Al-Rasheed University College
Medical Analysis Department
Clinical Chemistry Lab.
Fourth Stage

كليـــــة الرشيد الجامعـــــة
قســـــم التحليلات المرضيــة
مختبر الكيميـــاء السريريـــة
المرحلـــــة الرابعـــــة

Specimen Collection

Lecture (1)

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Clinical Biochemistry

Collection and Handling of Specimen

Types of specimens :-

1- ***Serum*:** is the liquid part of flood, which is obtained by taking the blood from vein and collected in a plain tube containing no anticoagulant. The sample left at room temperature (R. T.) or in water bath with 37 ºC for 15 minutes, then make centrifuge for about 10 minutes. The upper layer (supernatant) is the serum which contents ***Albumin*** and ***Globulin***.

2- ***Plasma*:** when blood sample collected in a tube containing anticoagulant (like; EDTA, Heparin… etc) and then directly centrifuged, the upper layer is the plasma, which contain ***Albumin***, ***Globulin***, and ***Fibrinogen***.

3- ***Whole blood*:** is the blood sample collected in a tube contains anticoagulant.

4- ***Urine sample*:**
   - **a-** random sample.
   - **b-** 24 hr. urine sample.

5- ***Stool sample.***

6- ***Stone*:**
   - **a-** Kidney.
   - **b-** Urinary tract.
   - **c-** Gall bladder.

Blood Specimen Collection

The technique of collection of blood is best learned at the bed side. From an experienced teacher, the following points are worthy of special mention:-

The needle should have a short bevel.

1. Blood should be collected with minimum stasis.
2. The vein used is better felt than seen.
3. If the vein look difficult, the arm should be compressed with a *Sphygmo manometer* cuff, inflated to just below the diastolic blood pressure.

4. Before removing the needle from the vein, the cuff should be let down and if possible loosened.
5. The quantity of blood collected must be correct for the amount of anticoagulant used.
6. The blood must be gently mixed with the anticoagulant.
7. Loss of blood glucose or CSF glucose by glycolysis should be prevented by addition of fluoride.

Faults in biochemical results:-

These faults (problems) can be divided into:

a. Faults before collection of the sample.
b. Faults after collection of the sample.

a. The faults before collection of the sample can be caused by:-

- ❖ Drugs.
- ❖ Diet.
- ❖ Venous stasis.
- ❖ Intravenous infusion.
- ❖ Keeping blood overnight before sending to the laboratory.
- ❖ Putting blood into wrong container.

b. The faults after collection of the sample can be caused by:-

1. **Faults caused by Heamolysis:-** which mean the breakdown of RBC which may caused by :
   a. Use of too small or too large needle.
   b. Moisture in the tube or in the syringe.
   c. Vigorous mixing of blood.
   d. Rapid expansion of blood in the tube.
   e. During bad separation processes.
2. **Laboratory Faults:-**
   a. Faults in labeling.
   b. Faults in equipment.
   c. Faults in calculation.
   d. Faults in the techniques.

Heamolysis should be avoided because:-

a. Heamolysis may be directly interfere in a chemical reaction by enzyme inhibition as in ***lipase***, or interfere with di-azo reaction (bilirubin estimation), or yielding significant color, thus interfere with colorimetric procedure.
b. Some constituents are present in high concentration in the RBCs and the Heamolysis due to release the content of the RBC to the serum which lead to high false results, (ex: K^+, AST, LDH, ACP).

Anticoagulants :-

1- **Heparin**: inhibits the formation of thrombin from prothrombin.
2- **EDTA**: (Ethylene Diamine Tetra Acetate) chelate calcium (Ca^{2+}).
3- **Oxalate**: precipitate calcium (Ca^{2+}).
4- **Citrate**: converts calcium (Ca^{2+}) into non-ionic form.
5- **Sodium fluoride**: large amount is needed to act as anticoagulant, so it is used as preservation for glucose by inhibition glycolysis, and bacterial action.

Urine Specimen Collection

Principle:

Urine is one type of specimen that can be easily collected from a patient. Urinalysis testing can give the doctor valuable information about many body systems especially kidney function. The physician uses the information from urine testing to diagnose and treat many disease states.

Types and collection procedure of urine specimens:

1. **Routine or random sample:** The patient is given a non-sterile collection container and instructed to collect a midstream specimen in the container. This type of specimen is routinely used for urinalysis and may not be used for a culture and sensitivity.

2. **First voided specimen:** The patient is given a urine container to take home and instructed to collect a sample of the urine the first time he or she urinates in the morning. Because urine is not stable, the specimen should be returned to the laboratory within one (1) hour of collection. If that is not possible, the specimen should be refrigerated until it can be tested.
3. **Timed specimen:** Timed specimens are usually a 24 hour urine collection.
4. **Clean-catch mid-stream specimen:** Patients with orders for a urine culture and sensitivity are given the proper mid-stream urine collection kit and the appropriate instruction sheet.
5. **"Dirty" specimen:** The patient is given a sterile urine cup and told to clean as stated above for a clean-catch specimen. They are then instructed to collect the FIRST part of the voided stream. Fill the container one half to two thirds full and finish voiding into the toilet. Apply the cap tightly and label the cup.
6. **Catheterized specimen:** These specimens are collected by specially trained personnel only.

Stool Specimen Collection

Use the special stool transport system for Ova and Parasites (Formalin, 10% and PVA fixative) and for Stool Culture (Enteric Transport C&S) provided by your physician or available at Legacy Laboratory Patient Service Centers.

1. Collect the stool in a clean wide mouthed container. Urine or water must not contaminate the sample. Urinate before collecting the stool specimen, if necessary.
2. Remove the vials from inside the plastic bag.

3. Open the vials carefully. Using the collection spoon attached to the vial cap, add enough stool until the liquid reaches the FILL line on the vial label, (approximately the size of 5g). **Do not overfill** the vials.
4. Tighten the cap so the specimen cannot leak out and shake the vial until the mixture appears well mixed.
5. Label the containers with the patient's full legal name (first and last name), date of birth or social security number, and date and time of collection. Store at room temperature until delivered to the laboratory. Return the specimen to a Legacy Laboratory location within 24 hours of collection.

note:

1. DO NOT use a laxative before collecting a stool specimen.
2. Collect stool from areas that look bloody or have mucous.