



# Biochemistry (1111@nur11) – First Stage



## Specimens Collection in Biochemistry Laboratory

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# Specimen Collection in Biochemistry Laboratory

Valid laboratory results are dependent on proper specimen collection and handling prior to the arrival of the sample in the laboratory.



# Specimen Collection in Biochemistry Laboratory

## Phlebotomy Procedure

- 1- Wash hands thoroughly before beginning any phlebotomy procedure. Be sure to check the expiration dates on tubes before proceeding.
- 2- Confirm that the identity of the patient is matching with the consent/requisition form before collecting the specimen.
- 3- Explain the procedure including small risks of hematoma, slight pain and some light-headedness. Inquire whether the patient has a history of fainting or dizziness with phlebotomy procedure. Explain that loss of vacuum or a collapsed vein may necessitate another draw.
- 4- On a table desk, assemble all necessary equipment: cotton/gauze, tubes, safety needle, alcohol swab, tourniquet, gloves and bandaid.
- 5- Position the patient so that they seated comfortably in a chair with their arm extended on a desk to form a straight line from the shoulder to the wrist. The patient's arm and elbow should be firmly supported and not bent at the elbow.



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6- Check both arms to select the larger and fuller veins. Palpate and trace the path of the veins several times with your finger. Tap the vein at the site of the draw with two fingers; this will cause the vein to dilate. The following factors should be considered in site selection:

- a) Extensive scarring: Healed burns areas or scar tissue should be avoided.
- b) Specimen collected from an area with a hematoma may yield erroneous test results. If another vein site is not available, the specimen should be collected distal to the hematoma.

7- Apply the tourniquet.

8- Ask the patient to open and close his fist so his vein becomes prominent. Vigorous hand pumping is not necessary to activate blood flow and should be avoided.



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9- Clean the vein puncture site with the alcohol swab in a circular motion from the center of the area to the outside. Allow the area to air dry to prevent hemolysis and a burning sensation to the patient.

10- Insert the stopper of the first tube to be drawn into the adaptor. Don't push too far to avoid premature loss of vacuum via puncture of the needle. The recommended order of draw when drawing more than one tube is as follows:

a) Non-additive tube (red tube).

b) Coagulation tube (light blue stopper).

c) Serum tube.

d) Additive tube (lavender stopper).

11- Insert the needle into the vein with the bevel facing upward. Puncture the stopper on the tube by pushing it onto the needle end and grasp the adaptor edge to provide stability once the blood flow has begun. Have the patient open his fist.

12- Fill the tube until the vacuum is exhausted. Remove the tube from the adaptor and insert subsequent tube. Be sure that all tubes are completely filled to ensure sufficient blood sample for laboratory analysis.

13- Place a cotton/gauze piece over the site. All used needles must be disposed of in a puncture proof biohazard receptacle. Never recap a needle. Recapping, purposeful bending, breaking, removing from disposable syringes or other manual manipulations of needle is prohibited. Apply pressure to the site for 2-5 minutes. Place a bandaid over the puncture site.

14- Again verify that the information on the sample tubes match the consent/requisition form.

15- Remove gloves and dispose of in a properly identified biohazard bag or container. Wash hands thoroughly after phlebotomy.

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## Additional Vein Puncture Considerations

### 1- Prevention of Hematoma:

- a) Puncture only the uppermost wall of the vein.
- b) Release the tourniquet before removing the needle from the vein.
- c) Use only major veins (not superficial veins).
- d) Make sure that the needle fully penetrates the uppermost wall of the vein. Partial penetration may allow blood to leak into the soft tissues surrounding the vein by way of the needle bevel.
- e) Apply a small amount of pressure to the area with the cotton/gauze pad when bandaging the arm.

### 2- Prevention of Hemolysis:

- a) Mix anticoagulant specimen thoroughly by inverting each tube gently 8-10 times. Don't shake, vigorous mixing may cause hemolysis.
- b) Avoid drawing blood from an area with a hematoma.
- c) Ascertain that the vein puncture site is dry without touching it.



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## 3- If a blood sample is unobtainable:

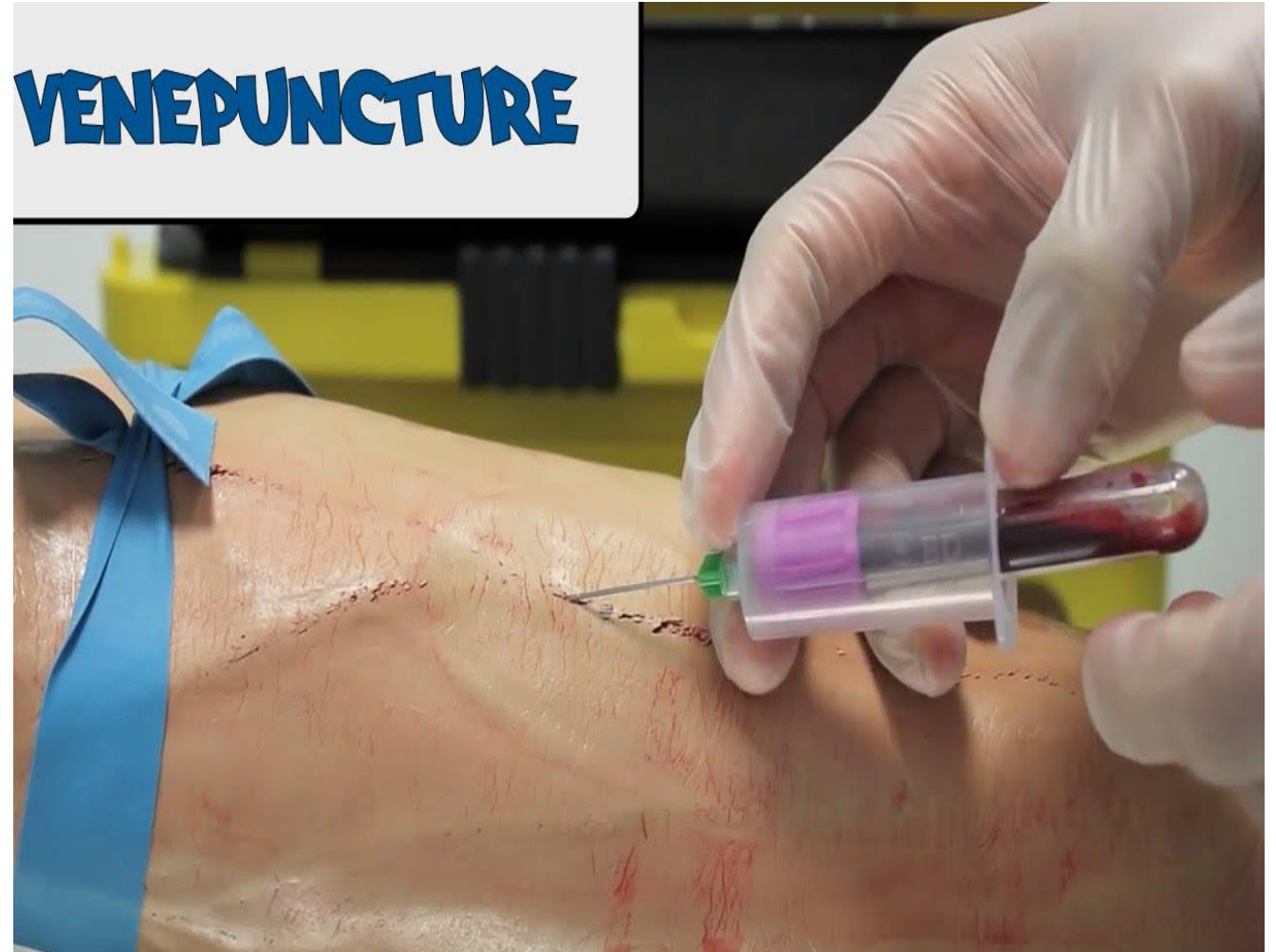
a) Change the position of the needle. If the needle has penetrated too far into the vein, pull it back slightly. If it has not penetrated far enough, advance it farther into the vein. Rotate the needle a half turn.

b) Try another tube, the tube may not have sufficient vacuum.

c) Loosen the tourniquet. It may be applied too tightly, thereby stopping the blood flow. Reapply the tourniquet loosely. This procedure can be accomplished easily when using the Velcro-type tourniquet by releasing it and quickly pressing it together again.

d) Probing for the vein is not recommended as it is painful to the patient. In most cases, another puncture in a site below the first site is advised.

e) Never attempt a vein puncture more than twice. Have another person attempt to draw the specimen.



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## Specimen Handling

- 1- Gently invert serum tubes 5 times and all tubes with anticoagulants 8-10 times.
- 2- Ensure all tubes are labeled with identification number and second identifier (first and last names of patient).
- 3- Let red-top and marbled tubes clot in an upright position for 30-45 minutes only. Centrifuge the tube for 5-10 minutes at 2500-3500 RPM and transfer the serum into a properly labeled pour-off tube using a disposable pipette.
- 4- Some other factors that can affect the sample are:
  - a) **Hemolysis:** it is the breaking down of red blood cells (RBC) because of:
    - i) Time: Holding blood over 2 hours before centrifuging can and usually lead to hemolysis. Allow at least 10-20 minutes (no more than 45 minutes) for the blood to clot prior to centrifuging.
    - ii) Temperature: Never store blood in too warm area, hot cars, hot sun, etc. Allowing blood to freeze in cold weather will also produce hemolysis.
    - iii) Trauma: Going through the vein, accessing a collapsed vein or using a small needle can cause hemolysis. Squeezing the finger is the main cause of hemolysis.
  - b) **Lipemia:** it is an abnormal amount of fat in the blood. This is usually caused by the patient not fasting.



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## Collection Tubes

- 1- Mottled Red Top: contains clot activator with gel separator in the bottom for collection of serum samples.
- 2- Red Top: contains no anticoagulants for collection of serum samples.
- 3- Purple Top: contains EDTA (ethylenediaminetetraacetate) for collection of hematology and hemoglobin analysis samples.
- 4- Green Top: contains sodium heparin for hematology and chemistry samples.
- 5- Gray Top: contains sodium fluoride and potassium oxalate which are glycolysis inhibitors.
- 6- Light Blue Top: contains sodium citrate for coagulation samples.
- 7- Royal Blue Top: may contain sodium heparin for trace metal studies.



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## Urine Collection

To collect a routine urinalysis, a clean mid-stream specimen should be obtained. A clean specimen is necessary to confirm the presence or absence of infecting organisms in urine. The specimen should be free of any contaminating matter that might be present on the genital organs. Therefore, patients should be urged to follow the steps below:



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## 1- Instructions for the female patients:

- a) If you are menstruating, first insert a fresh tampon or use cotton to stop the flow.
- b) Separate the skin folds around the urinary opening.
- c) Wash the urinary opening and its surrounding from front to back with a sterile antiseptic pad.
- d) Begin urinating into the toilet, making sure you keep the skin fold apart with the fingers of one hand.
- e) Wait until the urine stream is well established before moving the container into the path of the stream to catch the rest of the urine. Don't touch the container to the genital area.
- f) After collecting urine specimen in the cup provided, pour off into the urine transport tubes provided.
- g) Seal the top of the non-barcoded urine tubes with security seal signed by the patient.



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## 2- Instructions for the male patients:

- a) Wash the end of the penis well with soapy water and let it dry.
- b) Begin urinating into the toilet. Wait until the urine stream is well established before moving the container into the path of the stream to catch the rest of the urine. Don't touch the container to the genital area.
- c) After collecting urine specimen in the cup provided, pour off into the urine transport tubes provided.
- d) Seal the top of the non-barcoded urine tubes with security seal signed by the patient. Present on the genital organs contaminating matter that might be present on the genital urine. globin ples.

