

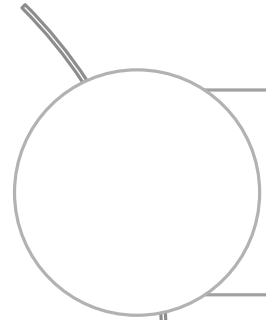
Urinalysis (UA)

Part 2

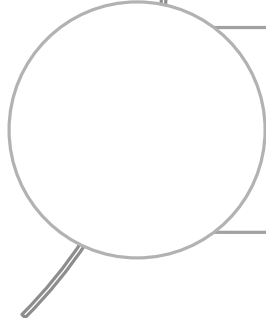
By Dr. Yasmine Sami

Medical biochemistry 2022-2023

Intended learning outcomes



Describe urine examinations



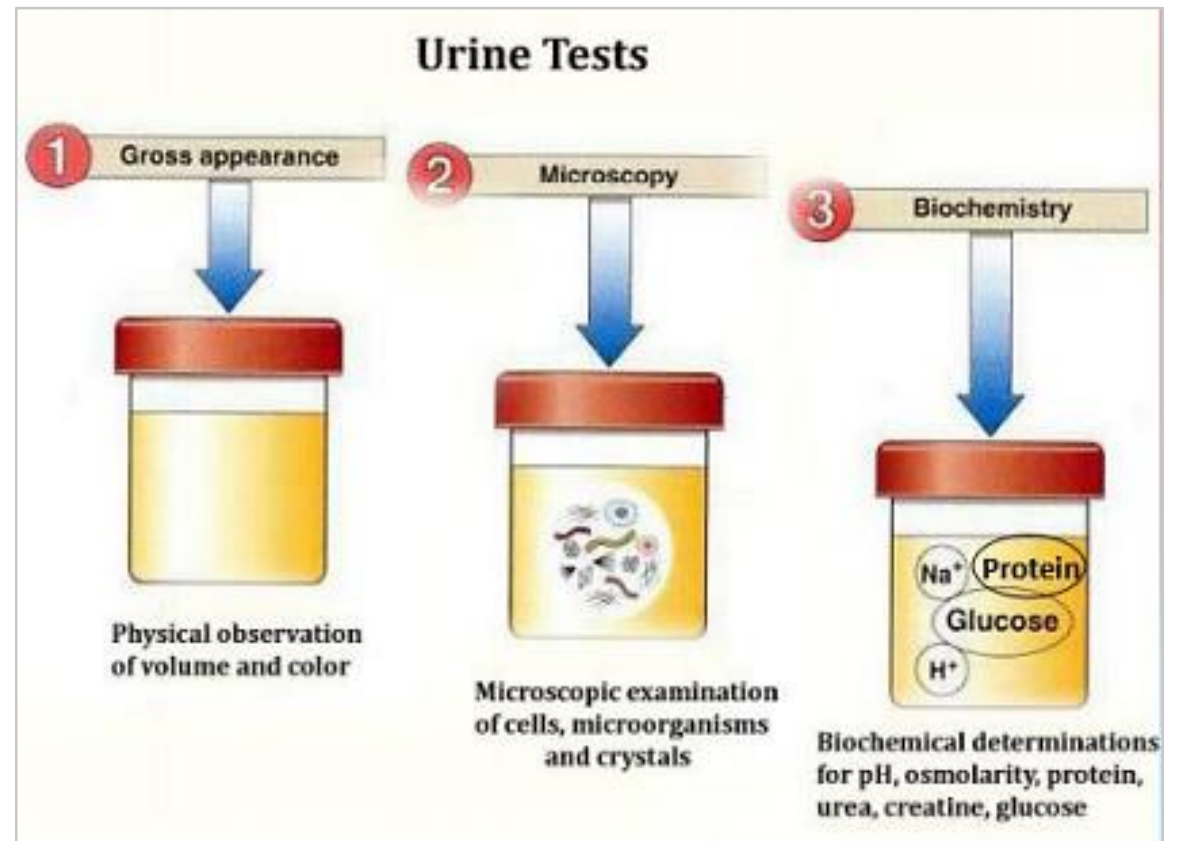
Describe Changes that occur when standing urine at room temperature

Urine analysis (General Urine Examination)

Urinalysis consists of the following

measurements:

- Physical examination
- Chemical examination
- Microscopic examination
- Miscellaneous elements



Microscopic examination

- Qualitative technique
- Urine must be freshly voided
- Examined without excessive delay in order to prevent cellular degeneration



Microscopic examination

- **Well mix sample of urine (10 -15ml) is centrifuged for 5mins at 1500 rpm**
- **The top part (supernatant) is discarded. A drop of urine left at the bottom of test tube (sediment) is placed on the glass slide and covered with cover slip, it is examined under high power**

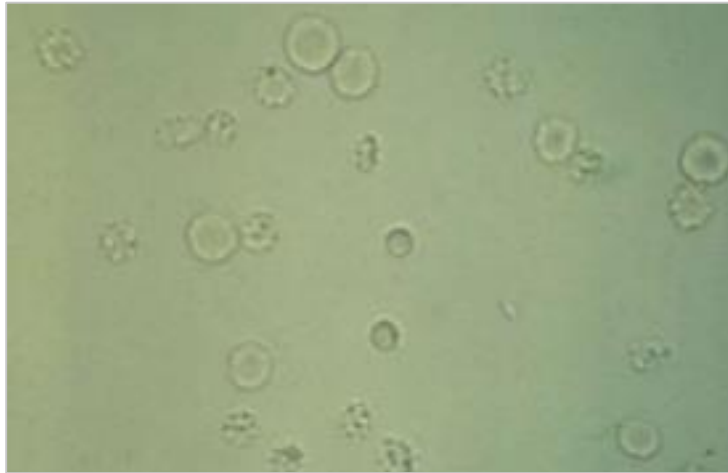
Microscopic examination

We should look for the following:

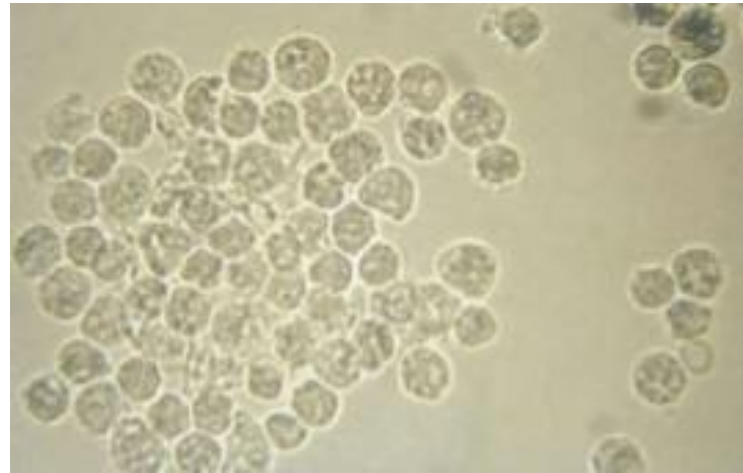
a. Cells:

- 1. RBCs: normal up to 2 cells, seen in haematuria**
- 2. WBCs: normal pus cells usually < 5 cells**
- 3. Epithelial cell: Urothelial transition cells could be flat, cuboidal or columnar and indicate UTI or tumor if present in large numbers.**

Microscopic examination



Red blood cells



white blood cells



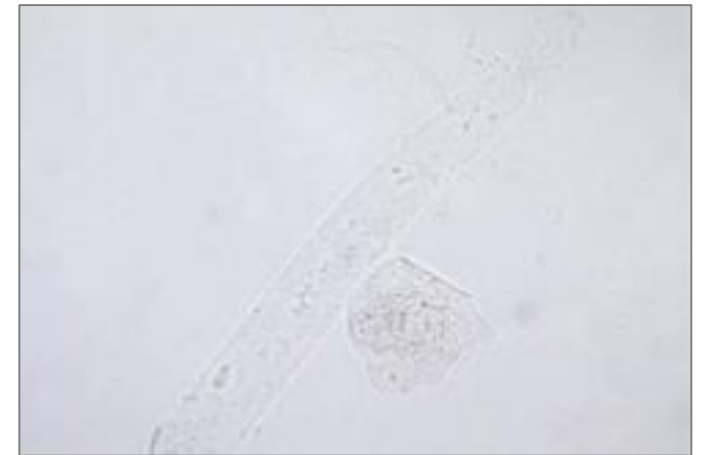
Epithelial cells

Microscopic examination

b. Casts: precipitated formed elements, they occur whenever there is urinary stasis in renal failure, ↑ **urine salts**, or ↑ **protein**.

The main type are:

1. Hyaline: these are clear, gelatinous and with no cellular elements. They indicate glomerular leakage of protein



Microscopic examination

2. Granular: formed by degeneration of epithelial cells' inclusion granules



3. Cellular: always pathological.

- i. RBC** or erythrocytic casts are considered diagnostic of glomerular disease causing haematuria
- ii. WBC** or leukocytic casts they are diagnostic of inflammation of the nephron

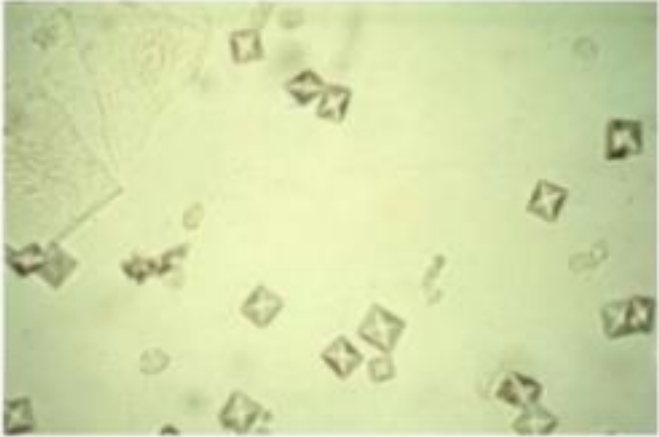
Microscopic examination

c. Crystals:

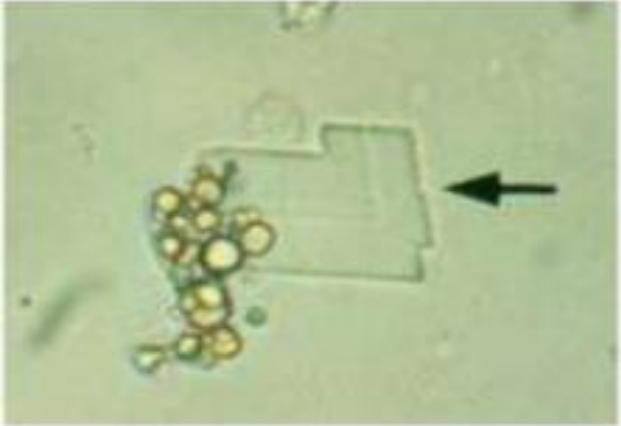
1. Acidic environment:

- Calcium oxalate crystals: normal colorless, envelope shaped.
- Amorphous urate crystals
- Uric acid crystals
- Cholesterol crystals: seen in nephrotic syndrome and always considered abnormal
- Cystine crystals: are highly pathologic seen in cystinuria and cause renal stones

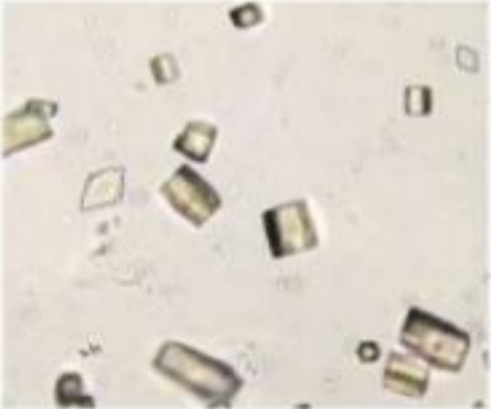
Microscopic examination



Calcium oxalate



Cholesterol



Uric acid

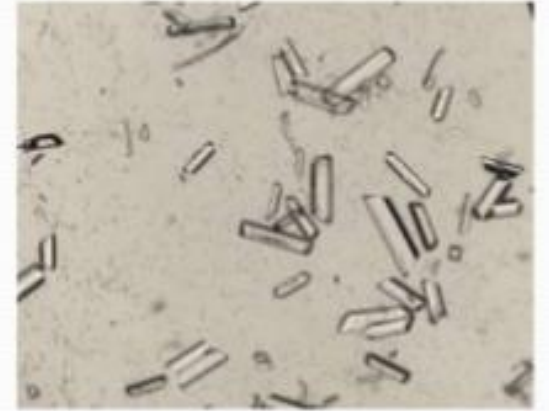


Cysteine

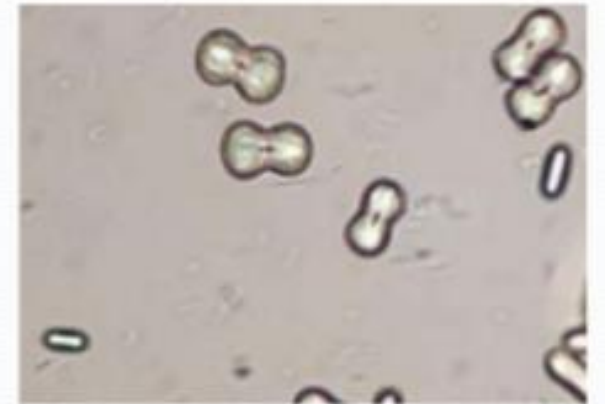
Microscopic examination

2. Alkaline environment:

- Amorphous phosphate crystals: normal colorless masses
- Calcium carbonate crystals: normal colorless spheres
- Triple phosphate crystals: colorless prisms, lead to serious complications, especially stagehorn stone formation



Triple phosphate



Calcium carbonate

Miscellaneous elements

- **Bacteria: bacteruria indicate UTI**
- **Asymptomatic bacteruria occur in DM and pregnancy**
- **Pinworms present in urine indicate fecal contamination of the sample**
- **Sperms in male indicate prostatic disorder**
- **C and S culture and sensitivity, it is sometimes done in UTI to diagnose the offending organism and choosing the most appropriate antibiotic for treatment**

Changing which occur in standing urine at room temperature

- 1. Increase in pH due to production of ammonia from urea by urease- producing bacteria.**
- 2. Formation of crystals due to precipitation of phosphates and calcium**
- 3. Loss of ketone bodies, since they are volatile.**
- 4. Decrease in glucose due to glycolysis and utilization of glucose by cells and bacteria.**

Changing which occur in standing urine at room temperature

5. Oxidation of bilirubin to biliverdin causing false negative test for bilirubin

6. Oxidation of urobilinogen to urobilin causing false negative test for urobilinogen

7. Bacterial proliferation

8. Disintegration of cellular elements, especially in alkaline and hypotonic urine.

THANK YOU !

ANY QUESTIONS ??

PLEASE ASK