



Red Biobancos

Institute of Health Carlos III

Red Nacional
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Spanish National
Biobank Network

SOP

Blood Samples

Blood Products Working Group

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Collection of Blood Samples

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1. ABBREVIATIONS

This document does not contain abbreviations.

2. DEFINITIONS

PERIPHERAL BLOOD: Organic fluid easily accessible by venipuncture.

POSTPRANDIAL FAST: no intake of food after a postprandial state where nutrient availability is greater than demand, and in which a net synthesis of reserve substances occurs.

3. OBJECTIVE

The purpose of this procedure is to define the procedure and establish the basic quality guidelines with respect to the collection of peripheral blood samples to be sent to biobanks for processing, and to describe the main causes of biological variability associated with peripheral blood extraction.

4. SCOPE

This procedure applies to all peripheral blood samples that are extracted in order to be processed and stored in a biobank.

5. MATERIALS

- Cotton.
- Kidney dish.
- Antiseptic.
- Syringe (depending on sample size), butterfly or Vacutainer system.
- IV needle.
- Tourniquet.
- Adhesive Plaster.
- Gloves.
- Sample collection tubes.
- Identification labels.
- Sharps container.

6. DEVELOPMENT

6.1 - PRIOR CONSIDERATIONS:

6.1.1- Obtaining informed consent: before obtaining a peripheral blood sample intended exclusively for a Biobank, it must be verified that the patient expressed consent in a valid manner in accordance with current legislation. Otherwise, the sample may not be taken.

6.1.2- Donor position: changing the position of the donor from face up (supine) to a sitting or standing position causes a shift of body water from inside of blood vessels to the interstitial spaces, causing a significant increase in the test values for lipids, enzymes and proteins, as these cannot be filtered.

6.1.3- Diet: Extraction is recommended after a postprandial fast of at least 8 hours. In this situation, measurements can be made regarding the basal metabolism without the variations that cause a transient increase in blood glucose and lipids after eating.

6.1.4- Extraction method: for health and safety reasons it is recommended to use extraction systems with butterfly needles and vacuum tubes. However, vacuum systems must be avoided in children and the elderly because their veins may not resist the negative pressure of this type of tubes.

6.1.5- Extraction site: routinely, the puncture sites are the superficial veins of the anterior surface of the forearm.

For hospitalized donors it is best to avoid using lines for obtaining samples and to make a new puncture, if possible, in the other arm. If a second puncture cannot be made, discard the first 10 ml of blood obtained from the line.

6.1.6- Time of extraction: since the concentration of various compounds (e.g. hormones) may change because of their circadian rhythms, it is recommended that, as far as possible, all extractions are performed in the same time period or at least to register the time of extraction.

6.2 - PROCEDURE:

6.2.1- Identification of the patient: the staff responsible for drawing blood must check the identity of the donor before performing the venipuncture.

6.2.2- Check that all material required for the extraction is present and that the proper tubes are selected.

6.2.3- Explain the procedure to the donor and ask if he/she is fasting, and any other necessary data prior to extraction.

6.2.4- Select the insertion site of the needle by palpating gently and firmly with the index finger. Veins have a more spongy texture and bounce back under finger pressure. Arteries are deeper and pulsate. Tendons are tough and resistant to pressure.

6.2.5- Apply the tourniquet 7.5– 10 cm above the puncture site. See directions for tourniquet.

6.2.6- Place the hyperextended arm in such a way that the hand is lower than the elbow.

6.2.7- Confirm the puncture site.

6.2.8- Disinfect the area with an isopropanol swab or another antiseptic swab, applying a circular motion from the inside outwards. Allow to air dry.

6.2.9- Perform the venipuncture by anchoring the vein with the thumb 2.5 to 5 cm below the site and inserting the needle with the bevel facing upwards, at an angle between needle and skin of 15°.

6.2.10- Collect the tubes and invert each tube immediately after collection. The recommended order of collection is: sterile blood culture tubes, tubes without additives and finally tubes with additives.

- 6.2.11- Release the tourniquet, and ensure that the patient has his/her hand open.
- 6.2.12- When all tubes are filled place a gauze pad on the puncture, without pressing.
- 6.2.13- Withdraw the needle with a fast and smooth backward motion and press the gauze over the puncture site for at least one minute, keeping the arm extended.
- 6.2.14- Discard the extraction material in an appropriate container.
- 6.2.15- Place a sterile bandage on the puncture and dismiss the donor.
- 6.2.16- Identify the tubes correctly and send them as quickly as possible to the Biobank.

6.3 - DIRECTIONS REGARDING THE TOURNIQUET:

- 6.3.1- Application of the tourniquet: apply the tourniquet around the arm with both ends toward you; fold the left end over the right end and pull the left end towards the shoulder; maintain tension while strapping the part of the tourniquet that surrounds the arm; this way it can be released with one hand.
 - 6.3.2- Pressure of the tourniquet: make sure that the pressure is sufficient to make the veins prominent, but does not compromise circulation. If it is too tight the skin around the tourniquet will turn white, and if it is too loose it will slip, in which case it must be released and applied again.
 - 6.3.1- Time of tourniquet application: the tourniquet may not be left on for more than one minute, and if the vein is not located in that time, it must be released and put back after 3 minutes.
- In cases of skin disorders or excessive hair, the tourniquet can be put over the sleeve.

6.4 - GENERAL RECOMMENDATIONS:

- Do not probe. It is painful for the patient and can cause a hematoma. If no blood can be drawn, remove the tourniquet and the needle. Even when no blood could be drawn, the puncture site must be controlled and the area must be pressed.
 - Never puncture twice in the same place. Replacing the tourniquet can cause bleeding and bruising.
 - Never puncture in a bluish area.
 - Never puncture a patient again if you are not able to locate the vein again.
 - Never puncture an ill person more than twice. Explain to the patient that it was not possible to extract a complete blood sample and that it has to be done again. Use clean equipment including syringe, tubes, antiseptics and cotton. If the second attempt is unsuccessful, let another phlebotomist obtain the blood sample.
- Do not pour blood from one tube into another, as this may contaminate the sample.

6.5 - GENERAL COMPLICATIONS DURING AN EXTRACTION:

- 6.5.1- Blood collection is insufficient or no blood can be drawn at all. Possible solutions are:
 - Move the syringe slightly forward (it may not be inside the lumen), or backward (it may have passed through the vein).
 - Adjust the angle of the device (the bevel should face to the upper wall of the vein).
 - Loosen the tourniquet (it may be too tight and block the blood flow).
 - Try with another tube (the first one may have lost vacuum).
 - Anchor the vein again (veins sometimes move away from the tip of the syringe and the puncture site).
- 6.5.2- If the blood stops flowing:

- The vein may have collapsed; secure the tourniquet to increase venous filling. If this maneuver fails, remove the syringe, observe the site of the puncture and introduce the syringe again.
- The needle/adaptor/tube may not have been assembled well, and every time a tube is changed the syringe moves out of the vein. Firmly grasp the equipment and place fingers on the patient's arm; use the flange for leverage to remove and replace the tubes.

6.5.3- Other complications:

- A bluish bump may form under the skin at the puncture site, probably a hematoma; loosen the tourniquet immediately and remove the syringe. Press the area for an appropriate time, while maintaining the patient's arm stretched. In the future, avoid using any bluish area.
- Bright red blood rather than dark red blood (venous blood) indicates an arterial puncture. After phlebotomy, press the area for more than five minutes while keeping the patient's arm straight.

6.5.4- Areas to avoid for venipuncture:

- Excess scarring from burns or surgical sutures.
- On the side of a mastectomy (test results may be altered by lymphedema).
- Hematoma or bruised areas, besides being painful, can yield erroneous results.
- In intravenous therapies/blood transfusions, the fluid can dilute the sample. The blood must be drawn from the other arm. If this is impossible, place the tourniquet below the intravenous cannula and extract the blood.
- In general, blood may never be extracted from an arm with a fistula or cannula.
- Edematous extremities (tissues with fluid accumulation alter the results).

7. REFERENCE DOCUMENTATION

- *Hematología: Fundamentos y aplicaciones clínicas [Hematology: Fundamentals and clinical applications]. Bernadette F. Rodak. Ed. Panamericana. 2nd Edition.*
- *Ple-15. Toma de muestras de sangre mediante punción venosa. [Taking blood samples by venipuncture]. Regional University Hospital Carlos Haya.*

8. RELATED DOCUMENTATION

- *Tube guide. BD Vacutainer*

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