
“Blood Culture Collection, For Bacteria, Fungus/Yeast, or Mycobacteria/AFB”

Principle:

Proper blood culture collections ensures timely and accurate detection of living microorganisms in a patient’s blood, which has great diagnostic importance. When bacteria multiply at a rate that exceeds the capacity of the reticuloendothelial system to remove microorganisms, a bacteremia and/or fungemia illness will result. Blood is drawn and cultured to identify the bacteria and/or fungus and determine susceptibility patterns before antibiotic therapy is started. Blood cultures can be drawn to detect bacteria (BLDA or BLDCU), fungus/yeast (FUNBL), or acid fast bacteria known as mycobacteria (AFBBL).

The volume of blood drawn is critical, because the concentration of organisms in the majority of bacteremias is low, especially if the patient is on antimicrobial therapy, and the sensitivity of blood cultures in detecting pathogens is proportional to the volume of blood collected. A significant number of bacteremias will be missed in adults if testing samples contain less than ten milliliters of blood, making twenty milliliters per culture bottle the optimal and requested minimum volume for an aerobic and anaerobic blood culture. The routine draw will be twenty milliliters of blood in both the aerobic bottle and anaerobic bottle. During a feverish episode, two sets of blood cultures should be obtained, and if possible, each set should be drawn from a separate site. In infants and children, the concentration of organisms during bacteremia is higher than adults, so less blood is required for culture. Pediatric bottles should only be used for pediatric patients whose age and condition preclude drawing greater than three milliliters of blood. Drawing from an indwelling catheter is not acceptable unless diagnosis of catheter sepsis is suspected.

Procedure:

A. Reagents, Supplies, and Equipment

1. Bactec bottles
 - i. All bottles are stored at room temperature
 - ii. Plus aerobic/F bottle (grey)
 - iii. Lytic anaerobic/F bottle (purple)
 - iv. Peds Plus/F bottle (pink)
 1. For pediatric patients only
 - v. Mycolytic/F lytic bottle (white)
 - vi. If these aerobic or anaerobic bottles are unavailable, the following bottles may also be used
 1. Standard aerobic/F bottle
 2. Standard anaerobic/F bottle (yellow)
2. 70% isopropyl alcohol pads
3. 2% chlorhexidine/alcohol solution, Alcohol pads/swabsticks (70% isopropyl alcohol), Povidone iodine swabsticks
4. Syringe

5. Safety needles
 6. Tourniquet
 7. Gloves
 - i. Must be worn at all times during the collection process.
 8. Lab Coat
 - i. Must be worn at all times during the collection process.
 9. Blood transfer device.
- B. Blood culture collection
1. Follow clinician's orders for specimen site.
 2. If possible, draw blood below an existing intravenous line to prevent dilution of the blood with infusion fluid.
 3. No more than three cultures may be drawn in a 24 hour period (unless from multiple lines) without prior review and approval by the microbiology Medical Director.
- C. Collection by peripheral venipuncture.
1. Identify and draw from two separate peripheral sites, if possible.
 2. Determine and collect the appropriate volume of blood
 - i. The appropriate volume of blood is critical because the sensitivity of blood cultures in detecting pathogens is proportional to the volume of blood collected.
 1. 16-20 ml is the optimal collection volume, making that 8-10 ml in each bottle. However, there is a minimum amount required, which is often times 6-10 ml total.
 2. Inoculating more than recommended for the specific blood bottle being used can interfere with the automatic instruments ability to detect a positive culture.
 3. Pediatric blood culture bottles should only be used for pediatric patients.
 - ii. Below is a summary of the Hospital Information System (HIS) blood culture orders, with their corresponding Bactec bottle types and volumes required:
 1. For optimal yield, it is best to collect maximum volume of blood for each bottle.

| HIS Order | Bactec Bottle & (Label Color) | Maximum | Minimum | Set Draw |
|---|--|----------------|--------------|--|
| *Culture: Aerobic & Anaerobic Blood (BLDCU) | Plus Aerobic/F (grey) Lytic/Anaerobic/F (purple) | 10 ml 10 ml | 3 ml 3 ml | 6 to 20 ml split equally between both bottles * < 6 ml drawn: add to Aerobic bottle only, reorder as Culture, Aerobic Blood (BLDA) |
| Pediatric Patients | PedsPlus/F Aerobic (pink) Lytic/Anaerobic/F (purple) | 3 ml 10 ml | 1 ml 3 ml | 6 to 14 ml add 3 ml to PedsPlus bottle and the remainder in Anaerobic bottle |
| **Culture, Aerobic Blood (BLDA) | Plus Aerobic/F (grey) | < 6 ml | 3 ml | 3 to 6 ml |

| | | | | |
|---|---------------------------|------|------|--|
| | | | | **only for difficult draw patients |
| Pediatric Patients | PedsPlus/F Aerobic (pink) | 3 ml | 1 ml | 1 to 3 ml |
| *** Culture AFB, Blood (AFBBL) | Myco/F Lytic (white) | 5 ml | 3 ml | 1 bottle/order/day ***see below |
| Pediatric Patients | Myco/F Lytic (white) | 3 ml | 1 ml | 1 bottle/order/day ***see below |
| *** Culture Fungus, Blood (FUNBL) | Myco/F Lytic (white) | 5 ml | 3 ml | 1 bottle/order/day Add order comment if specific yeast or mold suspected. ***see below |
| Pediatric Patients | Myco/F Lytic (white) | 3 ml | 1 ml | 1 bottle/order/day Add order comment if specific yeast or mold suspected. ***see below |
| *** Simultaneous orders for both FUNBL and AFBBL must have separate Myco/F Lytic bottles collected. | | | | |

3. Collection

- i. Identify the patient using two patient identifiers (patient name and date of birth) according to our patient identification procedure.
- ii. Apply a tourniquet and select puncture site.
- iii. Loosen the tourniquet.
- iv. Properly prepare skin prior to venipuncture.
 1. Clean the puncture site with a 70% isopropyl alcohol pad.
 2. Clean the area a second time with an approved antiseptic solution.

- a. 2% chlorhexidine/alcohol solution
 - (1) Wipe with a back and forth motion on the puncture site, for thirty seconds.
 - (2) Allow the area to dry for another thirty seconds.
 - (3) Do not blot or wipe away.
- b. Alcohol pads/swabsticks
 - (1) Use a circular motion to cleanse the venipuncture site, starting at the puncture site and moving outward, using three swabsticks.
 - (2) Allow the area to air dry for approximately two minutes.
- c. Individuals with an iodine hypersensitivity
 - (1) Cleanse with 70% isopropyl alcohol pad only.
 - (2) Cleanse the area for at least sixty seconds.
 - (3) Allow the area to completely dry prior to venipuncture.
- v. Once the antiseptic has been applied, do not palpate the site, unless a sterile glove or a glove which has been prepped with an alcohol pad is being worn.
- vi. Clean the rubber top (septum) of the culture bottles with 70% isopropyl alcohol.
 - a. Do not use iodine on Bactec bottles as this will cause specimen leaking.
- vii. Reapply the tourniquet.
- viii. Using a sterile safety needle and syringe, perform the venipuncture and withdraw the appropriate volume of blood.
- ix. Activate the safe medical device
- 4. Inoculation
 - i. Use a BD Blood Transfer Device to inoculate the appropriate blood culture bottle(s).
 - 1. Be careful not to overfill the bottles.
 - 2. Inoculating more than recommended for any particular blood bottle, will interfere with the automated instruments ability to detect a positive culture.
- D. Collection by butterfly.
 - 1. Can be used if a patient is a difficult draw.
 - 2. Identify the patient using two patient identifiers (patient name and date of birth) according to our patient identification procedure.
 - 3. Butterfly collection device adds blood directly into the Bactec bottle(s).
 - i. The Bactec bottle has volume markings on the label.
 - ii. Indicate on the Bactec bottle label where the appropriate (optimal) volume is, making sure it's above the inoculated liquid media line, to ensure each bottle is filled properly.
 - iii. Add the appropriate amount of blood to the indicated line being careful not to overfill.
 - 4. Gently mix the contents by inverting the bottles 4-5 times.
 - 5. Label each bottle while at the patient's chair or bedside, according to policy.
 - i. When labeling the bottle(s), it is important not to cover the manufacturer's label or barcode.
 - ii. Position the LIS barcode label vertically in a straight line, opposite the manufacturer's label.
 - 1. This ensures the bottle(s) can be properly scanned.

iii. Document in the HIS and on each bottle label, how the culture was drawn.

1. BLPH = Blood, Peripheral draw
2. BLLN = Blood, Line draw

E. Additional Notes:

1. Store bottles at room temperature, away from direct sunlight and/or ventilation sources, until courier pickup.
2. Do not place in the refrigerator.
3. When multiple cultures are ordered, draw the samples from separate venipuncture sites, if possible, and clearly indicate on each label the collection time and set number, which should both match up with the test requisition.
4. Blood culture bottles cannot be drawn using a disposable vacutainer hub.
5. Drawing from an indwelling catheter is not acceptable, unless diagnosis of catheter sepsis is suspected.