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

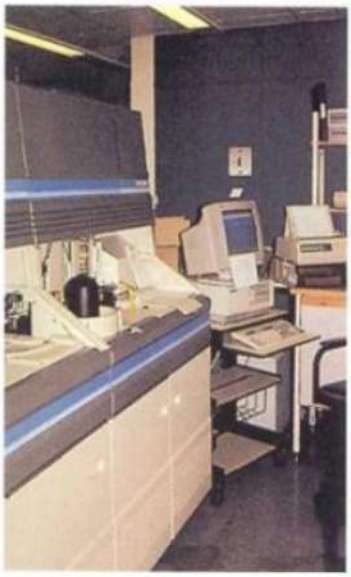
Clinical Biochemistry Lab

- 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 biochemistical tests are performed



Automated computerized machine

Kits

Manually

BIOCHEMSTRY TESTS

- **LFT**

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

- **KFT**

(urea, creatinie, creatnine clearance, uric acid, Na^+, K^+)

- **Lipid profile**

(cholesterol, TG, HDL, LDL)

- **Cardiac profile**

(AST, LDH, CK, K^+)

- **Bone profile**

(ALP, minerals: Mg^{2+}, Ca^{2+}, phosphate)

- **Electrolytes**

(Na^+, K^+, Cl^-, Mg^{2+}, phosphrous)

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.

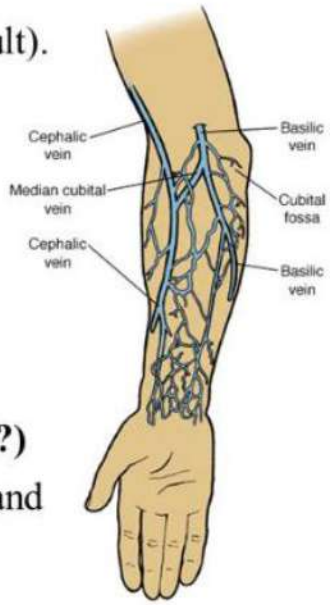
The phlebotomy equipments:

- 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

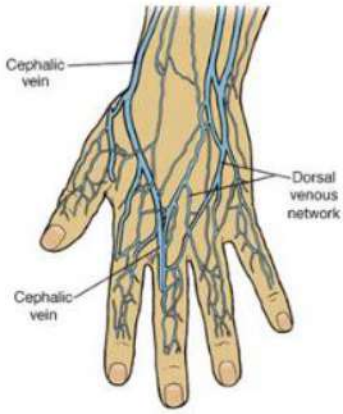
- **Veinpuncture** procedure, using arm vein (adult).



- **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

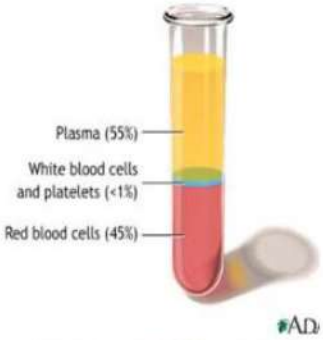
- Hand veins can be also used.



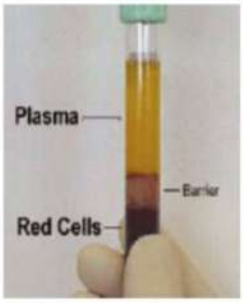
- **Artery blood** is rarely used in special cases as when blood gases, pH, CO_2, O_2 and bicarbonate is requested. It is usually performed by physicians.

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:

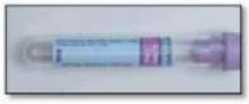
Contains clotting factors

- 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)