COMPARISONS BETWEEN CLASSIC METHOD AND REAGENT STRIPS FOR URINE ANALYSIS

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Macroscopic urinalysis

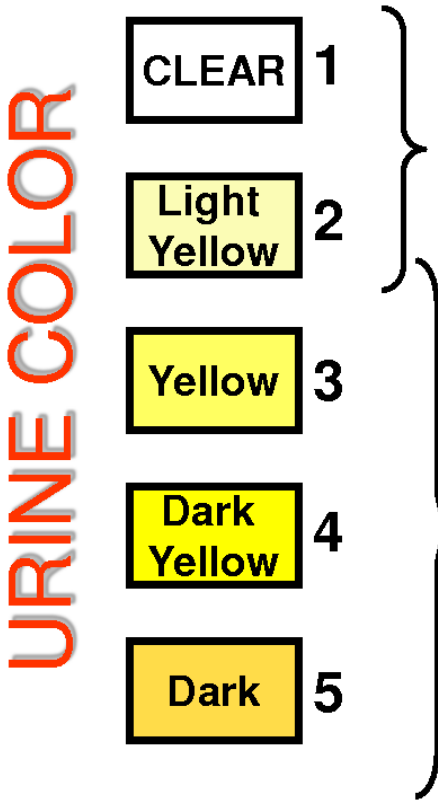
Is the direct visual observation of the urine, noting its volume, color, clarity or cloudiness, etc

Normal urine is typically **pale yellow** and **clear** . Obvious abnormalities in the color, clarity, and cloudiness may suggest different diseases.

Normal Urine

Abnormal Urine

HYDRATION ANALYSIS CHART



- The aim is to produce urine clear or light yellow on the Urine Color Chart.
- Consume 1 bottle (1.5 quarts) per hour or 8-12 quarts per day (8 quarts on a light PT day and 12 for a heavy PT day.
- Continue current level of water intake if urine is clear or light yellow.

NOTE: Desire to urinate less than twice per day and/ or producing urine darker than yellow color # 3 in the chart may indicate dehydration; the individual must start drinking immediately.

- Urine dark yellow color # 4 consume 1 bottle over 15 minutes and continue until urine color is yellow or lighter.
- Urine dark color # 5 or darker consume 2-3 bottles over 30 to 60 minutes and continue until urine color is yellow or lighter.
- Seek medical attention if heat injury symptoms are apparent or urine color does not change after adequate hydration.

Urine test	Normal Levels	Indicators
Leukocytes	Negative-trace 0-10 lev/vl	>Trace may indicate UTI
Nitrite	Negative - 0	Positive indicates significant infection
Uro-Bilirubin	0.2-1.0 mg/dl	>2.0 mg/dl may indicate liver issues
Protein	Negative - 0	>Trace may indicate kidney disfunction
pH	Optimal 7.0-7.5	(normal for **BLOOD** is 7.41)
Blood	0 - trace	>Trace may indicate any of several issues
Specific Gravity	1.016-1.022	Higher values may indicate dehydration
Extreme high/low values not related to fluid intake may indicate more serious condition		
Ketone	Negative - 0	>Trace ketones may indicate fat metabolisis or diabetes
Bilirubin	Negative - 0	* Trace or more indicates liver and/or gallbladder issues
Glucose	0-15 mg/dl	>15mg/dl may indicate kidney issues (or pregnancy) Glucose spike immediately after large meal is normal

* Drugs that may INCREASE bilirubin: Allopurinol, Barbiturates, Birth control pills, Chlorpromazine, Diuretics, Isoniazid, Phenazopyridine, Steroids, Sulfonamides

Drugs that may DECREASE bilirubin: Indomethacin and ascorbic acid (Vitamin C)

Dipstick chemical analysis

- Urine dipstick is a narrow plastic strip which has several squares of different colors attached to it.
- Each small square represents a component of the test used to interpret urinalysis.
- Colors generated by each pad are visually compared against a range of colors on brand-specific color charts
- The entire strip is dipped in the urine sample and color changes in each square are noted.

The squares on the dipstick represent the following components in the urine

Glucose

Bilirubin

Ketones

Specific Gravity

Blood

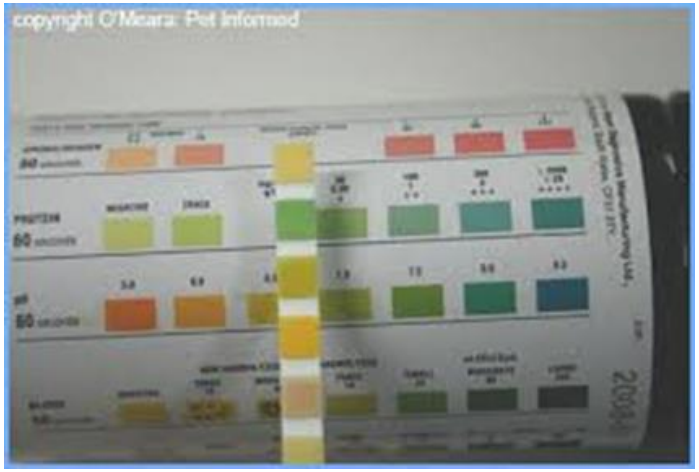
pH

Protein

Urobilinogen

Nitrite

Leukocyte Esterase



Nitrite (suggestive of bacteria in urine)
Bilirubin (possible liver disease or red blood cell break down)
Urobilinogen (possible liver disease)

URS–4SG

Reagent Strips for Urinalysis

For Professional Use Only

Anti-VC interference ability

APPLICATION:

For medical organization testing and analyzing the urine specimen

IMPORTANT:

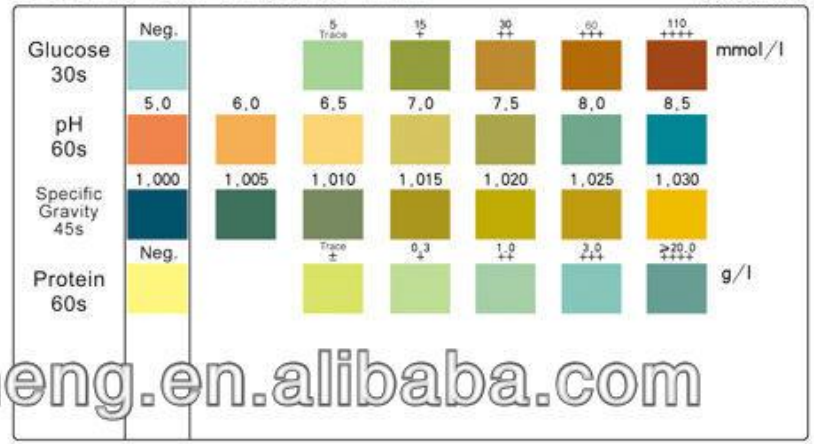
Keep away from light and moisture.
Promptly replace cap after taking out strips.
Do not remove desiccants.
Do not touch test areas of reagent strips.
Use it within the expiration date.
Read insert carefully before use.

LOT

100 Strips

TESTING AND READING TIME

Rev.08/2010



2

IVD

+2°C +30°C

MICROSCOPIC URINALYSIS

MICROSCOPIC URINALYSIS

Microscopic examination used to view elements that are not visible without microscope. e.g cells

1. Red Blood Cells:

Hematuria is the presence of abnormal numbers of red cells in urine due to:

a. Glomerular damage

b. Tumors

c. Urinary tract stones

d. Upper and lower urinary tract infections

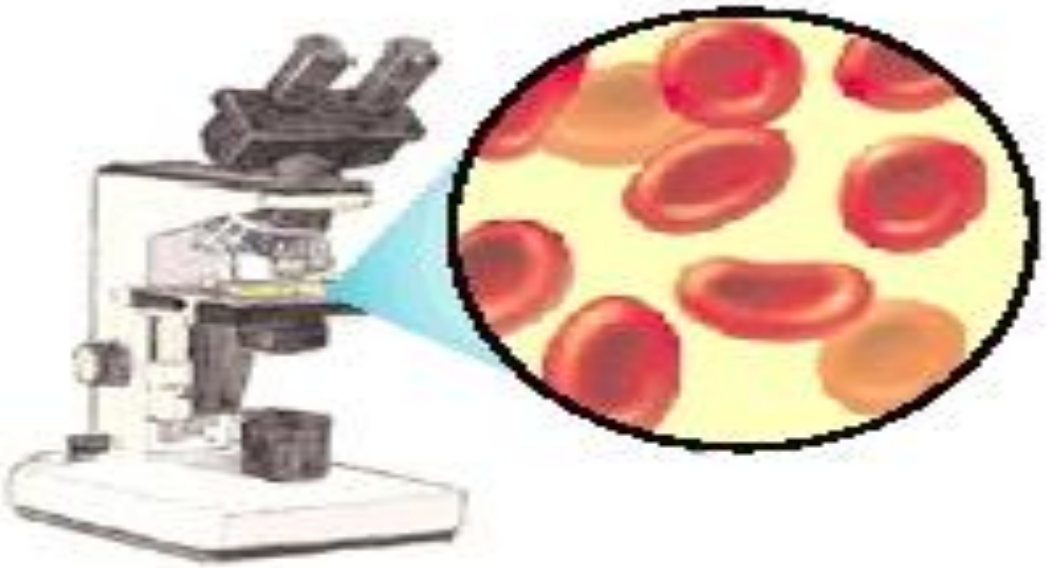
Hematuria

Two Types of Hematuria

- Gross hematuria means that the blood can be seen by the naked eye. The urine may look pinkish, brownish, or bright red.

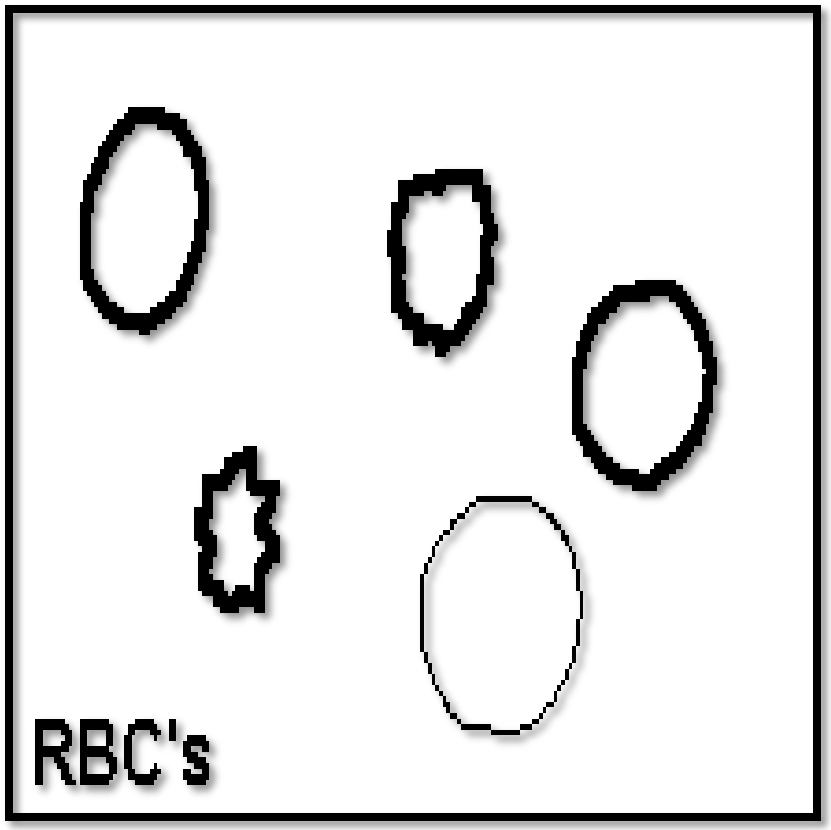
- Microscopic hematuria means that the urine is clear, but blood cells can be seen under a microscope.

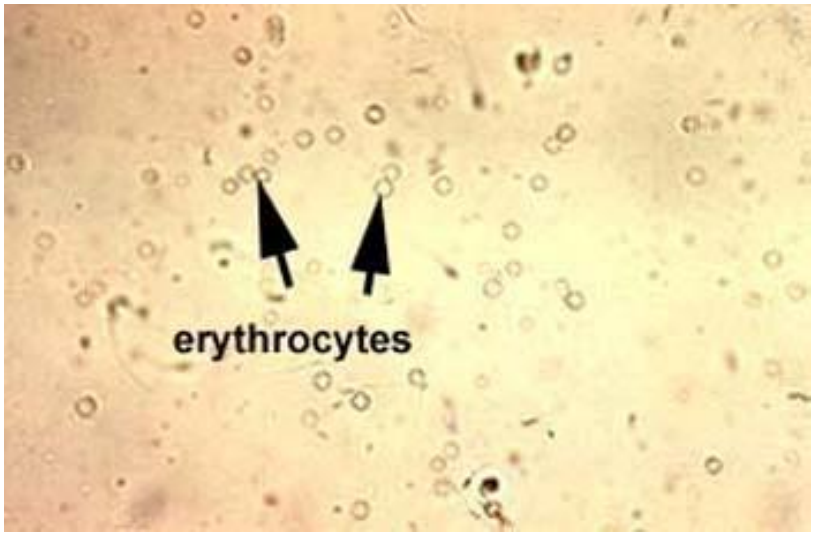
Gross hematuria means blood can be seen in the urine.



Microscopic hematuria means blood can be seen only with a microscope.

RBC's may appear normally shaped, swollen by diluted urine.



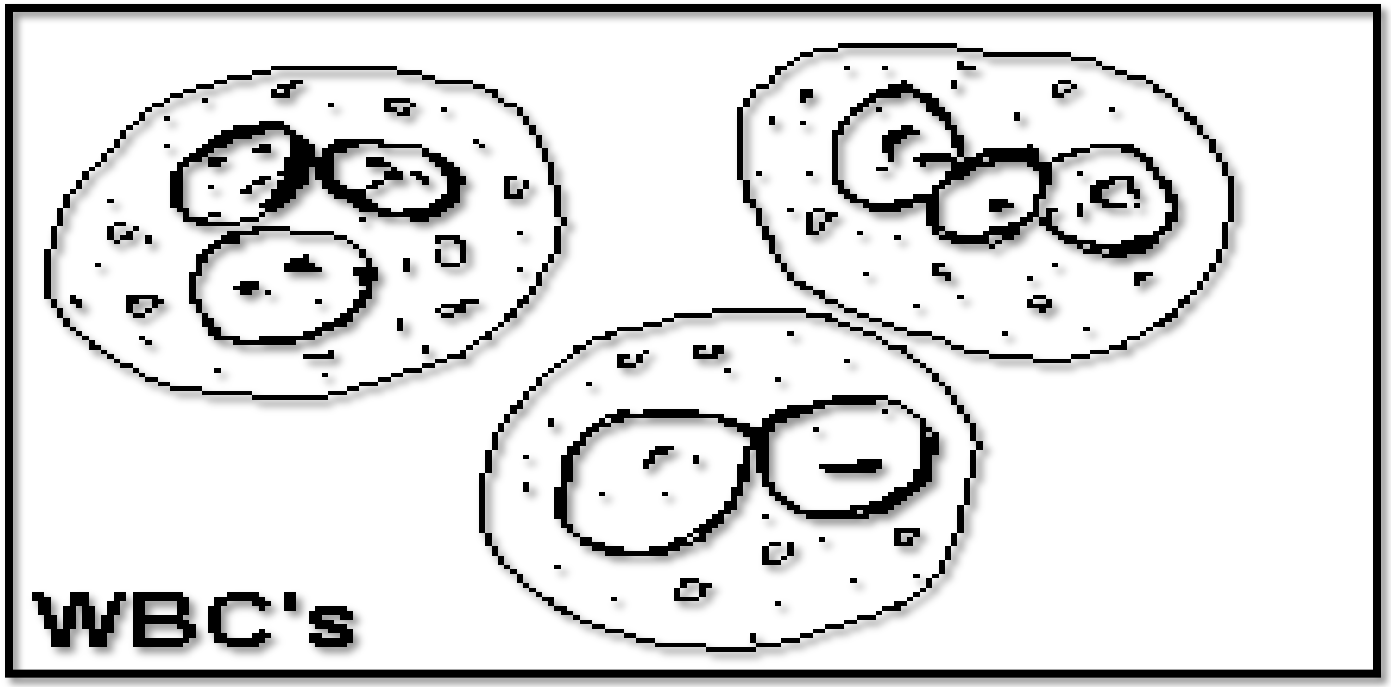


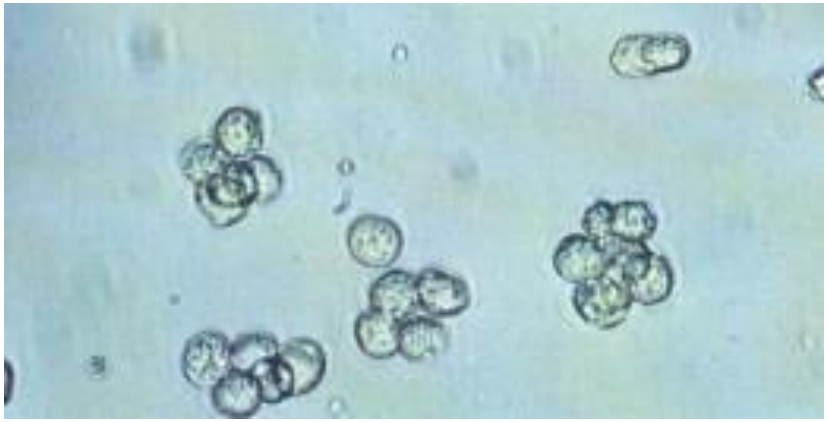
2.White Blood Cells

Pyuria refers to the presence of abnormal numbers of leukocytes that may appear with infection in either the upper or lower urinary tract or with acute glomerulonephritis.

Usually, the WBC's are granulocytes

WBCs - ≤2-5 WBCs/hpf

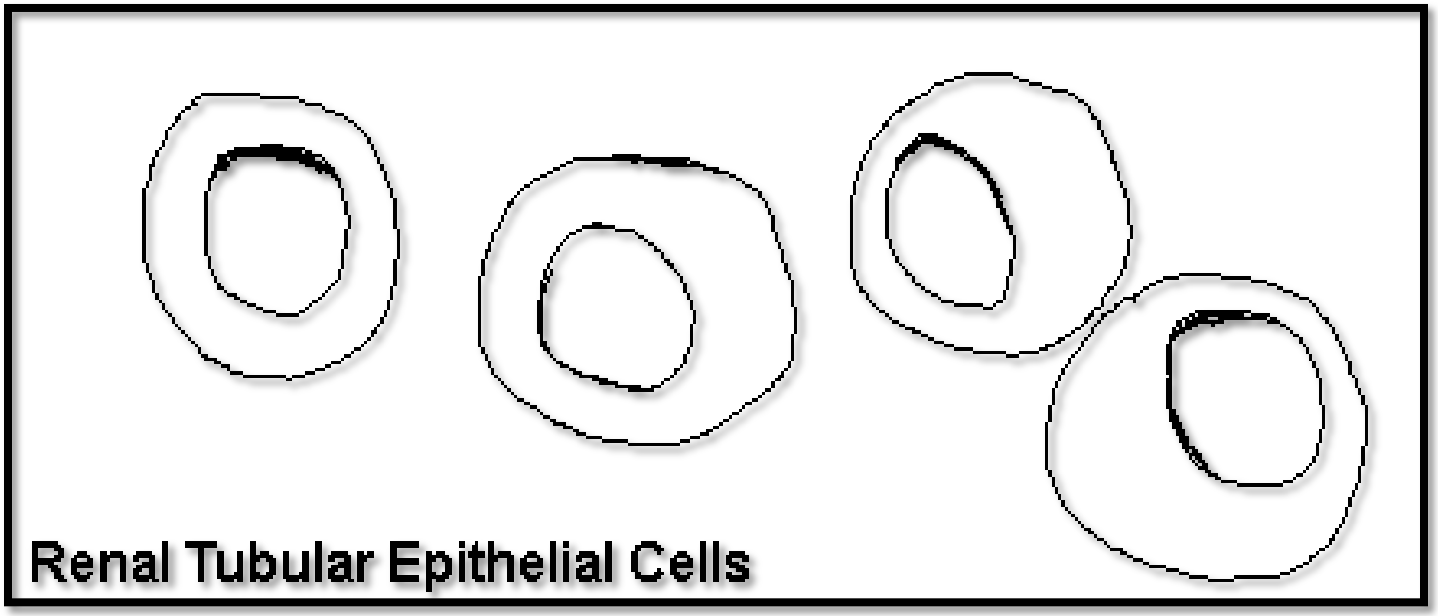

WBC's

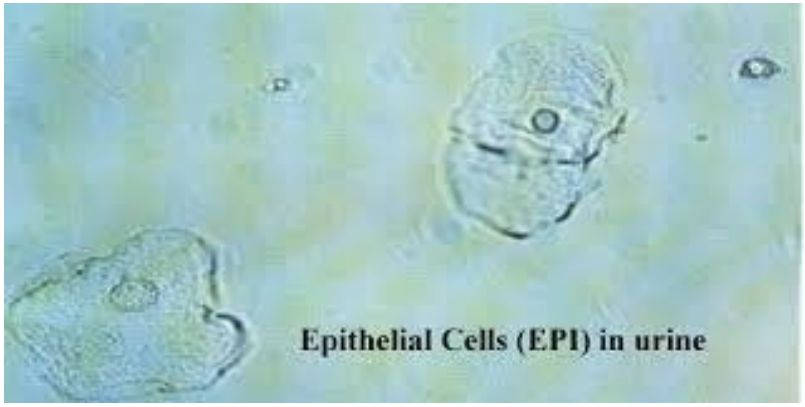


3. Epithelial Cells

- Renal tubular epithelial cells, contain a large round or oval nucleus and normally slough into the urine in small numbers. However, with nephrotic syndrome and in conditions leading to tubular degeneration, the number sloughed is increased.

- ≤15-20 squamous epithelial cells/hpf

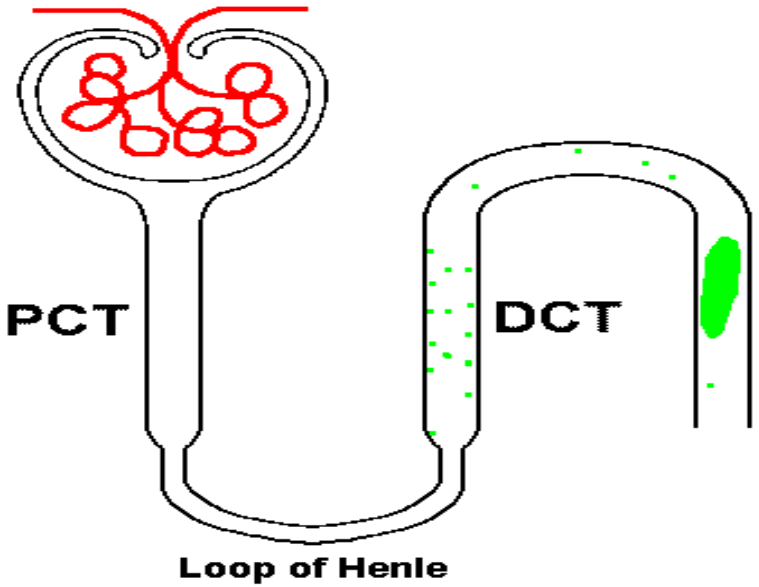

Renal Tubular Epithelial Cells


Epithelial Cells (EPI) in urine

4. Casts

- Urinary casts are cylindrical structures produced by the kidney and present in the urine in certain disease states.
- They are formed in the distal convoluted tubule (DCT) and collecting ducts of nephrons, then dislodge and pass into the urine, where they can detected by microscopy.

-Urinary casts may be made up of cells (such as white blood cells, red blood cells, kidney cells) or substances such as protein.


PCT
DCT
Loop of Henle

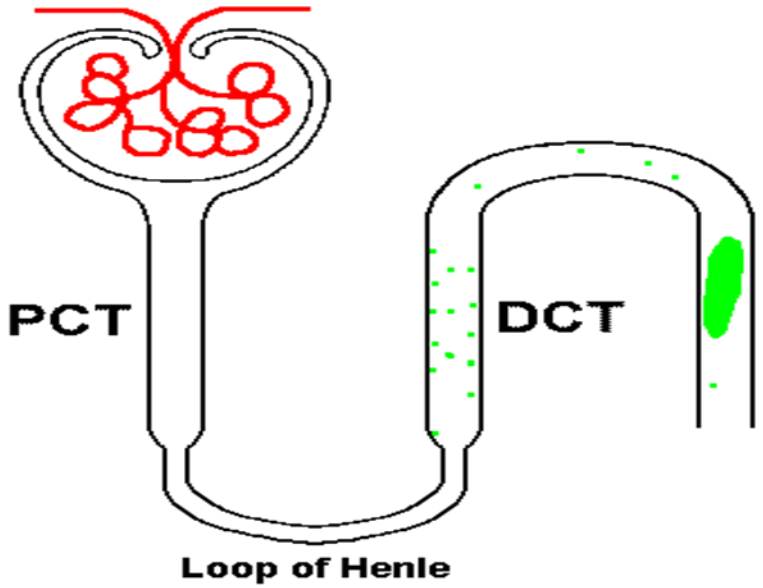
The factors which favor protein cast formation

1. low flow rate of the filtrate
2. high salt concentration
3. low pH

all of which favor protein denaturation and precipitation, particularly that of the **Tamm-Horsfall protein.**

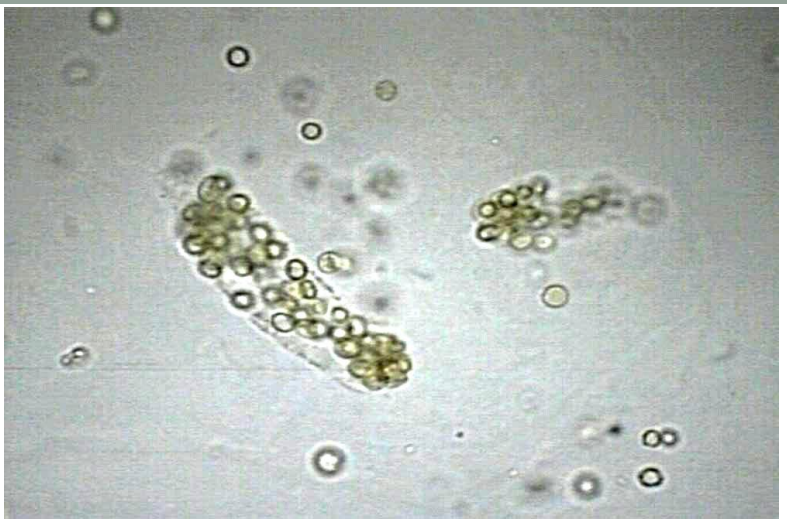
Protein casts with long, thin tails formed at the junction of Henle's loop and the distal convoluted tubule are called **cylindroids**. Hyaline casts **(Tamm-Horsfall proteins)** can be seen even in healthy people.

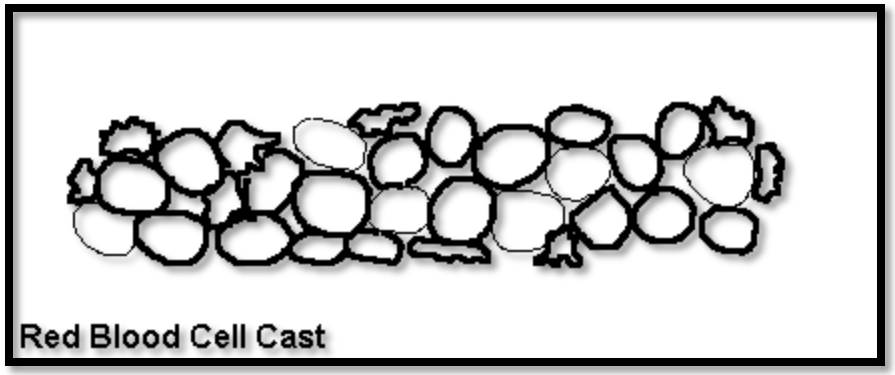
Hyaline casts are composed primarily of a mucoprotein (***Tamm-Horsfall proteins***) secreted by tubule cells. The Tamm-Horsfall protein secretion (green dots) is illustrated in the diagram below, forming a hyaline cast in the collecting duct

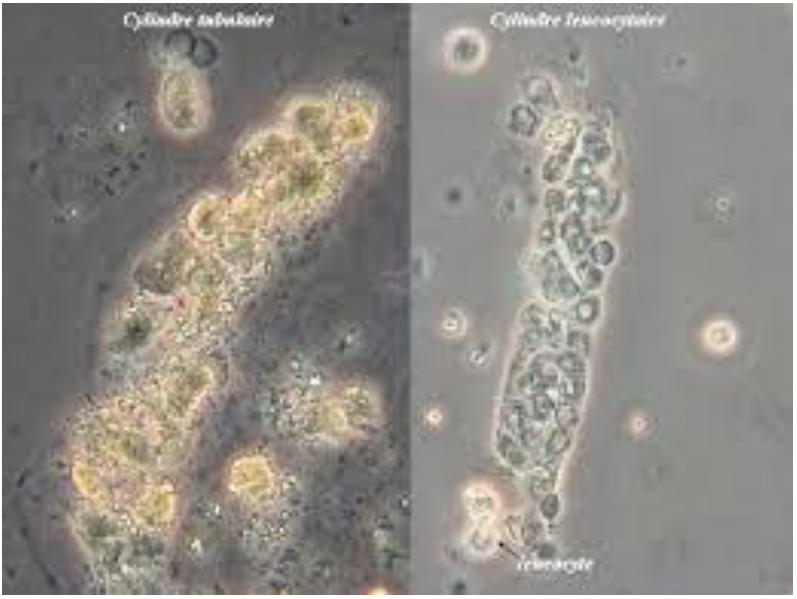


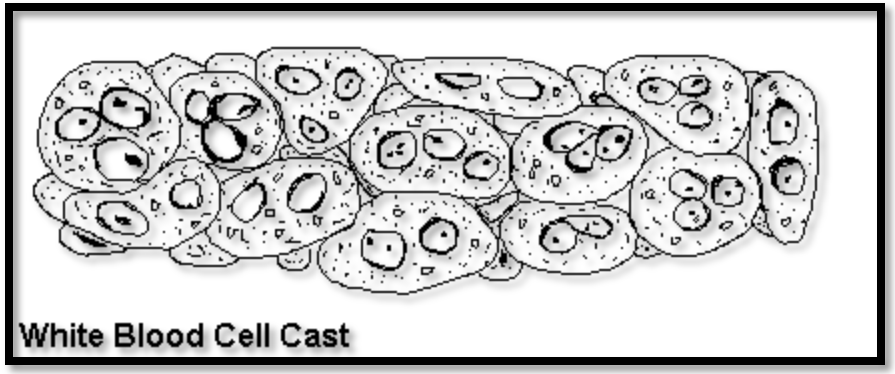
Red blood cells may stick together and form red blood cell casts. Such casts are indicative of ***glomerulonephritis***, with leakage of RBC's from glomeruli

White blood cell casts may also be present with ***glomerulonephritis***. Their presence indicates inflammation of the kidney, because such casts will not form except in the kidney.

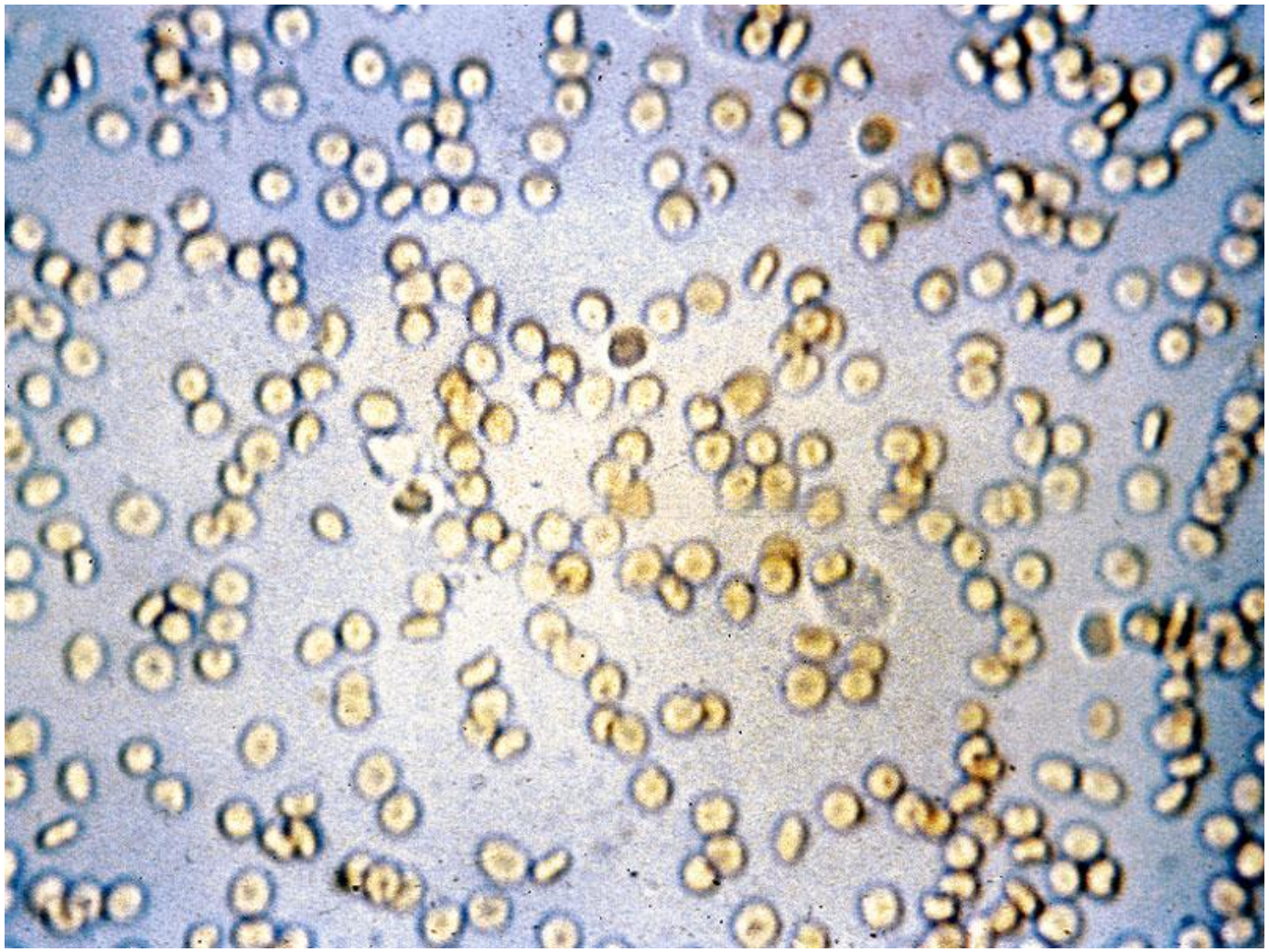



Red Blood Cell Cast

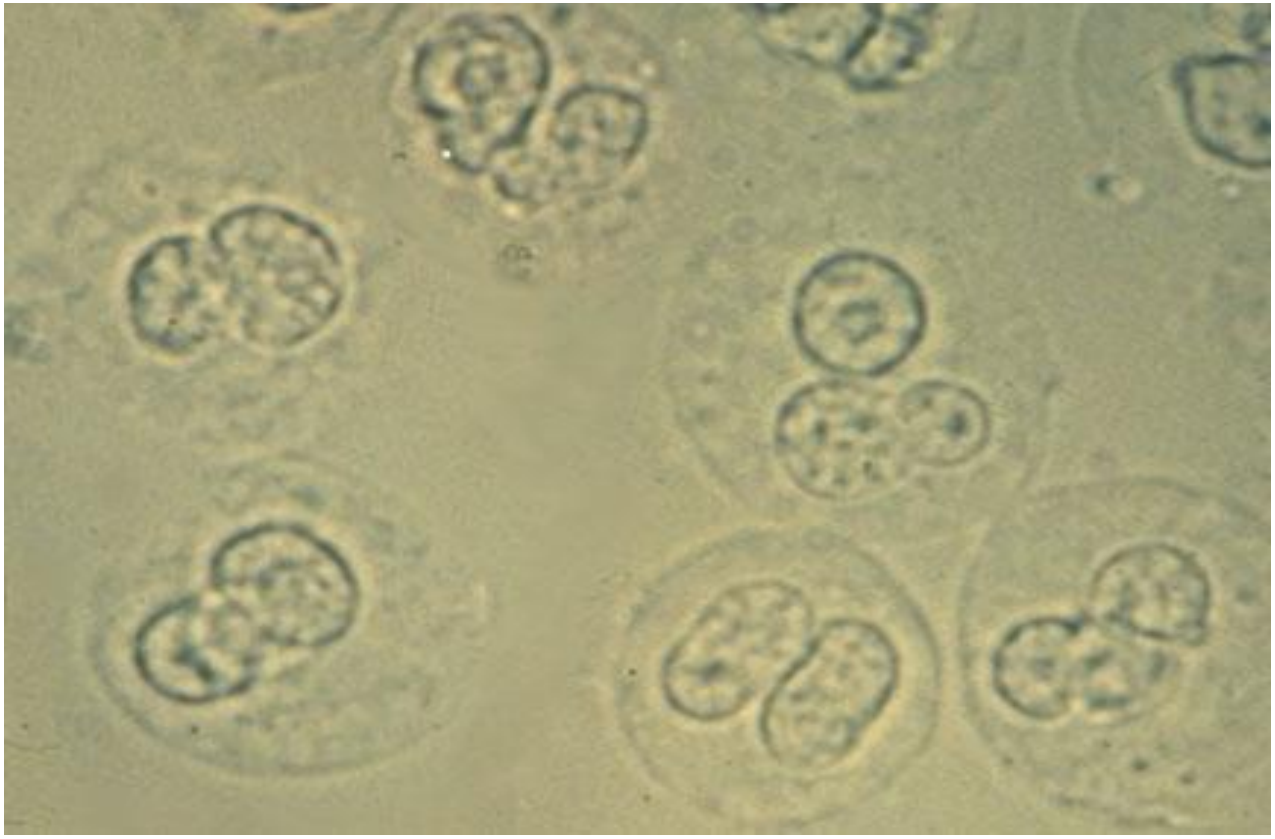

Cylindre tubulaire
Cylindre leucocytaire

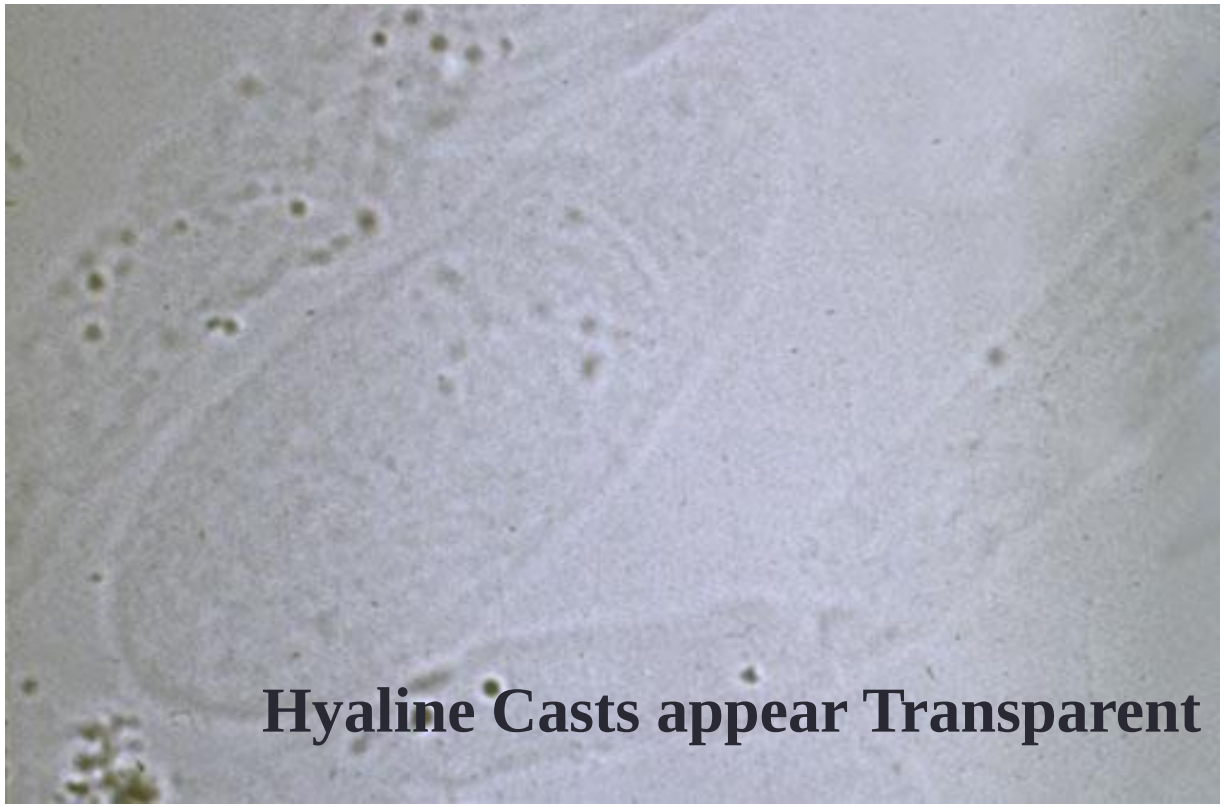

White Blood Cell Cast

RBCs

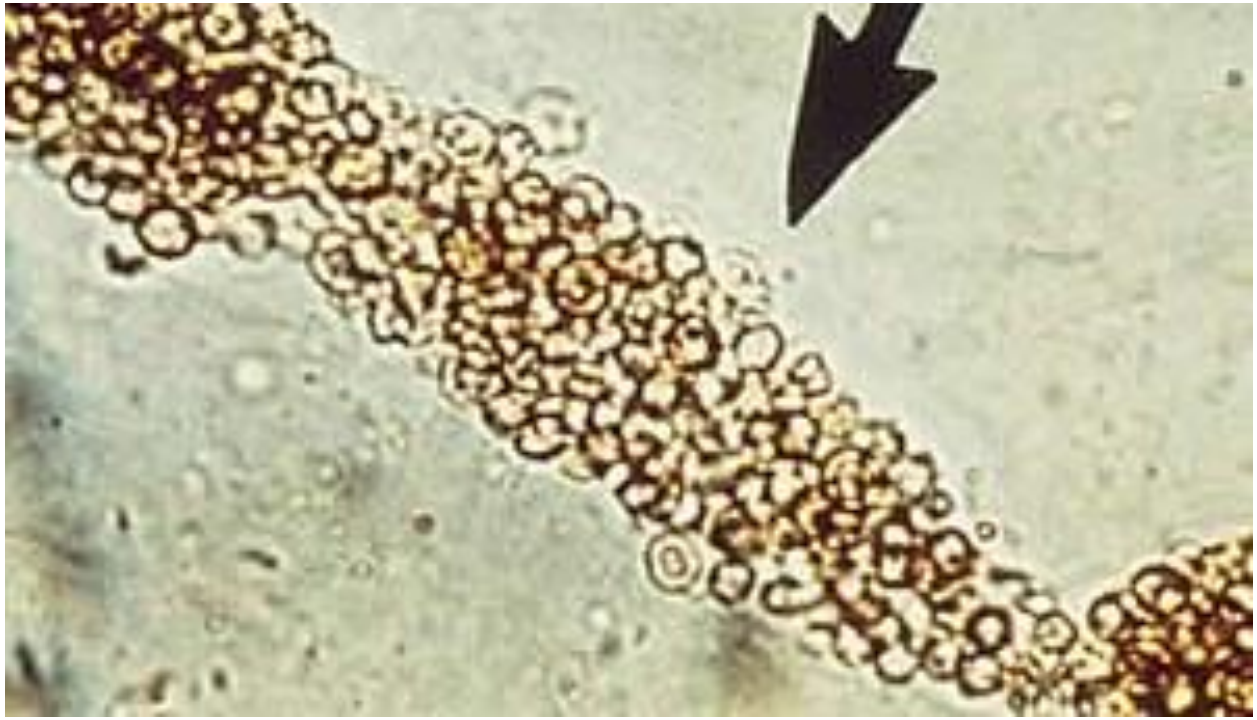


WBCs




Hyaline Casts appear Transparent

Red Cell Casts

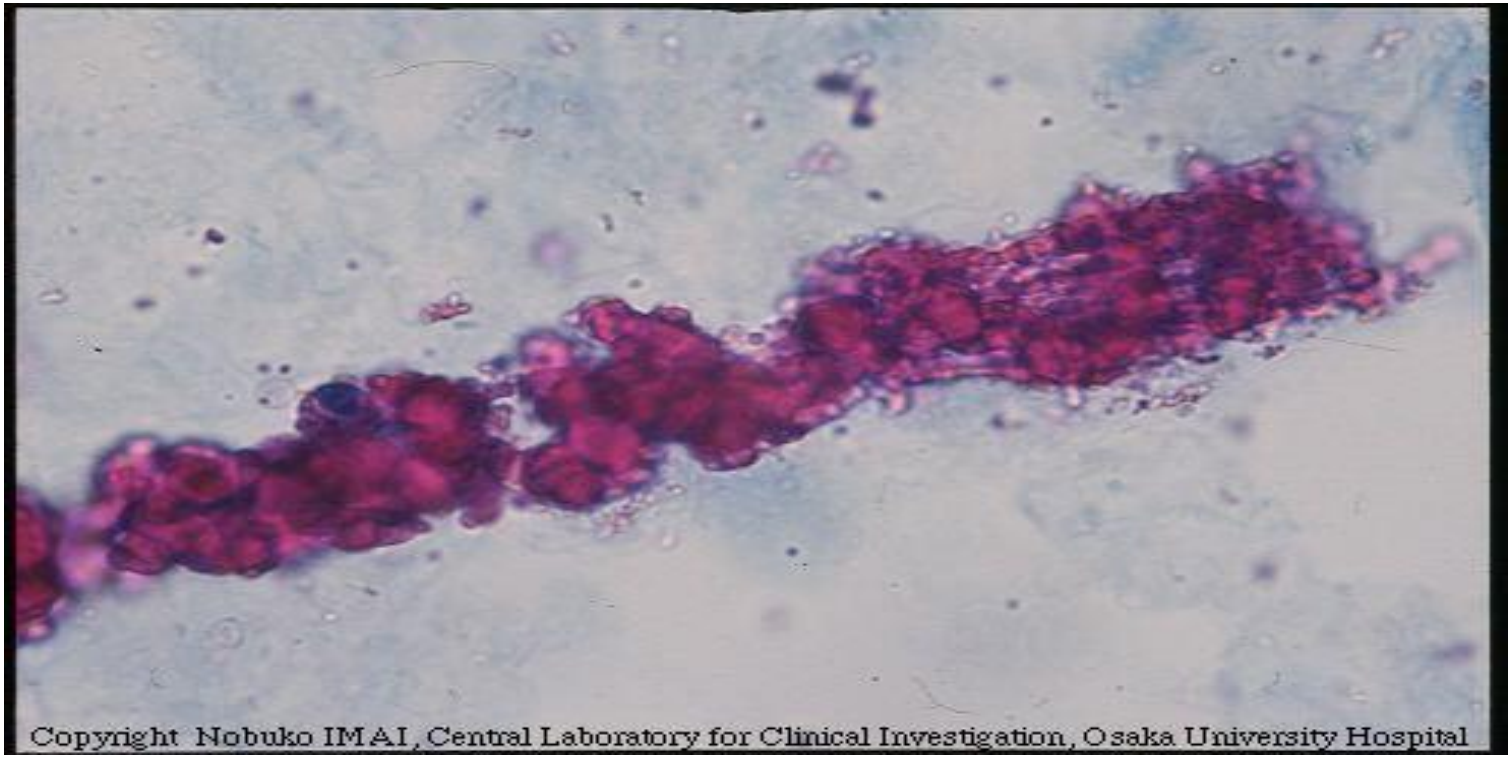


White Cell Casts

Bence Jones proteins

Bence Jones proteins are small proteins found in the urine. Testing for these proteins is done to diagnose and monitor ***multiple myeloma*** and other similar diseases. Bence Jones proteins are considered the **first tumor marker.**

A **tumor marker** is a substance, made by the body, that is linked to a certain cancer, or malignancy. Bence Jones proteins are made by plasma cells, a type of white blood cell. The presence of these proteins in a person's urine is associated with a malignancy of plasma cells.



Bence Jones protein cast (myeloma cast) from the urinary sediment of a patient with lambda-Bence Jones type multiple myeloma. Sternheimer stein, X200

https://www.youtube.com/watch?v=M9Zc4G5EHPA

Pregnancy tests

- It detects a hormone in the body called human choronic gonadotropin (hCG).
- hCG is a hormone produced during pregnancy. It appears in the blood and urine of pregnant women as early as 10 days after conception
- hCG is released into the body by the placenta when a woman is pregnant.

- The urine hCG test is usually performed by placing drops of urine on a prepared chemical strip. It takes 1-2 min. for a result.