q. 279 Which contaminants and artifacts are seen in urine?

- Muscle fibres and vegetable cells in fecal contamination.
- Spermatozoa
- Pollen grains- Seasonally
- Fibers of cotton and wool diapers
- Starch granules from gloves.
- Oil droplets from catheter lubricants.
- Lipid material from Vaginal creams.

Q. 280 How are contaminant fibers different from casts ?

- Fibers polarize, where as casts do not polarize.

Q. 281 What changes are seen in urine of Acute Glomerulonephritis?

- Macroscopic : - Hematuria
- Smoky turbidity
- Microscopic : - RBCs, RBC casts
- Epithelial casts
- Hyaline casts
- Waxy Casts
- Neutrophils

Q. 282 What changes are seen in urine of Chronic Glomerulonephritis ?

- Macroscopic : - Proteinuria
 - Hematuria

- Microscopic : - Granular casts
 - Waxy casts
 - Epithelial casts
 - RBCs
 - WBCs
 - Lipid droplets.

Q. 283 What changes are seen in urine of Acute Pyelonephritis ?

- Macroscopic : - Proteinuria
 - Turbidity

- Microscopic : - Neutrophils
 - Lymphocytes
 - Histiocytes
 - Renal epithelial cells
 - Leucocytes
 - Epithelial casts
 - Bacteria

Q. 284 What changes are seen in urine of Chronic Pyelonephritis?

- Macroscopic : - Occasional proteinuria

- Microscopic : - Leucocytes
 - Erythrocytes
 - Waxy casts
 - Granular casts
 - Bacteria

Q. 285 Which changes are seen in urine with Nephrotic Syndrome ?

- Macroscopic : - Proteinuria
 - Fat droplets

- Microscopic : - Fatty waxy casts
 - Oval fat bodies
 - Vacuolated renal epithelial cells (Single or clumps)

Q. 286 Which changes are seen in urine in Acute tubular necrosis ?

- Macroscopic : - Hematuria
 - Occasional proteinuria

- Microscopic : - Necrosed, degenerated renal epithelial cells
 - RBCs
 - Leucocytes
 - Granular, waxy broad casts

Q. 287 Which changes are seen in urine in Cystitis?

- Macroscopic : - Hematuria

- Microscopic : - RBCs
 - WBCs
 - Transitional epithelial cells
 - Histiocytes, giant cells

Q. 288 In which kidney infections, casts are not seen at all ?

- Cystitis

Q. 289 Which changes are seen in urine with urinary tract malignancy ?

- Macroscopic : - Gross hematuria

- Microscopic: - Atypical mononuclear cells with enlarged, irregular hyperchromatic nuclei and prominent nucleoli.

Q. 290 What are the advantages of automated urinalysis ?

- Enhance work flow
- Standardize some aspects of manual urinalysis

Q. 291 How automated urinalyser works ?

- Specific work is measured by mass gravity meter
- Urine chemistries are measured by standard reflectance spectrophotometer.
- Microscopic analysis is by automated intelligent microscopy system.

Q. 292 What is one of the main advantage of automated urinalyser?

- No centrifugation is needed.
- Handling of sample is minimized.

Q. 293 Apart from automated urinalyser which other instrument can be used to analyze casts and crystals in urine ?

- Flow cytometry : Stains DNA and membranes of formed elements - passes through laminar flow – measures the light scattered – fluorescence and impedance.

Q. 294 What is nephrolithiasis?

- It is a heterogenous condition with stones developing from wide variety of metabolic and environmental disturbances.
- May be found concentrated of nonorganic components, containing lipids or proteins.

Q. 295 With which conditions generally calcium stones are associated with?

- Hyperparathyroidism : As parathyroid hormone affects bone resorption.

Q. 296 In which metabolic conditions urinary screening is done?

- Phenylketonuria
- Alkaptonuria
- Tyrosinuria
- Maple Syrup Urine Disease
- Cystinuria

CEREBROSPINAL FLUID

Q. 1 Approximately how much CSF is produced daily ?

- 500 ml (0.3-0.4 ml/min)

Q. 2 Where is CSF found in the brain ?

- Approximately 25 ml in ventricles.
- Approximately 90-125 ml in sub arachnoid space.

Q. 3 Where does filtration and secretion of CSF occur?

- 70 % in choroid plexuses.
- Rest of it in ventricular ependymal lining and cerebral arachnoid space.

Q. 4 What are the functions of CSF ?

- Physical support to the brain : 1500 gms brain weighs in 50 gms of suspended CSF.
- Protective effect against sudden changes in acute venous and arterial blood pressure
- Excretory waste function pathway for hypothalamus releasing factors transported to cells.
- Maintains ionic homeostasis of brain.

Q. 5 What is meant by Blood Brain Barrier ?

- Consists of two morphologically distinct components :
 1. Unique capillary endothelium held together by intercellular tight junctions
 2. Choroid plexus, where single layer of specialized choroidal ependymal cells are connected by tight junctions overlying fenestrated capillaries.

Q. 6 Which ionic substances are tightly regulated by transport systems?

- H⁺, K⁺, Ca⁺, Mg⁺, Bicarbonate

Q. 7 Which constituents move freely across the blood brain barrier ?

- Glucose, urea , creatinine.

Q. 8 How does proteins cross the blood brain barrier ?

- Cross by passive diffusion.
- At a rate dependent on plasma to CSF concentration gradient.
- Inversely proportional to their molecular weight and hydrodynamic volume.

Q. 9 From which sites CSF can be obtained ?

- Lumbar
- Cisternal
- Lateral cervical puncture
- Ventricular cannulas or shunts

Q. 10 What precaution should be taken prior to CSF removal ?

- CSF opening pressure should be measured by a manometer.

Q. 11 In which conditions CSF pressure varies ?

- Postural changes
- Blood pressure
- Venous return
- Factors altering cerebral blood flow

Q. 12 What is normal opening CSF pressure in adults?

- 90 – 180 mm of water in lateral decubitus position with neck and legs in neutral position.
- Slightly higher in sitting position
- Varies 10 mm with respiration

Q. 13 What can be the limit of CSF pressure in obese patients ?

- Upto 250 mm of water.

Q. 14 What is the normal range of CSF pressure in infants and young children?

- 10 – 100 mm of water.

Q. 15 What is the significance of opening CSF pressure above 250 mm of water?

- Diagnostic of intracranial hypertension due to meningitis, intracranial hemorrhage and tumors.
- In such cases only 2 ml of CSF should be withdrawn.

Q. 16 In which condition idiopathic intracranial hypertension is commonly seen?

- Obese women during child bearing age.

Q. 17 In which cases elevated CSF pressure is seen?

- Congestive heart failure
- Meningitis
- Superior vena cava syndrome
- Thrombosis of venous sinuses
- Cerebral edema.

Q. 18 In which conditions opening pressure elevation is the only abnormality ?

- Cryptococcal meningitis
- Pseudotumor cerebri

Q. 19 In which cases decreased CSF pressure can be seen ?

- Spinal -Subarachnoid block
- Dehydration
- Circulatory collapse
- CSF leakage

Q. 20 What does a significant pressure drop indicate after removal of 1-2 ml of CSF?

- Herniation
- Spinal block above puncture site
- No fluid should be withdrawn then.

Q. 21 How much CSF is normally removed for CSF examination ?

- Upto 20 ml.

Q. 22 If serum glucose has to be done then when the sample should be collected before lumbar puncture ?

- 2 – 4 hours before lumbar puncture due to delay in CSF – serum equilibrium.

Q. 23 How is the CSF specimen divided?

- In three sterile tubes :
 1. For chemistry and immunology studies.
 2. For microbiology studies.
 3. For cytology, if suspected for malignancy.

Q. 24 In which conditions, variations in CSF sample collected tubes should be done?

- When 1st tube is hemorrhagic, cannot be used for protein studies in cases like multiple sclerosis
- Instead, 3rd tube should be examined.

Q. 25 Why 1st tube of CSF collection cannot be used for microbiology exams?

- It may be contaminated with skin bacteria.

Q. 26 Why glass tubes should be avoided for CSF examination ?

- This is because cells adhere to the glass and it will affect cell count and differential count.

Q. 27 How soon should be CSF specimen processed in the laboratory ?

- Within 1 hour to minimize cellular degradation.

Q. 28 Why refrigeration of CSF sample is contraindicated for culture specimens?

- This is because fastidious organisms (eg : Haemophilus Influenzae and Neisseria Meningitidis) will not survive.

Q. 29 How indications of lumbar puncture are divided?

- Meningeal infection
- Subarachnoid hemorrhage
- Primary or metastatic malignancy
- Demyelinating disease.

Q. 30 Which is the most important indication of CSF examination ?

- Infectious meningitis.

Q. 31 Which are routine recommended CSF laboratory tests ?

- Opening CSF pressure
- Total cell count (RBCs & WBCs)
- Differential cell count (Stained smear)
- Glucose (CSF/Plasma ratio)
- Total proteins.

Q. 32 What is the significance of gross examination ?

- Normal CSF : Crystal clear, colourless, viscosity similar to water
- Abnormal CSF : Maybe cloudy, purulent or pigment tinged.

Q. 33 What are the causes of cloudy or turbid CSF ?

- Leucocyte count more than 200 cells/ul or RBCs more than 400/ul.
- Microorganisms i.e. fungi, bacteria and amoeba
- Radiographic contrast material
- Aspirated epidural fat.
- Protein greater than 150 ug/ml

Q. 34 What is Tyndall's effect ?

- Direct sunlight is directed on the tube of CSF at 90 degree angle from observer
- Imparts sparkling or snowy appearance as suspended particles scatter the light .
- Helps to detect cell count when cells are less than 50 cells/ul

Q. 35 In which conditions clot formation is seen in CSF ?

- Traumatic taps
- Complete spinal block (Froin's syndrome)
- Suppurative or tuberculous meningitis.

Q. 36 In which condition clot formation is not seen in CSF ?

- Subarachnoid hemorrhage.

Q. 37 How does clot formation in CSF look like ?

- Fine surface pellicles are seen after refrigeration for 12-24 hours.

Q. 38 How does clots in CSF affect results ?

- The clots may interfere with cell count accuracy by entrapping inflammatory cells.

Q. 39 In which conditions viscous CSF is seen ?

- Metastatic mucin producing adenocarcinoma
- Cryptococcal meningitis due to capsular polysaccharide
- Liquid nucleus pulposus due to needle injury to annulus fibrosus.

Q. 40 What is significance of pink-red CSF ?

- Presence of blood
- Grossly bloody then RBC count more than 6000/ul
- Originates from Subarachnoid hemorrhage, intracranial hemorrhage, cerebral infarct
- Traumatic spinal tap.

Q. 41 What is the significance of pink CSF supernatant color ?

- RBC lysis
- Hb breakdown

Q. 42 What is the significance of yellow CSF supernatant color ?

- RBC lysis
- Hb breakdown products
- Hyperbilirubinemia
- CSF protein > 150 mg/dl (1.5 g/lit)

Q. 43 What is the significance of orange CSF supernatant color ?

- RBC lysis
- Hb breakdown products
- Hypervitaminosis A (Carotenoids)

Q. 44 What is the significance of yellow green CSF supernatant ?

- Hyperbilirubinemia (biliverdin)

Q. 45 What is the significance of brown CSF supernatant ?

- Meningeal metastatic melanoma

Q. 46 What is xanthochromia ?

- Pale pink to yellow color in the supernatant of centrifuged CSF.

Q. 47 How is xanthochromia detected ?

- CSF is centrifuged
- Supernatant fluid is compared with a tube of distilled water.

Q. 48 How is subarachnoid hemorrhage diagnosed from Xanthochromia ?

- Pale pink to orange xanthochromia is seen from released oxyhaemoglobin by lumbar puncture 2-4 hours after subarachnoid hemorrhage.
- Peak intensity is seen after 24-36 hours.
- Disappears over next 4-8 days.

Q. 49 What is pink to orange xanthochromia ?

- Seen in subarachnoid hemorrhage, released from oxyhaemoglobin.

Q. 50 What is yellow xanthochromia ?

- It is derived from bilirubin.
- Develops 12 hours after subarachnoid hemorrhage.
- Persists for 2-4 weeks.

Q. 51 In which conditions visible CSF xanthochromia is seen ?

1. Oxyhaemoglobin due to artifactual red cell lysis caused by detergent contamination of needle or collecting tube .
2. Delay of more than 1 hour without refrigeration before examination.
3. Bilirubin in jaundice patients.
4. CSF protein levels over 150 mg/dl seen in bloody traumatic taps and pathologic states (eg : Spinal block, polyneuritis and meningitis)
5. Carotenoids – orange color seen in people with hypercarotenemia (Hypervitaminosis A)
6. Merthiolate disinfectant contamination
7. Melanin (Brown) from Metastatic meningeal melanoma
8. Rifampicin therapy (red/orange color)

Q. 52 How will you differentiate Hb derived substances from Xanthochromic pigments ?

- By spectrophotometry

Q. 53 How will you differentiate between traumatic tap and subarachnoid hemorrhage?

1. Traumatic tap : Hemorrhagic fluid clears between first and third collected tubes.

Subarachnoid hemorrhage : Remains relatively uniform.

2. Xanthochromia
3. Microscopic evidence of erythrophagocytolysis
4. Hemosiderin laden macrophages
5. RBC lysis in 1-2 hours in traumatic tap of CSF, so early evaluation is necessary.
6. Latex agglutination immunoassay for D-dimer is positive in Subarachnoid hemorrhage but negative in traumatic tap.

Q.54 In which conditions false positive results for D-dimer are expected ?

- DIC
- Fibrinolysis
- Trauma from repeated punctures

Q. 55 How total cell count is done in CSF ?

- Undiluted CSF in manual counting chamber.

Q. 56 Why automated leucocyte and erythrocyte count is not preferred?

- As precision is poor in low count.

Q. 57 Which are manual methods of counting CSF cell counts?

- Rosenthal type chamber
- Neubauer's chamber
- Flow cytometry

Q. 58 What is the normal leucocyte count of CSF in neonates ?

- 0-30 cells/ul

Q. 59 What is the significance of RBC in CSF ?

- Normally no RBCs are seen.
- If present – pathologic process eg; Trauma, malignancy and traumatic tap.
- Gives useful approximation of true CSF WBC or total protein of traumatic puncture by correcting.
- All parameters should be done in a single tube.

Q. 60 What are the methods to do differential WBC counts in CSF ?

1. Counting chamber : Unsatisfactory as low cell numbers have poor precision.
2. Direct smear of centrifuged CSF sediment : Subject to error from cellular distortions fragmentation.
3. Cytocentrifuge

Q. 61 What are the advantages of cytocentrifuge ?

1. Requires minimal training.
2. Allows Wright's staining of air dried cytopins.
3. Cell yield and preservations are better.
4. 30-50 cells can be concentrated from 0.5ml of normal CSF.

Q. 62 How variable artifactual distortions in cytopsin for differential count in CSF be avoided ?

1. Fresh specimen
2. Albumin added to specimen (2 drops of 22% bovine serum albumin)
3. Cell concentration is adjusted to about 300 WBCs/lit prior to centrifugation.

Q. 63 What is the benefit of filtration and sedimentation methods of CSF?

1. Allow concentration of large volumes of CSF for cytological examination or culture.
2. Retain fluid filtration for additional studies

Q. 64 What is the normal lymphocyte monocyte ratio in CSF ?

- 70 : 30

Q. 65 When are more number of monocytes seen in CSF ?

- In young children upto 80%

Q. 66 What is the normal range of neutrophils in CSF ?

- 7 % with normal WBC count.

Q. 67 What are the causes of increased CSF neutrophils ?

1. Meningitis (Bacterial, Viral , Tuberculous and mycotic)
2. Amoebic encephalopathy
3. Other infections like cerebral abscess, subdural empyema, etc.
4. Following seizures
5. Following subarachnoid or intracerebral hemorrhage.
6. Following infarct.
7. Due to repeated lumbar puncture
8. Injection of drugs.
9. Metastatic tumor in contact with CSF.

Q. 68 Which other cells are seen in traumatic puncture ?

1. Bone marrow cells
2. Cartilage cells
3. Squamous cells
4. Ganglion cells
5. Soft tissue element
6. Ependymal and choroidal plexus cells.

Q. 69 What proportion of neutrophils can increase in bacterial meningitis ?

- Upto 60 %

Q. 70 How viral meningitis is suspected ?

- Neutrophilia changes to lymphocytic pleocytosis within 2-3 days.

Q. 71 What is the significance of persistent neutrophilia ?

- Persistent neutrophilic meningitis may be non-infectious or due to less common pathogens like Nocardia, Actinomyces, etc.

Q. 72 In which cases lymphocytosis is seen in CSF ?

1. Meningitis : Viral, tuberculous and fungal.
2. Early bacterial meningitis
3. Parasitic infections eg: Cysticercosis.
4. Degenerative disorders.
5. Sarcoidosis.

Q. 73 When blast like lymphocytes are admixed with normal lymphocytes ?

- In neonates.

Q. 74 In which conditions plasma cells are seen in CSF ?

1. Acute viral infection
2. Multiple sclerosis
3. Parasitic CNS infestations.
4. Sarcoidosis
5. Tuberculosis

Q. 75 What is the suggestive criteria of eosinophilic meningitis in CSF ?

- 10 % eosinophils.

Q. 76 What are the causes of Eosinophilia in CSF ?

1. Acute polyneuritis
2. CNS reaction within foreign material
3. Fungal Infections
4. Parasitic infections
5. Hypereosinophilic syndrome

Q. 77 When mixed cells without neutrophils are seen in CSF and what can be the interpretation?

- Viral & syphilitic meningitis.

Q. 78 In which condition macrophages are seen in CSF ?

- 12-48 hours after subarachnoid hemorrhage or traumatic tap.

Q. 79 In which carcinoma, cells are seen in CSF ?

1. Leukemia
2. Metastatic carcinoma
3. Primary CNS malignancy

Q. 80 In which type of leukemia, involvement of meninges is more common ?

- Acute lymphoblastic leukemia : Leucocyte count over 5 cells/ul with unequivocal lymphoblasts.

Q.81 Which tests increase sensitivity of lymphoma detection in CSF ?

- PCR
- Flow cytometry

Q. 82 Which proteins are found in CSF ?

- Prealbumin
- Transferrin
- Nerve tissue specific proteins

Q. 83 What is the normal CSF protein level ?

- 15-45 mg/dl

Q. 84 Enumerate different methods of measuring protein in CSF .

1. Lowry method
2. Trichloroacetic acid- poncue-S method
3. Biuret method

Q. 85 What is the normal range of CSF protein in infants ?

- Approximately 90 ug/dl for infants.
- Approximately 115 ug/dl for preterm infants.

Q. 86 What are the causes of increased protein levels in CSF ?

1. Increased permeability of blood brain barrier.
2. Decreased resorption at arachnoid villi.
3. Mechanical obstruction of CSF flow due to spinal block above puncture site.
4. Increase in intrathecal immunoglobulin synthesis.

Q. 87 What is low lumbar CSF protein level ?

- Less than 20 mg/dl

Q. 88 In which conditions low protein levels are seen in CSF ?

1. Young children between 6 months to 2 years.
2. Removal of large volumes of CSF
3. CSF leaks induced by trauma or lumbar puncture
4. Increased intracranial pressure
5. Hyperthyroidism

Q. 89 What does protein electrophoresis of CSF reveal ?

1. A prominent prealbumin band (Transthyretin)
2. Two transferrin bands

Q. 90 Which are turbidometric methods of CSF protein estimation ?

1. Trichloroacetic acid
2. Sulphosalicylic acid
3. Sodium sulfate for protein precipitation

Q. 91 What are the advantages of turbidometric methods of measuring CSF proteins ?

- Simple
- Rapid
- Requires no special instrumentation.

Q. 92 What are the disadvantages of turbidometric methods of CSF protein estimation ?

- Temperature sensitive method
- Requires much large volume of specimen
- Prone to significant variations from changes in albumin/globulin ratio.

Q. 93 In which condition, false positive elevation of protein is observed in CSF in TCA method ?

- In the presence of methotrexate.

Q. 94 Which reagents are used as precipitating agents in automated and micromethods?

1. Benzethonium chloride
2. Benzalkonium chloride

Q. 95 Which colorimetric methods are used for measuring CSF proteins ?

1. Lowry method
2. Dye binding methods (Eg : Coomassie Brilliant blue, Poncue S)
3. Modified biuret method

Q. 96 What are the advantages of colorimetric methods of measuring CSF proteins?

- Rapid
- Highly sensitive
- Can be used on small samples

Q. 97 What are the advantages of mixing Immunologic methods of measuring CSF proteins ?

1. Can measure specific proteins
2. Requires only 25-50 ul of CSF
3. Relatively simple to perform
4. Reagents are standardized.

Q. 98 How is the permeability of blood brain barrier assessed ?

- By immunochemical quantification of CSF albumin to serum albumin ratio in grams per deciliter.
- Normal is 1 : 230

Q. 99 What is the CSF / Serum Albumin index ?

- It assesses the permeability of blood brain barrier.
- It is measured as:

$$\text{CSF/Serum Albumin Index} = \frac{\text{CSF Albumin (mg/dl)}}{\text{Serum Albumin(g/dl)}}$$

Q. 100 How is the interpretation of intactness of Blood brain barrier is done ?

By CSF / Serum Albumin index

- Intact barrier :- less than 9
- Slight impairment :- 9-14
- Moderate impairment :- 14-30
- Severe impairment :- Greater than 3

Q. 101 In which condition blood brain barrier is not intact normally ?

- In infants upto 6 months of age reflecting the immaturity of the blood brain barrier.

Q. 102 By which other methods the intactness of blood brain barrier is measured?

- By CSF/Serum IgG

Q. 103 Which investigations of CSF are important for diagnosis of Multiple Sclerosis ?

1. CSF protein
2. CSF gamma globulin fraction on electrophoresis
3. CSF IgG /Albumin ratio by electroimmunodiffusion.

Q. 104 What is the interpretation of CSF levels of Beta –amyloid and Tau proteins if increased ?

- Subdural hemorrhage
- Bacterial meningitis

Q. 105 What is the interpretation of Beta-2-microglobulin if increased in CSF ?

- Leukaemia / Lymphoma

Q.106 What is the interpretation in C-reactive protein if increased in CSF ?

- Bacterial meningitis
- Viral meningitis.

Q. 107 What is the interpretation if fibronectin is increased in CSF ?

- Lymphoblastic leukaemia
- AIDS
- Meningitis

Q. 108 What is the interpretation if methemoglobin is increased in CSF ?

- Mild subarachnoid / subdural hemorrhage.

Q. 109 In which conditions myelin basic protein is increased in CSF ?

- Multiple Sclerosis
- Tumors

Q. 110 In which conditions Transferrin is increased in CSF ?

- CSF leakage

Q. 111 What is the normal range of CSF fasting glucose levels ?

- 50-80 mg/dl

Q. 112 What is the normal CSF/Plasma glucose ratio ?

- 0.3-0.9

Q. 113 Which values of CSF glucose are considered abnormal ?

1. Below 40 mg/dl in CSF
2. CSF/ Plasma glucose ratio is less than 0.3

Q. 114 In which conditions generally hypoglycorrhachia (low glucose level is seen)

1. Bacterial , Tuberculous and fungal meningitis (However, normal levels do not exclude the above conditions)
2. Malignant tumor
3. Sarcoidosis
4. Cysticercosis
5. Subarachnoid hemorrhage

Q. 115 Why glucose level in CSF is decreased ?

- It results from increased anaerobic glycolysis in brain tissue and leucocytes and impaired transport into CSF.

Q. 116 How is CSF glucose level useful parameter in assessing response to treatment?

- It normalizes before protein levels and cell counts normalize during recovery from meningitis.

Q. 117 What is significance of increased CSF glucose level ?

1. Clinically, no significance.
2. It reflects increased blood glucose levels within 2 hours of lumbar puncture.
3. Traumatic tap.

Q. 118 What is the significance of lactate measured in CSF ?

- It has been used to differentiate between viral and bacterial meningitis.
- It can also be used to differentiate between viral, fungal, mycoplasma and tuberculous meningitis
- In viral meningitis, levels less than 35 mg/dl are seen
- In bacterial meningitis it is more than 35 mg/dl

Q. 119 What is the significance of persistently high level of lactate in CSF ?

- Poor prognosis in head injury.

Q. 120 What is increased in CSF in Alzheimer's disease ?

- F2-Isoprostanes.

Q. 121 What is the significance of increased Adenosine deaminase (ADA) enzyme in CSF ?

- Indication of tuberculous meningitis
- Helps in differentiating tuberculous from other types of meningitis.

Q. 122 What is the significance of increased Creatinine Kinase in CSF ?

- Increased in Subarachnoid hemorrhage
- Correlates severity of the injury

Q. 123 What is the significance of lactate dehydrogenase enzyme in CSF ?

- Differentiates traumatic tap from intracranial hemorrhage as recent traumatic tap with intact RBCs does not significantly elevate LDH.
- It is much higher in bacterial meningitis than in aseptic meningitis.

Q. 124 In which conditions the CSF Lactate dehydrogenase is increased ?

- CNS Leukaemia / Lymphoma
- Metastatic carcinoma
- Bacterial meningitis
- Subarachnoid hemorrhage

Q. 125 How do Lactate dehydrogenase isoenzymes in CSF help in diagnosis ?

- LD 5 to total LD ratio is increased in leptomeningeal metastasis from Ca breast, lungs and metastatic melanoma.

Q. 126 What is the significance of increased ammonia levels in CSF ?

- It indicates hepatic encephalopathy.

Q. 127 In which conditions CSF amino acids are elevated ?

- In infants.

Q. 128 Which tumor markers are increased in CSF ?

1. CEA : Metastatic brain tumors
2. HCG : Metastatic choriocarcinoma
3. Alpha fetoprotein : Germ cell tumors (Diagnosis and monitoring)
4. Ferritin : CNS malignancy

Q. 129 Which stain is significant for diagnosing CNS infections ?

- Gram stain.

Q. 130 Which organisms in CSF are responsible for causing bacterial meningitis ?

1. B. Streptococcus (Neonates)
2. Neisseria (3 months and older)
3. Streptococcus pneumoniae (3 months and older)
4. E. coli and other gram negative bacteria (1 month and older)
5. H. Influenzae (Upto 18 years)

Q. 131 Which are the methods to diagnose bacteria in CSF ?

1. Gram stain
2. Culture
3. Latex agglutination
4. Limulus lysate assay in Gram negative bacteria
5. PCR
6. NAT

Q. 132 Which investigations are useful for diagnosing Neurosyphilis?

1. Abnormality in CSF proteins and cell counts.
2. VDRL (Nonspecific, less sensitive)
3. Treponemal antibody test (FTA-ABS) (Sensitive and specific, but chances of false positive are more)

Q. 133 Which viruses are responsible for viral meningitis ?

- Echovirus
- Coxsackievirus
- Poliovirus

Q. 134 Which investigations are done to diagnose Viral meningitis ?

1. CSF cell count : Lymphocytes predominate neutrophils.
2. Exclusion of growth in culture
3. RT-PCR

Q. 135 What changes are seen in CSF in HIV ?

1. Lymphocytosis
2. Elevated IgG
3. Opportunistic fungi in CSF.

Q. 136 Which fungus is most commonly seen in CSF ?

- Cryptococcus, diagnosed by :
 1. India ink or Nitrogen stains
 2. Latex agglutination
 3. Culture

Q. 137 What are the hallmark features of Tuberculous meningitis in CSF ?

1. Elevated proteins
2. Lymphocytic predominance

Q. 138 How is Tuberculous meningitis diagnosed in CSF ?

1. Acid fast stain
2. PCR
3. DOT ELISA
4. Adenosine Deaminase level

SYNOVIAL FLUID

Q. 1 What is the significance of doing synovial fluid examination?

- To differentiate between inflammatory and non-inflammatory conditions.

Q. 2 Which are the non inflammatory effusions?

- Osteoarthritis
- Traumatic arthritis
- Early rheumatic fever

Q. 3 Which are the inflammatory effusions ?

- Rheumatoid arthritis
- SLE
- Arthritis with inflammatory bowel disease
- Rheumatic fever

Q. 4 How will you differentiate between non inflammatory and inflammatory effusions in synovial fluid?

- Non inflammatory : Leucocyte count less than 3000/ul
- Inflammatory : Leucocyte count more than 3000/ul upto 75000/ul

Q. 5 Which anticoagulant should be used for synovial fluid collection ?

- Heparinized syringe.

Q.6 Why other anticoagulants such as EDTA, oxalate, etc. are not used for synovial fluid collection?

- As they form artifact crystals which may mislead in microscopy.

Q. 7 What changes can be seen in doing gross examination of synovial fluid?

Color: Evaluated against clear glass

- Normal : Clear
- Yellow : In sepsis
- Traumatic tap : Reddish brown
- Oily appearance : Cholesterol crystals

Q. 8 What is done to evaluate microscopic examination of synovial fluid?

- Total cell count : Performed within 1 hour .
- More than 10,000-50,000 indicates : Gout, Chronic arthritis (eg: Rheumatoid arthritis) , SLE and Septic arthritis.

Q. 9 What is observed in doing differential count of synovial fluid ?

- Neutrophils more than 50% : Gout, Rheumatoid arthritis
- Neutrophils more than 75% : Acute bacterial arthritis
- LE cells : Lupus arthritis
- Lymphocytes : Early Rheumatoid arthritis, Collagen disorders.
- Monocytes and macrophages : Viral arthritis
- Eosinophilia : Parasitic infection, Lyme's disease
- Lipid bodies : Trauma, Aseptic necrosis.

Q. 10 Which types of crystals are seen in synovial fluid ?

1. Monosodium urate monohydrate
2. Calcium phosphate

Seen in a polarized microscope

Q. 11 What are cholesterol crystals ?

- Cholesterol crystals are seen in synovial fluid in :
 1. Rheumatoid arthritis
 2. Tuberculous arthritis
 3. SLE

Q. 12 What is the significance of RA factor in synovial fluid?

- It is found in about 60 % patients of Rheumatoid arthritis.

Q. 13 What is the significance of ANA antibodies in synovial fluid ?

- They are found in SLE and Rheumatoid arthritis.

PLEURAL FLUID

Q. 1 What is pleural effusion ?

- Accumulation of fluid in pleura resulting from imbalance of fluid production and resorption
- Also known as serous effusion.

Q. 2 In which tubes pleural fluid is collected ?

- For total differential count : EDTA tube
- For other assessments : Heparinised tubes (To avoid clotting)

Q. 3 In which condition pleural effusion is called transudate ?

- When it is usually bilateral
- Due to increased hydrostatic pressure
- Or due to decreased plasma oncotic pressure
- Eg : Congestive heart failure, Hepatic cirrhosis , Malignancy, Hypoproteinaemia, Nephrotic syndrome.

Q. 4 When is pleural effusion called exudates ?

- Usually unilateral
- Due to localized disorders
- Due to increased vascular permeability
- Or due to decreased lymphatic resorption
- Eg : Infections : Bacterial, viral and tuberculosis
Neoplasms : Bronchogenic Ca, Metastatic Ca, Lymphoma etc.

Q. 5 Enumerate noninfectious inflammatory disease causing pleural effusion ?

- Rheumatoid disease
- SLE (LE cells)

Q.6 Enumerate extrapleural sources of pleural effusion ?

1. Pancreatitis : Increased amylase in effusion fluid
2. Ruptured esophagus : Increased amylase and low pH in effusion fluid
3. Urinothorax : Increased creatinine in effusion fluid

Q. 7 Which criteria is used to differentiate between transudate and exudate ?

- Light's criteria

Q. 8 What is Light's criteria for pleural fluid to be exudate ?

1. Fluid/Serum Protein ratio ≥ 0.5
2. Fluid/Serum LD ratio ≥ 0.6
3. Fluid LD $\geq 1/3^{\text{rd}}$ Upper limit of serum LD
4. Fluid Cholesterol ≥ 45 mg/dl
5. Fluid/Serum cholesterol ratio ≥ 0.3
6. Serum/Fluid Albumin gradient ≤ 1.2 g/dl
7. Fluid/Serum bilirubin ratio ≥ 0.6

Q. 9 What are the characteristics of pleural transudate ?

- Pale yellow to straw colored
- Odorless
- Does not clot

Q. 10 What does bloody pleural effusion indicate ?

- Trauma
- Malignancy
- Pulmonary infarction

Q. 11 How is traumatic tap differentiated ?

- Uneven blood distribution
- Fluid clearing with continued aspiration
- Formation of small blood clots

Q. 12 What is the evidence of hemothorax ?

- Fluid haematocrit greater than 50 % of blood haematocrit.

Q. 13 What are the characteristics of pleural exudates ?

- Variable degrees of cloudiness or turbidity.
- Can clot if not heparinised.

Q. 14 What is the significance of turbidity in pleural effusion ?

- Firstly, specimen is centrifuged
- If supernatant is clear : Turbidity is due to cellular elements or debris
- If supernatant is turbid : Chylous or pseudo-chylous effusion.

Q. 15 What are true chylous effusions ?

1. Produced by leakage from the thoracic duct from obstruction by lymphoma, carcinoma, etc.
2. Creamy top layer of chylomicrons are formed on standing.

Q. 16 What are pseudo chylous or chyloform effusions ?

1. Have milky, greenish or gold paint appearance
2. Accumulate through breakdown of cellular lipids in long standing effusions.

Eg : Rheumatoid pleuritis, Tuberculosis, Myxedema

Q. 17 How will you differentiate between chylous and pseudo chylous effusions?

| | CHYLOUS EFFUSION | PSEUDO CHYLOUS EFFUSION |
|---------------------------------------|---------------------------------|--------------------------------------------|
| 1. Onset | Sudden | Gradual |
| 2. Appearance | Milky white or yellow to bloody | Milky or greenish, metallic sheen |
| 3. Microscopy | Lymphocytes seen | Mixed cellular, cholesterol crystals seen. |
| 4. Triglycerides | ≥ 110 mg/dl | ≤ 50 mg/dl |
| 5. Lipoprotein electrophoresis | Chylomicrons present | Chylomicrons absent |

Q. 18 How is differential count of pleural effusion done ?

1. Stained , air dried Romanowski's stained cytocentrifuged smear.
2. Filtration or automated concentration method by Pap stain.

Q. 19 Which malignancies can be diagnosed by the cytologic study of effusion ?

- Metastatic carcinoma
- Mesothelioma
- Squamous cell carcinoma
- Lymphoma

Q. 20 What is the significance of presence of mesothelial cells in pleural fluid?

- Commonly seen in inflammatory processes .

Q. 21 In which conditions mesothelial cells are seen scarce in effusion ?

- Tuberculosis
- Empyema
- Rheumatoid pleuritis

Due to fibrin deposition and fibrosis occurring in these conditions, mesothelial cells are prevented from exfoliation.

Q. 22 How can lymphoma be differentiated from leukaemia in effusion ?

- Immunophenotyping by flow cytometry
- Immunocytochemistry

Q. 23 In which conditions neutrophils predominate in effusion ?

> 50 % seen in :

- Bacterial Pneumonia
- Pulmonary Infarction
- Pancreatitis

Q. 24 In which conditions lymphocytes predominate in effusion ?

> 50 % seen in :

- Tuberculosis
- Viral Infection
- Malignancy
- SLE

Q. 25 In which conditions, eosinophils predominate in effusion ?

> 10 % seen in :

- Pneumothorax
- Pulmonary Infarction
- Hypersensitivity
- Parasitic infections
- Congestive heart failure

Q. 26 What is the significance of amylase in pleural effusion ?

Indicates the presence of :

- Pancreatitis
- Esophageal rupture
- Malignant effusion

Can be differentiated by salivary, which is often seen in esophageal rupture and malignant effusion but not in pancreatitis.

PERICARDIAL FLUID

Q. 1 What is the significance of LDH and Creatinine Kinase in pericardial fluid ?

- It is more important in post mortem
- If it is more within 48 hours of death, it indicates Acute Myocardial infarction
- Troponin and myoglobin also rise after myocardial infarction.

PERITONEAL FLUID

ASCITES

Q. 1 What is ascites ?

- Pathologic accumulation of excess fluid in peritoneal cavity.
- Normal upto 50 ml
- Produced as an ultrafiltrate of plasma dependent on vascular permeability and hydrostatic and oncotic starling forces.

Q. 2 What are common causes of ascites having transudate ?

- Congestive heart failure.
- Hepatic cirrhosis
- Nephrotic syndrome (Hypoproteinemia)

Q. 3 What are the common causes of ascites with exudate formation ?

1. Primary infection like bacterial peritonitis, tuberculosis etc.
2. Neoplasms like : - Hematoma
Lymphoma
Mesothelioma
Ovarian Carcinoma
Prostatic Carcinoma
3. Trauma
4. Pancreatitis

Q. 4 What are the causes of ascites showing chylous effusion ?

- It is due to the damage to thoracic duct (Eg: Trauma, Lymphoma, Carcinoma, Prostatic infection, etc.)

Q. 5 How will you differentiate blood tinged ascites from traumatic tap ?

- Blood clears with continuous paracentesis
- As little as 15 ml of blood does not allow to read newspaper.

Q. 6 How subacute bacterial peritonitis is differentiated from uncomplicated cirrhosis ?

- In subacute bacterial peritonitis, leucocyte count is more than 500 / ul with more than 50 % neutrophils.

Q. 7 What is the significance of eosinophilia in ascites ?

- It is mostly inflammatory process associated with chronic peritoneal dialysis.
- Also seen in Congestive heart failure, lymphoma and vasculitis.

Q. 8 What is the significance of protein in ascitic fluid ?

- In bacterial peritonitis : Low protein
High Serum Albumin

Helps in differentiating from Cirrhosis.

Q.9 In which condition low glucose levels are seen in ascitic fluid ?

- Tuberculosis

Q. 10 What is the significance of different enzymes in ascitic fluid ?

1. Increased Amylase :- Acute Pancreatitis
Abdominal trauma
2. Increased Alkaline phosphatase :- Differentiating primary from secondary
bacterial peritonitis.
3. Increased LDH : Malignancy
Differentiating Cirrhosis from Hepatocarcinoma
4. Increased Adenosine Deaminase : Tuberculosis