

BLOOD COLLECTION

INTRODUCTION

Laboratory findings are very important in medical decision; 75-80% of the medical information about the patient is given to the laboratory examinations. The quality of a result from laboratory is done first by the correct collection. Laboratory measurements are used to:

- to confirm or infirm the clinical diagnosis;
- monitoring of disease or the response to treatment;
- developing the prognosis;
- screening (detection of disease during the preclinical stage).

In order to eliminate all the factors that might interfere with the results of the tests, some recommendations are necessary: the patient has to be informed about the collection of blood and to restrain any intake of food or fluids in the morning of the day when the blood test is going to be carried out. The patient's activities are coordinated so that they will not be in conflict with other diagnostic tests or drug administration. Most of the results are reported to the person's basal status (after a minimum of 12 hours from the last meal, in conditions without any physical or emotional stress). Request of the test must be written, the reference ticket must to specify the following information: name, age, sex, requesting physician, diagnosis, tests required, date, time of a collection.

Blood collection is made directly into vacutainer system. The Vacutainer system consists of a double-pointed needle, a plastic holder or adapter, and a series of vacuum tubes with rubber stoppers of various colors. The stopper colors indicate the type of additive present. For hematological tests, test tubes with anticoagulants are used. Several anticoagulation substances are designated for this purpose, for instance: sodium citrate, EDTA (ethylenediaminetetraacetic acid), heparin. The ratio between the blood and the anticoagulant substance is very important. Most of the anticoagulants bind calcium in the blood and inhibit clot formation. The blood goes from the patient directly into the appropriate test tube.



Figure

Do not collect in the syringe and then transfer to vacutainers because blood clotting starts immediately after the removal of vessels. It is also important to respect the proportion between blood and anticoagulant. The name of the patient must be written on the vacutainer label.

Table 3 Usual vacutainers types and additives

Biological sample	Additive / anticoagulant	Blood Volume	Vacutainer (cork)	Aplications
Plasma	Sodium citrate 3,2 % 0,5 ml	4,5 ml	blue	Coagulation
Blood	Sodium citrate 3,2 % 1 ml	4 ml	black	SRE
Blood	EDTA K ₃	2 ml	violet	Hematological tests, viral load
Serum	-----	7 ml	red	Biochemistry, hormones, tumoral markers
Plasma	heparine	4 ml	green	The arterial gases and pH

Equipment for routine venipuncture are: needles, holder – use with the evacuated system, tourniquet – wipe off with alcohol and replace frequently, alcohol wipes, adhesive bandages / tape – protects the venipuncture site after collection. Needle disposal unit – needles should never be broken, bent, or recapped. Needles should be placed in disposal unit immediately after their use. Gloves – can be made of latex, rubber, or vinyl, and are worn to protect the patient and the phlebotomist.

PROCEDURE

The median cubital and cephalic veins of the arm are used most frequently. Collecting blood samples includes the following steps:

- a) Position the patient comfortable and safe in case the patient becomes faint and falls;
- b) Palpate and trace the path of veins with the index finger. Arteries pulsate, are most elastic, and have a thick wall. Thrombosed veins lack resilience, feel cord like, and roll easily. If superficial veins are not readily apparent, you can force blood into the vein by massaging the arm from wrist to elbow, tap the site with the index and second finger, apply warm, damp washcloths to the site for 5 minutes, or lower the extremity to allow the veins to fill.
- c) Fold of the elbow is disinfected with iodine alcohol and the tourniquet is applied on the arm;

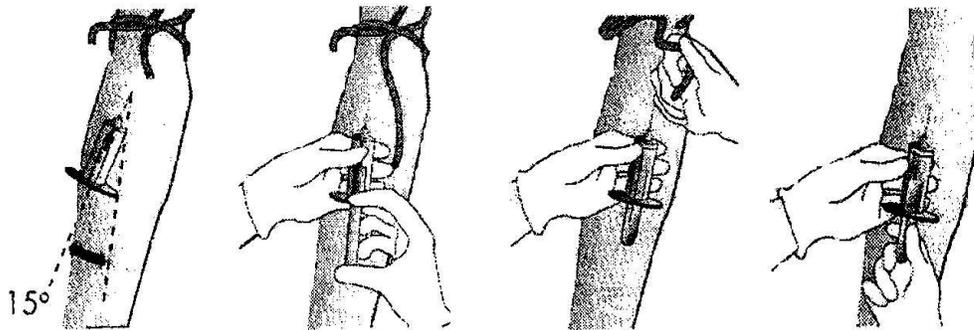


Figure 7.1 Steps in blood collection

- d) Penetrate the skin with the sampling device having between thumb and index from the right hand;
- e) When the needle is positioned in the vein, the position of the hand is reversed;
- f) Blood enters the tube in proportion to vacuum the inside, the tourniquet is released;
- g) Remove the tube with your right hand, left hand still fixing collection device, shake gently for a good tube immediately mixed with anticoagulant;
- h) Insert another tube if collecting more samples is necessary.

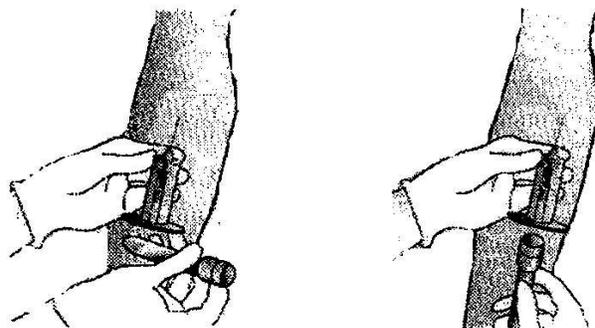


Figure 7.2 Steps in blood collection

It is important of follow safety and infection control procedures: wear gloves when handling blood/body fluids, change gloves after each patient or when contaminated, wash hands frequently, dispose of items in appropriate containers, dispose of needles immediately upon removal from the patient's. For the patient protect, place blood collection equipment away from patients, especially children.

While each successive tube is filling invert previous tube gently 5 times. Do not shake. Vigorous mixing can cause hemolysis. When all tubes of blood have been collected, remove the last tube from the vacutainer holder, place a cotton ball or gauze over the site and withdraw the needle in a smooth and cautious manner so as not to bruise the vein. After withdrawing the needle fully, apply pressure to the cotton ball over the puncture site and hold pressure. If patient is able ask them to apply pressure for 3 to 5 minutes until the bleeding stops. Discard the needle of the vacutainer into the biohazard container.

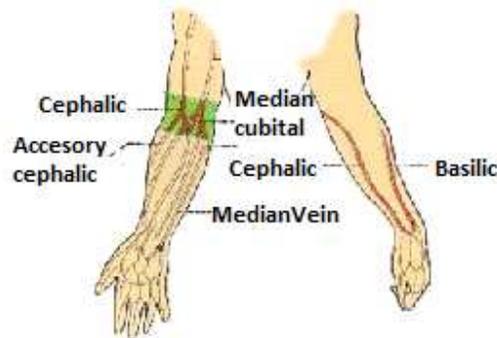


Figure 7.3 Arias for venipuncture

(<http://www.ok.gov/health/documents/Blood%20Collection%20Procedure%20%28Venipuncture%29%202007.pdf>)

Venous blood (venipuncture) is collected by antecubital (or other) vein puncture being mixed with a dry anticoagulant. The anticoagulant used is the ratio of 1 mg Na₂EDTA for 1 ml blood. Advantage: does not change the erythrocyte volume and morphology of leukocytes. It can assess: complete blood count, biochemical and coagulation determinations.

Capillary blood is collected from the fingertip (adults) or plantar surface of the heel or ear lobe (the child). This is the best smears are obtained as the morphology of the blood cells is better preserved in this case.

Arterial blood is collected mainly in intensive care services on the arterial catheter or collection device; it is used to determine the parameters of acid-base balance, blood gases and others.

The quality of laboratory results are directly affected by the quality of the blood sample obtained from the patient. Samples may need to be rejected as unacceptable for the following reasons:

- a. Hemolysis - this is usually caused by a procedural error such as using too small of a needle, or pulling back to hard on the plunger of a syringe used for collecting the sample.
- b. Clotted - failure to mix or inadequate mixing of samples collected into an additive tube.
- c. Insufficient sample - certain additive tubes must be filled completely. When many tests are ordered on the same tube be sure to know the amount of sample needed for each test.
- d. Wrong tube collected for test ordered.
- e. Tubes not processed before shipping to lab.
- f. Tubes held too long in facility before shipping.
- g. Submitting specimens in expired collection tubes. It is the responsibility of the submitter to ensure that specimens are collected in tubes that have not expired.