Introduction to biochemistry laboratory

Diagnosis of a disease is done by history, physical examination and in many cases needs medical laboratory. Laboratory results are also important in assessing disease severity and in monitoring progress of disease or in monitoring response to treatment (in follow up).

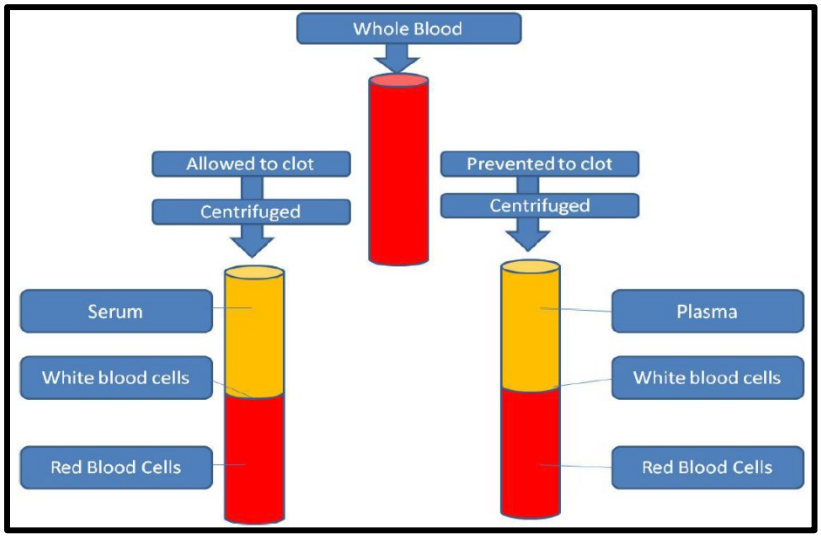
Function of clinical biochemistry laboratory:

In this lab the concentrations of many substances in body fluids of patients are measured.

Types of samples that are tested in clinical biochemistry lab:

Body fluids like serum, plasma, urine, whole blood, cerebrospinal fluid (CSF), saliva, ascetic fluid, synovial fluid and other body fluids but sometimes the lab analyze chemical composition of renal stones, tissues, or feces.

A blood sample from a patient may be used to get serum, or plasma or may be used as whole blood in some tests.



1- **Serum:** Blood outside of the human body will clot. This natural function prevents bleeding. If blood is drawn into a tube without anticoagulant (plain tube) then, the blood will clot naturally and separate into liquid and cells. This liquid is called serum. It is the fluid portion of a blood clot. It does not contain fibrinogen, therefore coagulation tests cannot be performed because the coagulation factors (fibrinogen) have been used in the process of clot formation.

2- **Plasma:** If anticoagulants are added to the tube: EDTA, Sodium citrate, heparin, etc., the blood will not clot. Blood outside the body with anticoagulant is referred to as whole blood. Whole blood can still be separated into liquid and cells. This liquid is called plasma. It is the liquid portion of blood when the tube contains anticoagulant. The use of an anticoagulant preserves the fibrinogens in the plasma, so it may be used in a coagulation test.

3- **Whole Blood:** Blood , if it is outside the body, fresh before clotting or when mixed with an anticoagulant, then it is still called whole blood. Example: a CBC requires EDTA-anticoagulated whole blood and some biochemical tests use whole blood as well.

Common biochemical tests in clinical practice:

- serum glucose
- Kidney function tests
- Liver function tests
- Calcium & phosphate
- Electrolytes like Na^+ and K^+
- Lipid profile

Laboratory work flow cycle:

The flow cycle includes the entire steps of laboratory test, starting from test ordering by a doctor until reporting the results.

The three phases of laboratory testing:

- **Pre-analytical phase:** test ordering, specimen collection, specimen handling & processing and specimen transport.
- **Analytical phase**
- **Post-analytical phase:** results transmission, interpretation, and follow-up and sometimes retesting.

Micropipette (small volumes measuring device)

Spectrophotometer

Water bath

$$C\ \ (Test) = \frac{\text{A (Test)} - \text{ A (Blank)}}{\text{A (Standard)} - \text{A (Blank)}}\ X\quad C\ (Standard)$$

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