

INCIDENCE OF PATHOGENS ISOLATED FROM BLOOD SPECIMENS

IN

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Introduction:

The results of blood culture studies can provide important information to the physician concerning the presence of septicemia in his patient, the type of bacterial pathogens involved and ultimately the antibiotics to which the organism is susceptible. The negative culture would be helpful in ruling out bacterial etiology of a present illness if the methodology used in blood culture were reliable to this extent. Unfortunately, this is not the case. Given a patient with septicemia, the demonstration of bacteria by culture methods from a blood specimen of this patient depends on many factors. of great importance is the number of bacteria present per unit volume of blood. Realizing that there are minimal levels of organisms necessary to initiate growth one may find that a suitable inoculum is not contained in the normal volume of blood drawn for culture (5-10 ml.). This volume should be increased to 20-30 ml.

The current status of bacteremia at the time the specimen is taken must be considered and is a critical determining circumstance. Organisms may be shed into the circulatory system in "showers" so that at any one time great numbers may be present. Within a few hours these

organisms may be cleared from the circulation and then reappear in another shower a few hours later. If blood is drawn between these times of high count bacteremia the likelihood of obtaining spuriously negative results is increased. Of less importance in a septicemia in timing is which large numbers of organisms are consistently present in the blood during the early course of the illness.

Antibacterial therapy prior to taking the specimen may, of course, largely determine the success or failure of blood culture. If there is a high level of circulating antibiotic, even though this level is inadequate to kill the organisms in the blood, there may be enough carry-over into the culture to either kill the organisms or suppress their in vitro reproduction. When the laboratory is informed of the antibiotics that the patient has received, growth suppression may be avoided by technical manipulations, e.g., addition of penicillinase to the medium.

The practice of taking multiple specimens greatly increases the chances of obtaining positive cultures. While it usually is not necessary to repeat blood cultures every two hours around the clock, it is certainly to the physician's advantage

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Incidence of Pathogens

Table 1 Percentage of Pathogens isolated from patients' blood samples (1971)

Months	Total Specimens	Isolated Pathogens in Blood												
		Salmonella sp.	S. aureus	Pseudo- monas sp.	Diphtheroids	E. coli	D. pneumoniae	β + α Strept.	Akaligenes fecalis	Neisseria sp.	Klebsiellae sp.	Serratia	Aerobes	
		%	%	%	%	%	%	%	%	%	%	%	%	
Jan. 71	316	1.5	7.9	1.2	2.5	2.2	.9	.3	1.2				.6	
Feb. 71	312		8.0	1.2	3.5	4.8	1.2	1.6	1.5		.3		.3	
Mar. 71	322	.9	6.8	1.2	3.1	1.7	1.2	.6	.2				1.2	
Apr. 71	303	1.2	7.1	1.2	4.1	3.8	.3		2.9	.3	.3		.5	
May 71	332	1.2	7.2	2.1	5.4	2.7	.9		2.4				.6	
Jun. 71	302	2.6	3.2	2.6	5.2	2.9	.6	.3	1.3		.6		.6	
Jul. 71	290	1.1	1.8	1.1	3.4	4.8	.3	.6	2.6		.6		.3	
Aug. 71	343	.8	7.5	1.4	3.7	6.1		.2	2.4		.2		.8	
Sep. 71	345	1.4	6.3	1.1	2.8	4.6	.5				.2		1.7	
Oct. 71	316	2.3	6.0	3.1	1.8	3.7	.9	1.2	2.2	.3	.3		.3	
Nov. 71	303	1.9	4.8	1.9	1.9	4.5	.3	.3	.3		.9		.6	
Dec. 71	206	2.4	1.9	.9	2.4	2.8	2.4	1.4	.4		.4		1.4	

to take blood cultures at the time when the organisms are expected to be present in the greatest number. The physician should order blood culture studies during each febrile episode. If subacute bacterial endocarditis is suspected, culturing on alternate days for two to three weeks may be required to yield positive findings. Frequently, diagnosis by culture has been established only after the cessation of antibiotic therapy for several days.

Normally, positive blood cultures will not be recognized until after 18–24 hours of incubation. Although this is a long interval to wait in the case of a critically ill patient, it is necessary. The microscopic examination of the whole blood specimen will but rarely disclose the presence of bacteria, although staining the buffy coat is slightly more efficient in detecting bacterial forms.

Over pathogens that are associated with specific diseases are not difficult to evaluate when isolated from culture. However, there are a number of organisms that are known to be a part of the normal flora of the body that can and do cause a severe or life threatening illness when they find their way into the circulatory system. Since these organisms, notably, coliforms, *Staphylococcus albus*, various alpha hemolytic streptococci, and diphtheroids are also found on the skin and other body surfaces, culturing one of these organisms from the blood always raises some doubt as to whether

the organism was actually in the blood or occurred as a contaminating organism at the site of venipuncture. A rule of thumb to use in guiding the physician is that if one of these organisms is repeatedly cultured from the blood this constitutes firm evidence that they are indeed from the circulation and are regarded as pathogenic, rather than representing dermal contamination.

Procedures :

The procedures use in the Department of Microbiology Chula Hosp. Med. School are as follow:

1. Use TSB* as the media 30 ml. for each Hemoculture bottle
2. Air are withdrewed and Co₂ are added in the bottle.
3. Subculture the every 1st. and 7 th. day of incubation using the blood agar plates and the differential media (BB. agar)**
4. Check for the colonies present after 24 hrs. incubation

Summary :

Summarily, negative blood culture results are of doubtful value as a diagnostic aid. The practice of taking a blood culture during the temperature rise, and of taking a multiplicity of cultures over a time period of several days will markedly increase the possibility of obtaining a positive culture. When antibiotic therapy

* Trypticase Soy broth.

** The Differential brom thymol blue agar containing lactose.

has been started several hours or more before the specimen is taken, the likelihood of obtaining a positive result is greatly minimized. It is helpful for the laboratory to be informed as to the antibiotic used.

It should be understood that most of the organisms that reside in or on the body have at one time or another been found to cause disease and have been isolated from the blood. These are the same organisms that occasionally occur as

contaminants. Therefore, the correlation of the blood culture report with the clinical progress of the patient is of great importance.

References :

1. Watson, K.C. Isolation of *Salmonella typhi* from the blood stream. *J. Lab. Clin. Med.*, 46, 128. (1955).
2. Patho-Capsule—from College of American pathologists, Chicago, Illinois.