False-Positive Macroscopic Appearance of Blood Cultures in Sorbitol-Containing Hypertonic Medium

DAVID F. WELCH AND MICHAEL T. KELLY†*

Clinical Microbiology Laboratories, Veterans Administration Medical Center, and Department of Pathology, University of Utah College of Medicine, Salt Lake City, Utah 84148

Received for publication 26 February 1979

Inability to rely on macroscopic examination as an aid in identifying positive blood cultures was encountered when a hypertonic medium containing sorbitol was tested in a comparative study with an isotonic blood culture medium.

Macroscopic examination of blood cultures is a useful method for detecting growth of the most commonly encountered microorganisms. Cultures of blood in isotonic media rarely become turbid unless growth of an organism occurs. However, media containing sucrose as a hypertonic agent have been noted to cause lysis and delayed sedimentation of blood cells, thus making inspection of the bottles for microbial growth difficult. Rosner (4) reported a false-positive rate of greater than 75% in blood culture media containing 10% sucrose. A new hypertonic blood culture medium (Pfizer Diagnostics) has recently been developed which reportedly avoids the problem of excessive turbidity. The medium contains 6% sorbitol as a hypertonic agent instead of sucrose. This communication describes our experience with the new hypertonic medium.

Blood cultures were submitted to the Clinical Microbiology Laboratory of the Veterans Administration Medical Center in sets of three bottles: two containing 100 ml of Columbia broth (CB; Difco) with sodium polyanethol sulfonate and CO₂ and one containing 100 ml of brucella broth (Pfizer) with 6% sorbitol (sorb-B), sodium polyanethol sulfonate, and CO₂. Instructions were given to inoculate each bottle of the set with 10 ml of blood. The sorb-B and one of the CB cultures were vented in the laboratory, and all bottles were incubated at 35°C. Routine subcultures were performed after 1, 5, and 21 days of incubation.

Of approximately 100 blood specimens tested, only those cultured in CB were clear after 1 to 2 days of incubation. Few sorb-B cultures could be unequivocally designated as negative at any time throughout the incubation period, based on macroscopic observations. After 7 days of incubation, the smear- and culture-negative sorb-B

broths varied from a slightly turbid to a "chocolatized" appearance. Hemolysis was evident in a number of the sorb-B blood cultures. Figure 1 shows the appearance of blood cultures in sorb-B compared to CB. Figure 1A demonstrates the appearance of a positive culture in sorb-B (*Streptococcus pneumoniae*, 48 h). Figure 1B shows the almost identical appearance of a negative culture in sorb-B. Figure 1C is a negative culture in CB. Blood cultures in sorb-B such as that shown in Fig. 1D had less turbidity, but the reduced turbidity was due to a smaller blood inoculum. Figure 1E shows the turbidity and hemolysis seen in other negative sorb-B blood cultures. In all cases, blood inoculated into the hypertonic medium was more turbid than that in CB, and in most cases visual inspection could not be used to distinguish positive and negative cultures.

The number of specimens included in the study did not allow for conclusions to be made regarding the recovery of organisms in sorb-B compared to CB. However, all of the organisms isolated from CB were also recovered from sorb-B. In one case, *S. pneumoniae* was isolated only from the sorb-B. In addition, two isolates of *Propionibacterium* and *Bacillus* species were recovered after 21 days only from the sorb-B.

Numerous studies have indicated that hypertonic media are superior to isotonic media in terms of increased numbers of isolates and more rapid recovery rates (1-3, 5, 6). Ideally, the hypertonic systems should also allow for positive blood cultures to be readily recognized by a simple inspection of the bottles. We conclude that the sorbitol-containing medium evaluated in the present study does not allow for daily inspection for macroscopic evidence of growth in most cases. Further study will be needed to determine if there is an advantage in terms of increased numbers of significant isolates that would warrant the use of this medium.

† Present address: Clinical Microbiology Division, Clinical Laboratories, University of Texas Medical Branch, Galveston, TX 77550.

FIG. 1. (A) Blood culture in sorb-B from which *S. pneumoniae* was isolated. (B) Negative blood culture in sorb-B showing turbidity and hemolysis. (C) Negative blood culture in CB showing no turbidity and no hemolysis. (D) Negative blood culture in sorb-B showing less turbidity due to smaller inoculum. (E) Negative blood culture in sorb-B showing hemolysis and turbidity.

LITERATURE CITED

1. Henrichsen, J., and B. Bruun. 1973. An evaluation of the effects of a high concentration of sucrose in blood culture media. *Acta Pathol. Microbiol. Scand. Sect. B* **81**:707-710.
2. Rosner, R. 1972. A quantitative evaluation of three blood culture systems. *Am. J. Clin. Pathol.* **57**:220-227.
3. Rosner, R. 1974. Evaluation of four blood culture systems using parallel culture methods. *Appl. Microbiol.* **28**:245-247.
4. Rosner, R. 1974. Comparison of macroscopic, microscopic, and radiometric examinations of clinical blood cultures in hypertonic media. *Appl. Microbiol.* **28**:644-646.
5. Rosner, R. 1976. Growth patterns of a wide spectrum of organisms encountered in clinical blood cultures using both hypertonic and isotonic media. *Am. J. Clin. Pathol.* **65**:706-710.
6. Sullivan, N. M., V. L. Sutter, W. T. Carter, H. R. Attebery, and S. M. Finegold. 1972. Bacteremia after genitourinary tract manipulation: bacteriological aspects and evaluation of various blood culture systems. *Appl. Microbiol.* **23**:1101-1106.