

Blood Culture Collection Procedure

Principle

Detection of organisms in a patient's blood has diagnostic and prognostic importance. When bacteria multiply at a rate that exceeds the capacity of the reticuloendothelial system to remove them; bacteremia results. Bacteria enter the blood stream from extravascular sites via the lymphatic vessels. Blood cultures are essential in diagnosis and treatment of the etiologic agent of sepsis. Bacterial sepsis constitutes one of the most serious infectious diseases and, therefore, expeditious detection and identification of blood-borne bacterial and fungal pathogens is one of the most important functions of the diagnostic microbiology laboratory. Guidelines to achieve this end are described in this procedure.

Materials

1. BacT/Alert® aerobic blood culture bottle (blue)
2. BacT/Alert® anaerobic blood culture bottle (purple)
3. BacT/Alert® blood culture system adapter
4. Wampole™ Isolator™ tube (10 mL) for filamentous fungal and acid-fast bacilli (AFB) blood cultures
5. Wampole™ Isolator™ tube (1.5 mL) for pediatric AFB and fungal blood cultures
6. Chloraprep® One-Step Frepp® applicator (1.5 mL); Medi-Flex Inc., store at room temperature
7. Chloraprep® One-Step Sepp® (0.67 mL) applicator
8. Butterfly needle
9. Alcohol pad

Safety

During all routine operation and maintenance procedures of this equipment, protective safety equipment is required. Appropriate devices will be utilized to ensure Standard Precautions compliance.

Methods

General Considerations

Number and Timing:

Most cases of bacteremia are detected by using 2 or 3 sets of separately collected blood cultures. More than 3 sets of blood cultures in a 24-hour period yield little additional information. Conversely, a single blood culture may miss intermittently occurring bacteremia and make it difficult to interpret clinical significance of certain organisms.

1. Acute sepsis: Collect 2 or 3 culture sets from separately prepared sites prior to starting antibiotic therapy.
2. Acute endocarditis: Obtain 3 blood culture sets with 3 separate venipunctures over 1 to 2 hours, and begin therapy.
3. Subacute bacterial endocarditis: Obtain 3 blood culture sets on day 1. If all are negative at 24 hours, obtain 3 more.
4. Patients on antibiotic therapy: Blood should ideally be drawn just prior to next dose of antibiotic. Dilution of blood in culture bottles should allow for recovery of bacteria in routine BacT/Alert® aerobic and BacT/Alert® anaerobic bottles.

Blood Volume			
Weight Kg	Weight lb	Volume of Blood to Collect	Bottle Type
<4.0	<8.8	1 mL	Aerobic BacT/Alert® (Blue)
4-14	8.8-31	3 mL	Aerobic BacT/Alert® (Blue)
15-25	31-55	10 mL	Aerobic BacT/Alert® (Blue)
>25	>55	20 mL	Aerobic BacT/Alert® (Blue) + Anaerobic BacT/Alert® (Purple)

Collection Sites:

Blood can be collected by venipuncture of peripheral veins or from intravascular catheters.

****If blood is obtained from an intravenous catheter, a corresponding specimen should also be obtained by venipuncture.****

Collection Procedure-Peripheral Draw:

1. Disinfect culture bottles or Isolator™ tubes with an alcohol pad prior to venipuncture.
2. Remove 1.5 mL Chloraprep® One-Step Frepp® Applicator from container. Hold in a horizontal position and pinch handle to break ampoule. Do not continue to squeeze handle.
3. Place sponge on selected venipuncture site and depress once or twice to saturate sponge.
4. Scrub vigorously for at least 30 seconds and allow site to dry before proceeding.

Note: If at all possible, do not repalpate vein after disinfecting skin prior to inserting needle. If re-palpation is necessary, apply iodine or alcohol to gloved finger and allow it to dry before re-palpating site.

5. Insert needle into vein and secure it with tape or have a coworker secure needle.
6. Place an adapter cap on BacT/Alert® blood culture bottle septum and press down to penetrate and obtain blood flow. Verify that blood flows into bottle. Hold adapter cap down on bottle during collection. Line demarcations on bottle label indicate sufficient blood volume.
7. After obtaining specified amount of blood, move adapter cap to next BacT/Alert® bottle (if required) and continue the collection. Do not remove needle from patient's vein during this process.
8. After blood collection is complete, remove adapter cap from culture bottles and then remove needle from patient's vein.
Note: If blood was collected using a syringe, see "Guide to Bottle Selection" chart to determine proper distribution of blood.
9. Label each bottle using a computer generated label, or label by handwriting. Label must contain: patient's name and identification number, collection date and time, collector's initials and source or site.
10. Bandage venipuncture site following standard protocol.
11. Send blood cultures to Microbiology Laboratory as soon as possible.
12. If collecting a blood culture that requires Isolator™ Microbial System (AFB or fungus), prep stopper with alcohol. Use the Isolator™ as you would a VACUTAINER®.

Collection Procedure-Line Draw:

1. Shut off intravenous (IV) fluids infusing through line and clamp lumen.
2. Disinfect top of blood culture bottles with an alcohol pad.
3. Clean hep-lock cap with a Chloraprep® One-Step Sepp® Applicator. Allow to dry before proceeding (at least 30 seconds).
4. Using a sterile 20-mL syringe, aspirate 20 mL of blood.
5. Inject 10 mL of blood through rubber top of each blood culture bottle.
Note: For short draws, see "Guide to Bottle Selection" chart to determine proper distribution of blood.
6. Attach a sterile syringe and flush lumen with heparin, if indicated.
7. Uncap IV tubing, reconnect to central line, and resume any IV infusions.
8. Collect a second blood culture by using the peripheral draw technique.

Guide to Bottle Selection		
Bacterial	Adult	BacT/Alert® aerobic culture bottle + BacT/Alert® anaerobic culture bottle (blue-10mL) (purple-10 mL)
	Pediatric	BacT/Alert® aerobic culture bottle (blue-1 mL to 3 mL)
	Short Draw (<10 mL)	BacT/Alert® aerobic culture bottle (blue)
	Short Draw (>10 mL but <20 mL)	BacT/Alert® aerobic culture bottle (blue-10mL) remaining goes into BacT/Alert® anaerobic culture bottle (purple-10 mL)
Fungal	Adult	Isolator™ tube (10 mL)
	Pediatric	Isolator™ tube (1.5 mL)
Acid-Fast	Adult	Isolator™ tube (10 mL)
	Pediatric	Isolator™ tube (1.5 mL)
Short Draw Examples		
8 mL drawn: All blood goes into BacT/Alert® aerobic bottle (blue)		
12 mL drawn: Place 10 mL in BacT/Alert® aerobic bottle (blue) and 2 mL in BacT/Alert® anaerobic bottle (purple)		

References

Isenberg HD, et al. 1994. Clinical Microbiology Procedure Manual, ASM Press, Washington, D.C.
 Hindler J, Dunne M, Nolte F, et al. 1997. Blood culture III, Cumitech 1B. ASM Press, Washington, DC.
 CLSI. 2007, Principles and Procedures for Blood Cultures; Approved Guideline. CLSI Document M-47-A, CLSI, 940 West Valley Rd, Suite 1400, Wayne, PA 19087-1898.
 Author: R.C. Fader, Ph.D.; Section Chief, Microbiology/Virology