



Title of the lecture Introduction To Clinical Biochemistry
Laboratory & Safety Measures



Introduction To Clinical Biochemistry
Laboratory & Safety Measures

- Clinical labs is important in disease diagnosis, determine its severity and patient response to specific treatment
- **Sections of clinical laboratory:**
 - 1) Hematology
 - 2) Clinical biochemistry
 - 3) Clinical microbiology
 - 4) Serology
 - 5) Blood bank
 - 6) Histology and cytology

Clinical Biochemistry Lab

- Measure the concentration of one or more substances in biological specimen of patient and compare it with reference value obtained from healthy subjects.

Types of samples:

- Body fluids: blood, serum, plasma, urine, cerebrospinal fluid (CSF), feces other body fluids or tissues

How clinical biochemical tests are performed



Automated computerized machine



Kits



Manually

BIOCHEMISTRY TESTS

- **LFT**

(AST, ALT, ALP, GGT, TP, Alb, globuline, bilirubin)

- **KFT**

(urea, creatinine, creatinine clearance, uric acid, Na⁺, K⁺)

- **Lipid profile**

(cholesterol, TG, HDL, LDL)

- **Cardiac profile**

(AST, LDH, CK, K⁺)

- **Bone profile**

(ALP, minerals: Mg²⁺, Ca²⁺, phosphate)

- **Electrolytes**

(Na⁺, K⁺, Cl⁻, Mg²⁺, phosphorous)

Laboratory Work Flow Cycle:

Three phases of laboratory testing:

Pre-analytical

- test ordering, specimen collection, transport and processing

Analytical

- testing

Post-analytical

- results transmission, interpretation, follow-up, re-testing.

BLOOD COLLECTION (Phlebotomy):

- Phlebotomy: blood withdraw from a vein, artery or bed capillaries for lab analysis.

The phlebotomy equipments:

- Disposable syringes or
- Tourniquet
- Alcohol swap
- Blood collection tubes
- Gauze pads or adsorbent cotton
- Waste container



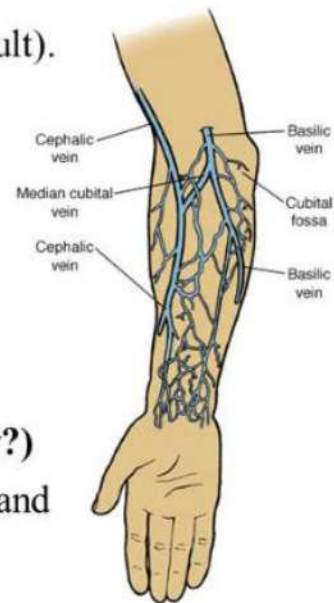
*** Minimum use of tourniquet is advised because blood constituents may be changed due to prolonged venous occlusion.

Vein Selection

• **Vein puncture** procedure, using arm vein (adult).

• **Three veins in arm may be used:**

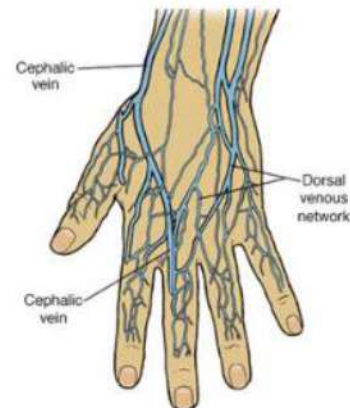
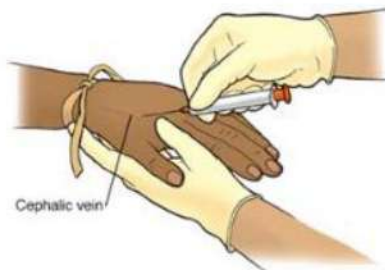
- ❖ median cubital vein or,
- ❖ cephalic or
- ❖ basilic veins



• **Median cubital vein is the best choice (why?)**

because it has good blood flow than cephalic and basilic which has more slowly flow

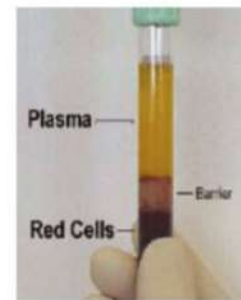
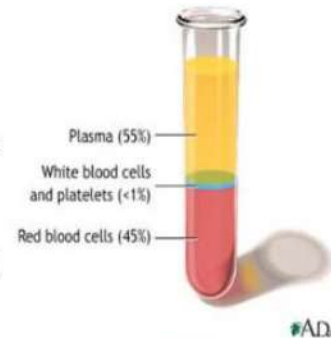
• Hand veins can be also used.



• **Artery blood** is rarely used in special cases as when blood gases, pH, CO₂, O₂ and bicarbonate is requested. It is usually performed by physicians.

Preparation of Blood Sample

- Blood contains: RBCs, WBCs and platelets
- Serum and plasma are prepared from whole blood by centrifugation.
- After centrifugation of blood, the blood separate into three layers
- **In biochemical tests, one of three type of blood sample can be used:**
 1. Whole blood (HA1C)
 2. Serum
 3. Plasma



Whole blood

- **whole-blood specimens must be analyzed within limited time (why?)**
 - Over time, cell will lyses in whole-blood which will change the conc. of some analytes as potassium, phosphate and lactate dehydrogenase
 - Some cellular metabolic processes will continuo which will alter analytes conc. like glucose and lactate.

Difference between Serum and plasma

Blood serum:

- Serum is the same as plasma except it doesn't contain clotting factors (such as fibrin)
- Mainly use in chemistry lab & serology.

Blood plasma:

Contains clotting factors

- So, serum and plasma all has the same contents of electrolytes, enzymes proteins, hormones except clotting factors

Blood collection tubes:

Plasma separating tubes:

- Lavender (EDTA)



- Hematology
- HbA1C

- Green (heparin)



- Enzymes, Hormones
- Electrolytes

- Light blue (citrate)



- Coagulation (PT,PTT)

- Gray (floride oxalate)



- Glucose

- Black



- ESR

Serum separating tubes:

- Red no additives



- Yellow : gel



*** Sample Storage Serum or plasma is stored in: 2-4oC for 3-5 days
-20oC for long time (months)