



Laboratory Training in Hospital

General introduction for laboratory diagnostic tests
in Clinical biochemistry

By

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Lab. Training course outline

Clinical
biochemistry 50%

Microbiology:
20%

Serology: 15%


Haematology: 15%

Clinical biochemistry

- Laboratory diagnostic tests : tests that are used to obtain a supportive information about individual or /patient.
- Collaborative approaches, using proper guidelines for protocol, specimen collection.
- Risk factors (age>70yrs, history of illness, history of allergy, aggressive or antisocial behaviour, use medication treatment, alcoholic, drug addiction, etc.)

Diagnostic testing process

- ❖ **Pre-test Phase:** appropriate test selection, proper patient preparation, individualized patient education and emotional support.
- ❖ **Intra-test Phase:** Performance of procedure, sample collection, preserving handling, labelling and delivered to correct dept. observation of standard, documenting and keeping records.

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- ❖ **Post-test Phase:** Interpretation of test results, info. of patients, ID. of critical values and compare with control guidelines.
 - **History and assessment:** Performing of physical assessment, ID condition that could influences with test outcome (preg., DM., taking any medication treatment, ect...) .

Interfering Factors

❖ Sample error:

- Incorrect sample (collection, handling, storage or labelling).
- Incorrect/ incomplete patient prep.,
- Delayed of specimen delivery.
- Haemolysis of blood, etc.

Interfering Factors

❖ Patient factors:

- Incorrect pre-test diet.
- Current drug therapy, Type of illness
- Dehydration
- Position /or activity at time of specimen collection
- Postprandial status (last time of eating)
- Stress, alcohol consumption.

Interfering Factors

❖ Patient factors:

- Time of day (morning/evening)
- Age/ gender, Pregnancy
- Patient knowledge
- Noncompliance with instruction and pre-test preparation
- Patient posture: imp. to measure plasma volume, value is (12-15)% higher at supine position for several hrs.

Interfering Factors

- ❖ Changing from supine to standing could alter values by increasing of: Hb, RBC, Hct, Ca, K, P, AST, ALP, T.ptn, Alb, Cholesterol (chol), TG.
- ❖ Change from an upright to a supine, value would decreased: Hct, Ca, T.ptn, and chol.
- ❖ Tourniquet applied > 1 min. increases of ptn (5%), iron (6-7)%, AST(9.3)%, chol (5%), while decreases (K) 6%, Creatinine (2-3)%.

Laboratory diagnostic tests units

- Laboratory report of clinical results:
- System international (SI) unit
=*Amount/volume (moles or milimoles per liter)*
- *gm or miliequivalent per deciliter*

Sample collection types

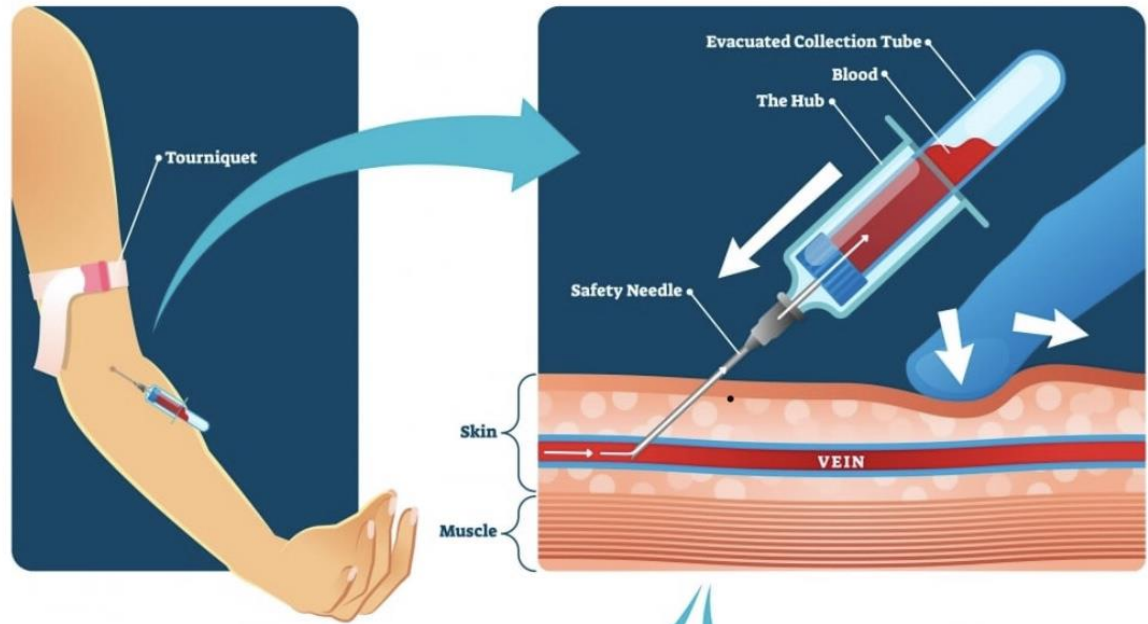
- Blood (whole, plasma, serum) (fasten)
- Urine sample (med-stream), Stool(GI), sputum
- Biological fluid (salvia, synovial, cerebrospinal, amniotic)
- Hair, skin, tissue, bone marrow.
- Particular tools, sterile containers, special kits

Venipuncture

The Process of Making an Incision in a Vein With a Needle



Antecubital vein



Tests



Sharps Container








Personal Protective Equipment (PPE)

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General biochemical profile

- ❖ **Basic Metabolic Screen**: Cl, Na, K, CO, Glu, BUN, Creatinine.
- ❖ **Diabetes Mellitus (DM)**: FBG, PPG, GTT.
- ❖ **Kidney functions**., BUN, Phosphorus, creatinine, creatinine clearance, uric acid, T.ptn, alb globulin, (alb/glub) ratio, Ca, Glu.
- ❖ **Liver function** : t.Bilirubin, ALP, Chol, GGT, AST, ALT, T.ptn, (alb/glu) ratio, LDH, viral hepatitis panel, PT
- ❖ **Cardiac enzymes** : CK, AST, LDH, ALT

Blood collection tubes

Important Notes	Tube Colour	Tube Type	Information
<p>The sample should be inverted about six times to ensure the blood and gel mixes to activate the clotting process.</p> <p>The samples must not be shaken to mix the blood</p>	 Gold	Serum Separating Tube (SST)	This tube type is used for the vast majority of Biochemistry, Immunology and Serology tests. Please check the website if unsure of the correct sample type.
<p>The tubes should be filled up to the line indicated on the tube to ensure the correct ratio of blood to anticoagulant is achieved for analysis. The sample should be inverted about six times to ensure the blood and anticoagulant mixes.</p> <p>The samples must not be shaken to mix the blood</p>	 Green	Lithium Heparin/Plasma Separating Tube	A few of the tests that use this tube type require the plasma to be frozen within half an hour of the sample being take. Please check the test information on the website.
<p>The tubes should be filled up to the line indicated on the tube to ensure the correct ratio of blood to anticoagulant is achieved for analysis. The sample should be inverted about six times to ensure the blood and anticoagulant mixes.</p> <p>The samples must not be shaken to mix the blood</p>	 Royal Blue	Sodium Heparin Tube	These sample are used to check the levels of trace metals, lead and mercury in the blood.
<p>These tubes should not be shaken</p>	 Red	Plain Tube	These tubes are very rarely used and should only be used for a specimen under instruction from the laboratory.
<p>The tubes should be filled up to the line indicated on the tube to ensure the correct ratio of blood to anticoagulant is achieved for analysis. The sample should be inverted about six times to ensure the blood and anticoagulant mixes.</p> <p>The samples must not be shaken to mix the blood</p>	 Grey	Fluoride Oxalate Tube	Anticoagulant and fluoride salt act as a glycolysis inhibitor to stabilise the glucose concentration in the sample. Main tests analysed on the sample: Glucose, Lactate and Alcohol.
<p>The tubes should be filled up to the line indicated on the tube to ensure the correct ratio of blood to anticoagulant is achieved for analysis. The sample should be inverted about six times to ensure the blood and anticoagulant mixes.</p> <p>The samples must not be shaken to mix the blood</p>	 Lavender	Potassium EDTA Tube	Potassium EDTA serves as the anticoagulant for the performance of almost all haematological tests. Larger EDTA bottles are used for transfusion samples only.
<p>The tubes should be filled up to the line indicated on the tube to ensure the correct ratio of blood to anticoagulant is achieved for analysis. The sample should be inverted about six times to ensure the blood and anticoagulant mixes.</p> <p>The samples must not be shaken to mix the blood</p>	 Light Blue	Sodium Citrate Tube	The ratio between anticoagulant and blood for physiological examinations is 1:9

Reference:

A manual of laboratory training in hospital. By: Dr. Shatha H.Ali