

10 practical
5 theoretical

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1 for practical work

Report :

Student name – title – objective – principle – material and method –
result – discussion – Question

*** Final : Tue . 20-2-1434**

24 -12 -2013

Experiment 1

Physical properties and detection of normal
constituents of urine

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Objectives:

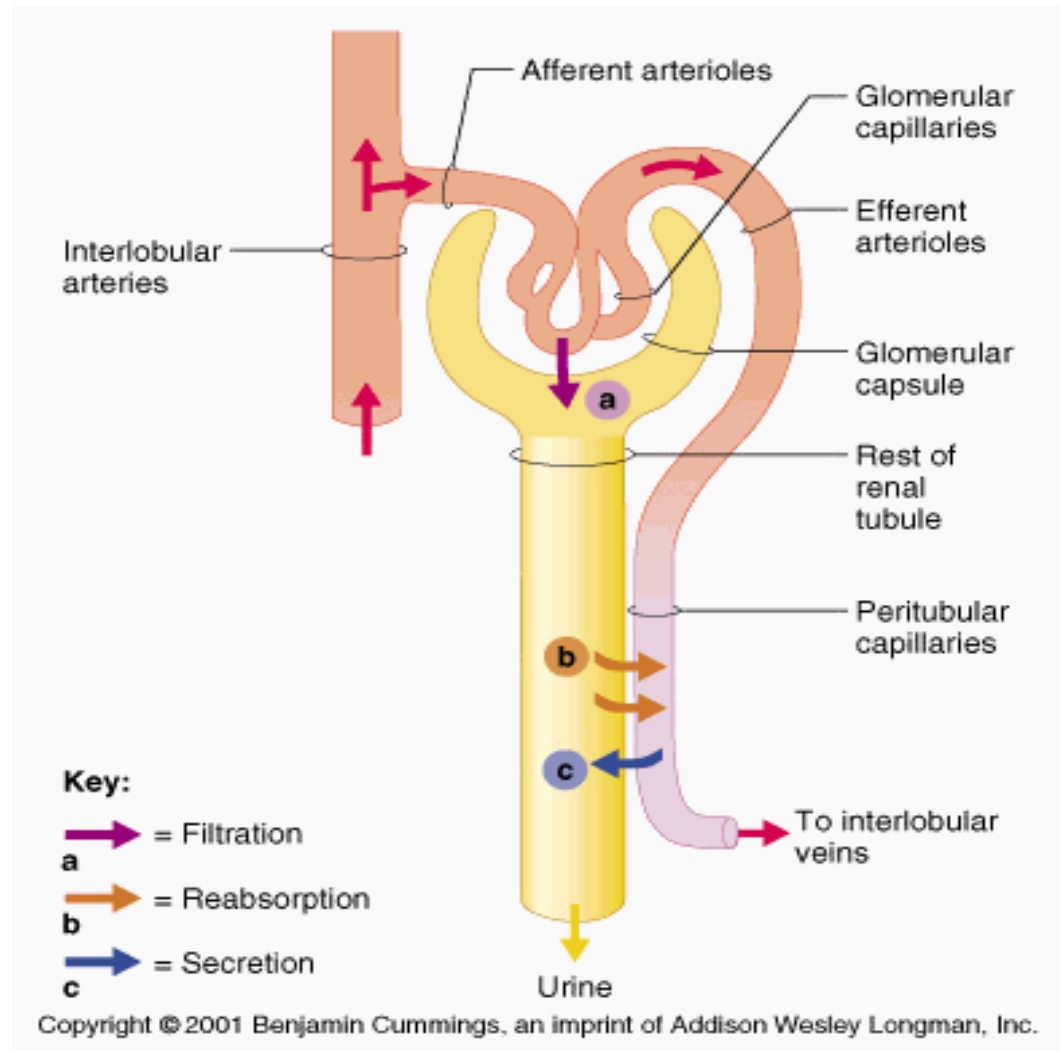
- 1- The simple examination of urine.
- 2- To detect some of the normal organic constituents of urine.(Qualitative)
- 3- To detect some of the normal inorganic ions present in urine. .(Qualitative)

Note:

All the examination **in 24 hour collection of urine**

Urine formation:

In a healthy adult about 1200 ml of blood pass through nephrons (functioning renal excretory tissue) every minute, and about 125ml of glomerular filtrate is formed. (125 is filtration and it called glomerular filtrate) **That indicate for high filtration of nephrons .



Urine formation:

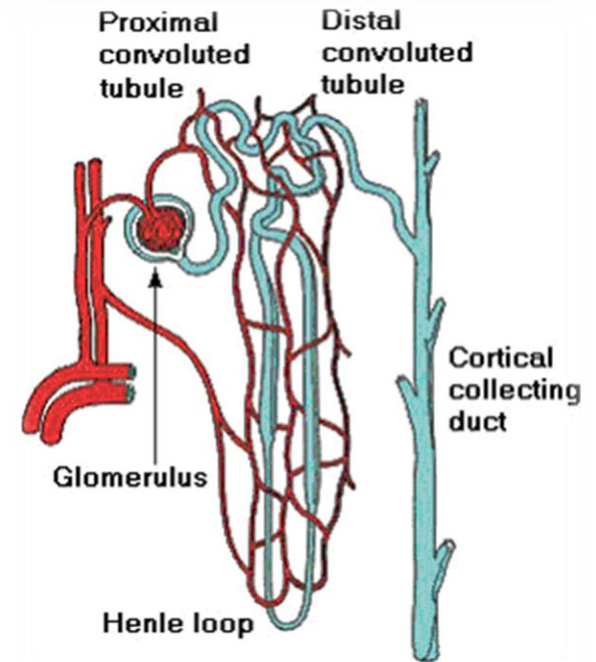
the concentration of substance which present in filtrate depend on the molecular weight:

- substance that has molecular weight less than about 70,000 are present in the glomerular filtrate at about the same concentration as in the plasma

substance that has molecular weight than about 70,000 do not pass freely through the glomeruli and are present in the glomerular filtrate at a lower concentration than in plasma.

Urine formation:

- ✓ Renal tubules conserve water and the soluble constituents of the body by reabsorption using both passive and active transport.
- ✓ urea are reabsorbed in the proximal portion of the tubules
- ✓ In the distal portion of the tubules further water and ions are reabsorbed, acidification of the urine takes place, and ammonia may be formed (to be excreted as ammonium).
- ✓ urine that is finally excreted has an entirely different composition



Constituent	Daily Excretion	
	Glomerular Filtrate	Urine
Water	130,000 ml	1500 ml
Sodium	20,000 mmol	150 ml
Albumin	4 g (60 μ mol)	0.04 g (6 μ mol)
Urea	900 mmol	400 mmol

Indicate for high reabsorbtion of nephrone..

(1) Simple Examination of the Urine (physical test):

(A) Volume (urinary Output):

The normal 24 hours urine volume of an adult is between 750 and 2000 ml.

❖ There are several Factors will affected on urinary output : (Generally divided on two types)

- 1) Physiological factors
- 2) Pathological factors

1) Physiological :

depends on the fluid intake (which is usually a matter of habit) and on the loss of fluid by other routes (primarily sweating which, in absence of fever, depends on physical activity and on the external temperature).

(A) Increase concentration (amount) of salt : will lead to decrease the volume of urine (output) , it will be low than 500 ml/day

(B) Diuretics : will lead to increase the urinary output (more than 2000ml/day)

Like ; coffee , Beer , Cola

(c) Increase water intake : increase urinary output

(2) Pathological:

Diabetes Mellitus : hug amount of urine ((A)
3500ml/day) .

- **Polyuria** : If the urinary output $> 2000\text{ml/day}$
- **Oliguria** : If the urinary output from $500 - 200\text{ml/day}$
- **Anuria** : If the urinary output from $0 - 125\text{ ml /day}$,
this condition occurs in Obstructive collected adduct
due to a stone or tumor .

Note : the polyuria and oligouria can observeing in
Physiological and Pathological condition but the
anuria only observing in Pathological condition

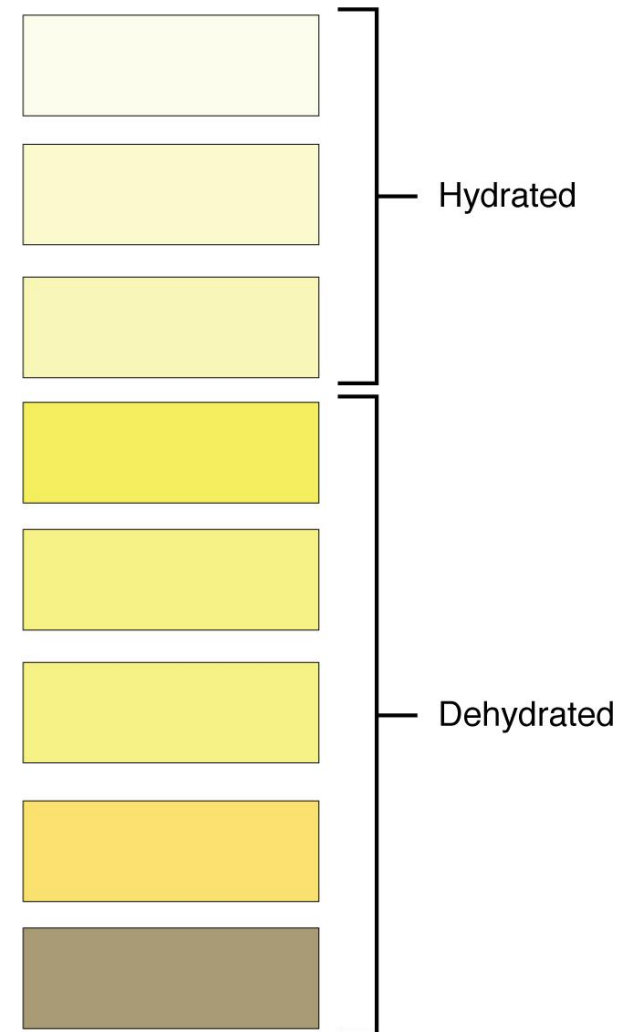
(B)Color:

Normally ; it is Pale to dark yellow

➤ the urine has yellow color due to excretion of the normal urine pigments (urochromas)

➤ there are indirect relation ship between the yellow color and specific gravity. (pale urine has a low specific gravity, a dark line has a high specific gravity)

➤ Colored urines occur in certain diseases or metabolic disorders, and after the administration of many drugs



(C)Appearance:

**Normal should be Clear , The Following Appearance are not normal:

✓ **Casts:** The tubule secrete an α 1 –glycoprotein , which in the presence of albumin, comes out of solution in gel form as casts.

✓ **Mucus Protein:** This may be from semen or from vaginal discharge.

Pathologically, it may be due to disease of the lower urinary tract or to

pus.

✓ **Crystals:** These are not normally . Uric acid (reddish-yellow) and calcium oxalate(colourless) may precipitate from acid urine and phosphate (whitish) from alkaline urine

(D) Odour or smell :

✓ urine which had a normal odour on arrival at the laboratory , (No offensive)

(E) PH :

On a normal pH between 5.5 and 8.0,

Normally : A vegetarian diet which causes a tendency to alkalosis, thereby produces an alkaline urine.

- *Important of PH of urine* : The pH of the urine in disease may reflect both the acid-base status of the plasma, and the function of the renal tubules.

(F) Specific Gravity (SG) :

The normal specific gravity (correctly called relative density) of a pooled 24 hour urine sample is between 1.025 and 1.010

**There are indirect relation ship between water and SG
(\uparrow Water \longrightarrow \downarrow SG)

**There are direct relation ship between concentration of substance in urine (Concentration of urine) and SG.

**The concentration of urine is highest in the a morning specimen (overnight urine) and is lowest in a specimen passed an hour after much fluid has been taken.

**urinometer use to measure the SG

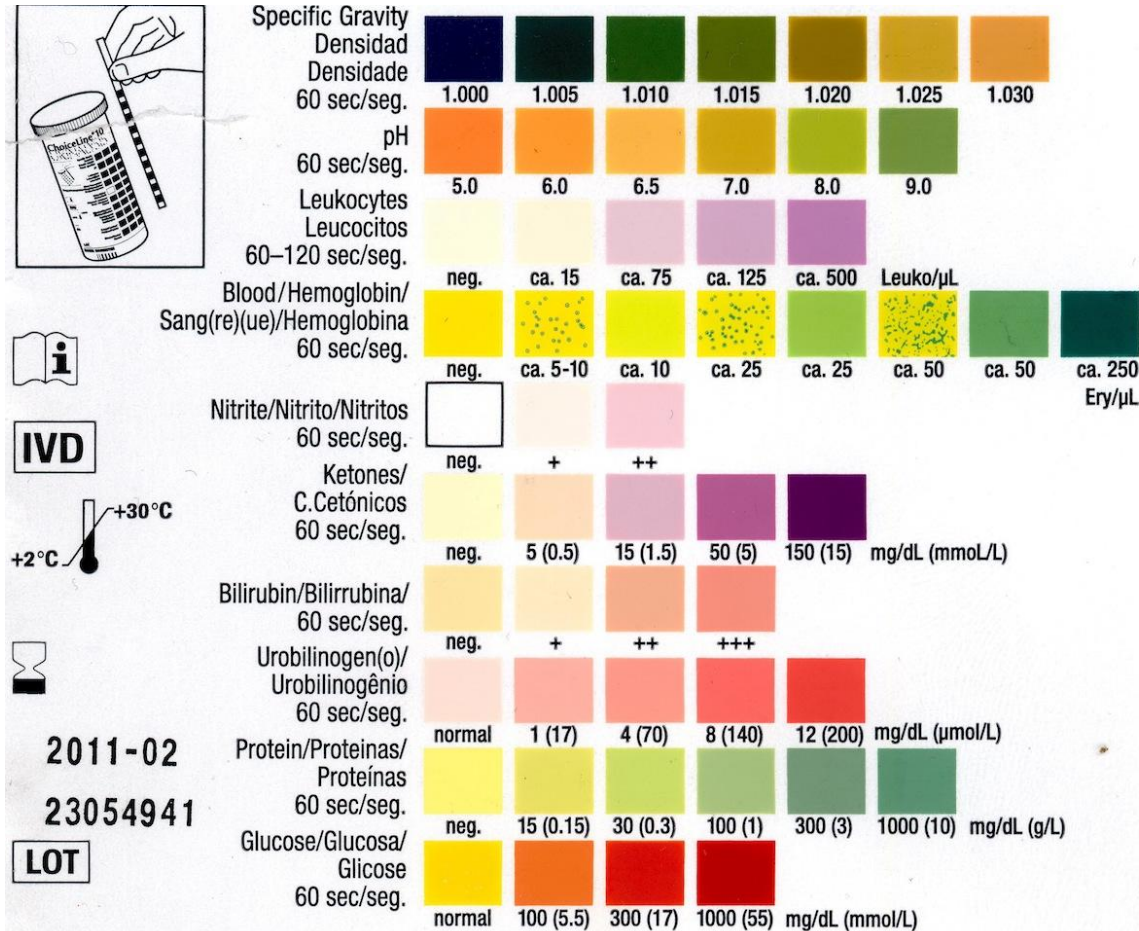
The Simple Examination of Urine

Part I: physical Proprieties of normal urine

- 1- Volume: Measure the volume of the 24 hour collection of normal urine.
- 2- Color: Visually examine its colour.
- 3- Appearance: State whether it is clear, cloudy or whether deposits or precipitates are present.
- 4- Odour: State whether it is normal urine like ammonical, or not.

5- pH: Record the pH of the sample.

6- Specific gravity;



The Simple Examination of Urine

Part II: Detect of some Organic constituent of urine

1- Creatinine:

- -Put 5 ml of urine + 1 ml of a saturated solution of picric acid + 1 ml of 10% sodium hydroxide solution.
- A deep **red color or orange** due to **creatinine picrate** appears. On acidification, with 2N HCl, the color changes to yellow.

2- Uric acid:

- Put 2 ml of urine + 1 ml of Benedict reagent , then heated in a boiling water bath for three minutes .

White precipitate indicates the presence of uric acid.

The Simple Examination of Urine

Part II: Detect of some Inorganic constituent of urine

1) Chlorides: *Add 5 ml of urine+ 5 drops of 2N nitric acid + + 3 drops of 2N silver nitrate solution.*

- - **A white precipitate of silver chloride** is formed which dissolves in 2N ammonium hydroxide solution.

2) Phosphates: *Add 5 ml of concentrated nitric acid + 5 ml of urine+ 4 ml of saturated ammonium molybdate solution.*

Heat the mixture gently. A yellow crystalline precipitate of ammonium phospho-molybdate appears.

- **3) Bicarbonate:** Add 4 drops of concentrate HCl + 5 ml of urine. A slight **effervescence occurs due to CO₂ evolution.**
- **4) Sulphates :** Acidify 10 ml of urine + 1 ml dilute HCl+ 4 drops of 5% barium chloride solution.
 - A **white precipitate of barium sulphate is formed.**
- 5) Ammonia:** Add 1 ml of 10% sodium hydroxide solution + 5 ml of urine. Boil. **The ammonia may be detected by its occur in confirmed by turning moist red litmus paper to blue.**

THANK YOU