

Urine

A) Proteins:

- **Glomerular proteinuria:** ↑ glomerular permeability → filtration of high molecular weight proteins (e.g. glomerulonephritis).
- **Tubular proteinuria:** ↓ tubular reabsorption with normal glomerular permeability → excretion of low molecular weight proteins (e.g. chronic nephritis)

1 - Prerenal proteinuria: Bence - Jones protein:
This abnormal gamma globulin (light chains only) is synthesized by malignant plasma cells (*Multiple myeloma*).
It precipitates at 60°C, redissolves at 100°C and reprecipitates on cooling.

3 - Postrenal proteinuria: is due to:
Lower urinary tract inflammation, tumors or stones

2 - Renal proteinuria: due to :

- Glomerular proteinuria : Glomerulo-nephritis
- Tubular proteinuria: Nephritis, nephrotic syndrome
- After prolonged standing (Orthostatic proteinuria)
- Microalbuminuria:
- small amounts of albumin in the urine (20 – 200 mg/L) needs special tests for detection.
- It is an early indicator of glomerular affection due to uncontrolled DM or hypertension.

B) Glycosuria:

1 - Glucosuria: (Presence of detectable amount of glucose in urine)

- Uncontrolled DM :The concentration of glucose in the plasma exceeds the renal threshold.
- Renal glucosuria : Normal plasma glucose concentration with proximal tubular malfunction → ↓ renal threshold (Gestational Diabetes & Fanconi's syndrome).

2 - Fructosuria: (Presence of fructose in urine)

- Alimentary causes : ↑↑ fructose intake
- Metabolic : ↓↓ fructokinase or aldolase B in the liver.

3 - Galactosuria: (Presence of galactose in urine)

- Alimentary: ↑↑ galactose intake
- Metabolic: ↓↓ galactokinase or galactose
- l-phosphate uridyl transferase in the liver.

C) Ketonuria :

- 1 - Diabetic ketoacidosis
- 2 - Glycogen storage disease
- 3 - Starvation
- 4 - Prolonged vomiting
- 5 - Unbalanced diet: high fat & Low CHO diet

D) Nitrite :

Positive nitrite test is significant of bacteria in urine.

- Chief **inorganic** solids:
- ✓ Sodium
- ✓ Potassium
- ✓ Chlorides
- ✓ Small amounts of Ca, Mg, S & phosphates
- ✓ Traces of Fe, Cu, Zn and I₂

- Chief **organic** solids:
- ✓ Non protein nitrogen (NPN) compounds
- ✓ Organic acids
- ✓ Sugars
- ✓ Traces of proteins, vitamins, hormones and

E) Choloria :

(Presence of bile in urine):

- 1 - Bilirubin / Bile salts :** in cases of
 - Hepatocellular damage.
 - Obstruction of bile ducts either extrahepatic (stone) or intrahepatic (hepatic tumors)
- 2 - Urobilinogen:**
 - Normally present in trace amounts in urine
 - Marked ↑↑ in:
 - hemolytic anemia
 - hepatocellular damage

F) Blood

II - Hemoglobinuria: (Presence of hemolysed blood in urine)

- a - Hemoglobinopathies (Sickle cell anemia & Thal)
- b - Malaria (P. falciparum)
- c - Transfusion reaction (BI. Incompatibility)

I - Hematuria: (Presence of detectable amount of blood in urine)

- a - Acute & chronic glomerulonephritis
- b - Local disorders of kidney & genito-urinary tract (Trauma , cystitis , renal calculi and tumors).
- c - Bleeding disorders (Hemophilia).