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Use of the BacT/Alert Blood Culture System for Culture of Sterile Body Fluids Other than Blood

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Studies have demonstrated that large-volume culture methods for sterile body fluids other than blood increase recovery compared to traditional plated-medium methods. BacT/Alert is a fully automated blood culture system for detecting bacteremia and fungemia. In this study, we compared culture in BacT/Alert standard aerobic and anaerobic bottles, BacT/Alert FAN aerobic and FAN anaerobic bottles, and culture on routine media for six specimen types, i.e., continuous ambulatory peritoneal dialysate (CAPD), peritoneal, amniotic, pericardial, synovial, and pleural fluids. Specimen volumes were divided equally among the three arms of the study. A total of 1,157 specimens were tested, with 227 significant isolates recovered from 193 specimens. Recovery by method was as follows: standard bottles, 186 of 227 (82%); FAN bottles, 217 of 227 (96%); and routine culture, 184 of 227 (81%). The FAN bottles recovered significantly more gram-positive cocci ($P < 0.001$), *Staphylococcus aureus* ($P = 0.003$), coagulase-negative staphylococci ($P = 0.008$), gram-negative bacilli ($P < 0.001$), *Enterobacteriaceae* ($P = 0.005$), and total organisms ($P < 0.001$) than the routine culture. There were no significant differences in recovery between the standard bottles and the routine culture. The FAN aerobic bottle recovered significantly more gram-positive cocci ($P < 0.001$), *S. aureus* isolates ($P < 0.001$), coagulase-negative staphylococci ($P = 0.003$), and total organisms ($P < 0.001$) than the standard aerobic bottle, while the FAN anaerobic bottle recovered significantly more gram-positive cocci ($P < 0.001$), *S. aureus* isolates ($P < 0.001$), *Enterobacteriaceae* ($P = 0.03$), and total organisms ($P < 0.001$) than the standard anaerobic bottle. For specific specimen types, significantly more isolates were recovered from the FAN bottles compared to the routine culture for synovial ($P < 0.001$) and CAPD ($P = 0.004$) fluids. Overall, the FAN bottles were superior in performance to both the standard bottles and the routine culture for detection of microorganisms from the types of sterile body fluids included in this study.

The traditional method for culture of sterile body fluids other than blood involves culture on solid medium with or without an enrichment broth, such as thioglycolate broth. Concentration of specimens is accomplished by filtration or centrifugation.

For some types of body fluids, other large-volume culture methods have been evaluated, including culture in blood culture bottles. Continuous ambulatory peritoneal dialysate (CAPD) specimens are particularly well-suited to large-volume culture techniques, because specimen volume is often very large, while the concentration of organisms can be relatively low. Several commercial blood culture systems, including Bactec (Becton Dickinson Microbiology Systems, Cockeysville, Md.), Septi-Chek (Becton Dickinson Microbiology Systems), and Isolator (Wampole Laboratories, Cranbury, N.J.), have been used for CAPD culture (4, 5, 13, 17). The use of blood culture bottles has also been shown to be superior to conventional culture for the diagnosis of spontaneous bacterial peritonitis (3). More-limited studies have also suggested a role for culturing of synovial fluids in blood culture bottles, particularly for pediatric patients (12, 18).

The BacT/Alert system is a continuously monitored blood culture system for detecting bacteremia and fungemia (10). In addition to the standard BacT/Alert aerobic and anaerobic blood culture bottles, new media, designated FAN aerobic and FAN anaerobic bottles, are available. FAN bottles have been shown to enhance the recovery of fastidious bacteria, bacteria from patients receiving antimicrobial therapy, and yeasts in comparison to the standard BacT/Alert bottles (15, 16).

Although the BacT/Alert system has been thoroughly evaluated for culturing of blood, only a limited number of studies have evaluated the utility of this method for culturing of other types of sterile body fluids (1, 2, 11). The present study was designed to assess the performance of the BacT/Alert system to recover microorganisms from several types of sterile body fluids with standard aerobic and anaerobic bottles and FAN aerobic and FAN anaerobic bottles versus conventional media. Additionally, we wanted to determine whether there was any difference in recovery between the BacT/Alert FAN bottles and the standard BacT/Alert bottles.

MATERIALS AND METHODS

All specimens were collected from patients at Geisinger Medical Center, Danville, Pa.; The Reading Hospital and Medical Center, Reading, Pa.; or the University of Michigan Medical Center, Ann Arbor, Mich.

Specimen types included in this study were pleural, peritoneal, pericardial, amniotic, and synovial fluids and CAPD. Only specimens with a minimum volume of 3.0 ml were included. A maximum volume of 60 ml was utilized, even when more specimen was available. All specimens were collected by standard protocols for collection of sterile fluids at the three participating institutions.

The specimens were divided into three equal aliquots. One aliquot was divided equally between one set of standard BacT/Alert aerobic and anaerobic bottles, the second aliquot was divided equally between one set of BacT/Alert FAN aerobic and FAN anaerobic bottles, and the third aliquot was used to inoculate the routine bacteriology media. When the volume for routine culture was equal

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TABLE 1. Comparative yield of clinically significant isolates of bacteria and yeast by specimen type

Specimen type (total specimens)	No. of positive specimens (% positive)	No. of total isolates	No. of isolates (% of total no. of isolates) recovered from:			*P* for FAN versus routine method
			Routine culture	Standard bottles	FAN bottles	
Peritoneal (209)	46 (22.0)	66	52	51	59	NS[a]
Pleural (241)	10 (4.1)	13	11	9	13	NS
Synovial (361)	50 (13.8)	51	37	40	51	<0.001
CAPD (287)	85 (29.6)	95	82	84	92	0.004
Amniotic (15)	0 (0.0)	0	0	0	0	NC[b]
Pericardial (27)	2 (7.8)	2	2	2	2	NC
Total (1,140)	193 (16.9)	227	184 (81.0)	186 (86.3)	217 (95.6)	<0.001

[a] NS, not significant ($P > 0.05$).
[b] NC, not calculated when total number of isolates was ≤10.

to 1 ml, the specimen was divided among the plated media, thioglycolate broth, and a slide for Gram staining. Specimen types were placed into three groups for plating on routine medium. Synovial and pericardial fluids (group 1) were plated on blood agar plates, chocolate agar plates, and thioglycolate broth with vitamin K and hemin. CAPDs (group 2) were plated on the group 1 media plus MacConkey agar plates. Peritoneal, pleural, and amniotic fluids (group 3) were plated on the group 2 media plus Columbia nalidixic acid agar plates and anaerobic blood agar plates, phenylethyl alcohol agar plates, and laked kanamycin-vancomycin agar plates. When the volume for routine culture was >1.0 ml, the specimen was centrifuged, resuspended in 1.0 ml of supernatant, and plated in the manner used for the 1.0-ml specimens.

After venting of the standard aerobic and FAN aerobic bottles, all bottles were loaded into BacT/Alert instruments. The instruments were the same instruments utilized in the laboratories for routine blood cultures. The standard BacT/Alert software was used. Bottles flagged as positive by the BacT/Alert system were subcultured and interpreted according to the standard protocols for each of the participating laboratories. For the purposes of this study, each bottle was processed independently of the other three bottles in a set, i.e., a negative bottle was not examined when another bottle in a set was flagged as positive (except as noted below for terminal subcultures). All BacT/Alert bottles were incubated for 7 days at The Reading Hospital and Medical Center and the University of Michigan Medical Center and for 6 days at Geisinger Medical Center.

When growth was detected on routine media or in one or more of the bottles from one specimen but not in the other bottle(s) inoculated from the same specimen, terminal subcultures were performed on the negative bottles at the end of the standard incubation period. Aerobic and anaerobic bottles were subcultured on chocolate agar plates incubated aerobically in a 5 to 10% CO_2-enriched atmosphere. Anaerobic bottles were also subcultured on blood agar plates incubated anaerobically. Approximately 20% of all other negative sets of bottles were also blindly subcultured on the same media to establish an accurate false-negative rate.

Routine plated and tubed media were incubated at 35°C in either 5 to 10% CO_2 (aerobic culture) or anaerobically (anaerobic culture). The routine media were examined by the standard protocols in use at each of the participating laboratories. Aerobic cultures were incubated for a minimum of 2 days, while anaerobic cultures were maintained for a minimum of 5 days. Bacterial identification and antimicrobial susceptibility testing were performed according to standard laboratory protocols.

Chart review was conducted by the principal investigator at each site to determine which isolates were clinically significant.

Statistical analyses were carried out by methods described by Ilstrup (6).

RESULTS

A total of 1,157 specimens were included in this study (Table 1). In one of our laboratories, we limit the workup of specimens containing more than three different organisms. Indeed, that was the reason why specimens with more than three organisms were excluded from this study. Seventeen specimens (14 peritoneal, 1 amniotic, 1 pleural, and 1 CAPD) each grew four or more different organisms on the routine culture and were excluded from further analysis. Of the remaining 1,140 specimens, 284 were positive by one or more methods, including 185 which grew clinically significant microorganisms, 91 which grew one or more microorganisms which were not clinically significant, 7 which grew a significant isolate(s) mixed with a microorganism which was not clinically significant, and 1 which grew a significant isolate mixed with an isolate the significance of which could not be determined. In all, there were 227 significant isolates.

Of the 227 significant isolates, 184 (81.0%) grew in the routine culture, 186 (81.9%) grew in the standard bottles, and 217 (95.6%) grew in the FAN bottles. No significant differences were noted between the yields of the routine culture and the standard bottle culture for either individual specimen types or cumulatively. However, significantly more isolates were recovered from the FAN bottles than from the routine cultures for synovial ($P < 0.001$) and CAPD ($P = 0.004$) specimens as well as for total specimens ($P < 0.001$). A trend toward significance was noted for peritoneal fluids favoring the FAN bottles over the routine culture ($P = 0.09$).

A summary of significant isolates is presented in Table 2. No significant differences in organism detection were noted between the routine culture and standard bottle culture for specific microorganisms. However, in comparing the recovery of specific microorganisms between the routine culture and the FAN bottle culture, significantly more gram-positive cocci ($P < 0.001$), *S. aureus* isolates ($P = 0.003$), non-*S. aureus Staphylococcus* sp. isolates ($P = 0.008$), gram-negative bacilli ($P < 0.001$), *Enterobacteriaceae* ($P = 0.005$), and total organisms ($P < 0.001$) were recovered from the FAN bottles than from the routine culture.

A summary of the significant isolates from each of the four bottle types is presented in Table 3. The FAN aerobic bottle recovered significantly more yeast than the FAN anaerobic bottle ($P < 0.001$), while the FAN anaerobic bottle recovered significantly more anaerobic bacteria than the FAN aerobic bottle ($P = 0.003$). The standard aerobic bottle recovered significantly more yeast than the standard anaerobic bottle ($P < 0.001$).

In comparing each FAN bottle to its standard counterpart (Table 3), significant differences were noted. The FAN aerobic bottle recovered significantly more gram-positive cocci ($P < 0.001$), *S. aureus* isolates ($P < 0.001$), non-*S. aureus Staphylococcus* sp. isolates ($P = 0.003$), and total isolates ($P < 0.001$) than the standard aerobic bottle. The FAN anaerobic bottle recovered significantly more gram-positive cocci ($P < 0.001$), *S. aureus* isolates ($P < 0.001$), *Enterobacteriaceae* ($P = 0.03$), and total isolates ($P < 0.001$) than the standard anaerobic bottle.

Blind subcultures were performed on all bottles read as negative by the instrument for which another bottle(s) or the routine culture was positive. For the aerobic bottles, terminal subculture detected one *Candida albicans* isolate from a FAN bottle and one *C. albicans* isolate and one *S. aureus* isolate from standard aerobic bottles. Terminal subculture of the standard anaerobic bottles detected three *C. albicans*, one *Candida tropicalis*, one coagulase-negative staphylococcus, and two *Fla-*

vobacterium odoratum isolates, while terminal subculture of the anaerobic FAN bottle detected five *C. albicans* isolates, one *Candida parapsilosis* isolate, one *Candida tropicalis* isolate, one *Pseudomonas aeruginosa* isolate, two *Flavobacterium odoratum* isolates, and one coagulase-negative staphylococcus isolate.

In addition, blind terminal subcultures were performed on all four bottles from 192 specimens, with negative results by all methods. No additional isolates were detected by these subcultures.

Three bottles were flagged as positive by the BacT/Alert instruments, but no organisms were seen by Gram staining and no organisms grew from subculture of the bottles. These three bottles were classified as false-positive results. The false-positive test results did not appear to be related to the specimen volume in these three bottles. Two of the bottles had ≤2.5 ml, while the third bottle had 5.01 to 7.5 ml. There were no false-positive results from the 157 specimens (628 bottles) containing the largest inoculum volumes, i.e., 7.51 to 10 ml.

DISCUSSION

This study was undertaken to compare the BacT/Alert system with a routine culture method for the recovery of microorganisms from six types of sterile body fluids other than blood. Although it has been marketed and cleared by the Food and Drug Administration for the detection of microorganisms from blood, the reported success of other blood culture methods and systems in the culture of body fluids other than blood prompted us to evaluate the BacT/Alert system for this purpose.

The results of this study show that the standard BacT/Alert bottles are equivalent to a rigorous, routine culture method for the recovery of bacteria and yeast from sterile body fluids other than blood.

The yield of the FAN bottles in this study was superior to those of both the standard bottles and the routine culture. The increased yield of the FAN bottles in comparison to that of the standard bottles in this study with body fluids other than blood was similar to published results obtained with blood (15, 16).

When blood is cultured in blood culture bottles, the blood itself provides some of the nutrients required for the growth of fastidious microorganisms, such as *Neisseria gonorrhoeae*. It is doubtful that an unsupplemented blood culture bottle used for the culture of body fluids other than blood can support the growth of all fastidious microorganisms. Fuller et al. evaluated the recovery of microorganisms from sterile body fluids in a study which compared a routine culture method with the Bactec Plus 26/27 culture system (5). The Bactec bottles were evaluated with and without a fastidious supplement. They recovered one isolate of *N. gonorrhoeae* and two isolates of *Haemophilus influenzae* only from the supplemented bottles. In this study, we recovered no isolates of *N. gonorrhoeae*. One isolate of *H. influenzae* was recovered from a FAN anaerobic bottle only.

An alternative to supplementing the bottles could be the use of a single chocolate agar plate. Indeed, the frequency with which such fastidious organisms might be isolated from specific types of fluids may influence the decision as to whether an unsupplemented bottle could serve as a stand-alone culture medium. For example, *N. gonorrhoeae* is a rare cause of CAPD infections but occurs more frequently in synovial fluids; thus, a chocolate agar plate might be added to a blood culture bottle for a synovial fluid but not for a CAPD fluid. Additional studies are needed to permit a more-accurate assessment of the need for either a fastidious supplement to the blood culture media or supplementary solid media for various specimen types.

TABLE 2. Comparative yield of clinically significant isolates of bacteria and yeast

Microorganism	Total no. of isolates	No. of isolates from:			*P* for FAN vs routine method
		Routine culture	Standard bottles	FAN bottles	
Gram-positive cocci	138	111	111	133	<0.001
S. aureus	51	42	39	51	0.003
Coagulase-negative staphylococcus	50	41	42	48	0.008
Enterococci	18	13	14	16	NS[e]
Streptococci[a]	19	15	16	18	NS
Gram-positive bacilli	4	3	4	3	NC[f]
Corynebacterium sp.	3	2	3	2	NC
Listeria sp.	1	1	1	1	NC
Gram-negative bacilli	54	42	46	53	<0.001
Enterobacteriaceae[b]	39	31	33	39	0.005
Other GNB[c]	15	11	13	14	NS
Anaerobes	9	7	5	9	NC
Clostridium sp.	5	3	2	5	NC
Anaerobic GNB	4	4	3	4	NC
Fungi					
Yeast[d]	22	21	20	19	NS
All microorganisms	227	184	186	217	<0.001

[a] Includes four *S. pneumoniae* isolates; one group B, three group G, and seven *viridans* group streptococci; two *S. milleri* group isolates; one *S. mitis* isolate; and one *S. sanguis* isolate.

[b] Includes 12 *Escherichia coli*, 9 *Enterobacter cloacae*, 2 *Enterobacter aerogenes*, 1 *Enterobacter* sp., 2 *Klebsiella oxytoca*, 2 *Klebsiella pneumoniae*, 5 *Serratia marcescens*, 2 *Citrobacter freundii*, and 4 *Proteus mirabilis* isolates.

[c] GNB, gram-negative bacilli. Includes two *Pasteurella multocida*, one *Campylobacter jejuni*, four *Pseudomonas aeruginosa*, one *Pseudomonas putida*, one *Pseudomonas alcaligenes*, one *Flavimonas oryzihabitans*, two *Flavobacterium odoratum*, one *Haemophilus influenzae*, and one *Aeromonas* sp. isolate and one unidentified oxidase-positive, gram-negative bacillus.

[d] Includes nine *C. albicans*, four *C. tropicalis*, one *C. glabrata*, seven *C. parapsilosis*, and one *C. pseudotropicalis* isolate.

[e] NS, not significant ($P > 0.05$).

[f] NC, not calculated when total number of isolates was ≤10.

Among the significant variables which can affect the yield of blood cultures, it is generally agreed that the volume of blood cultured is the most important (7). For the BacT/Alert system, specifically, Weinstein et al. demonstrated a significant increase in yield between standard BacT/Alert bottles inoculated with 10 ml of blood, compared to 5 ml (14). One of the advantages of using blood culture bottles for the inoculation of body fluids other than blood is that the bottles are designed to culture 5 to 10 ml of blood (depending on the manufacturer and bottle type), far more than can effectively be cultured in, e.g., a thioglycolate broth tube.

Four types of blood culture bottles were used in this study, including standard aerobic and anaerobic and FAN aerobic and anaerobic bottles. Each FAN bottle recovered significantly more isolates than its standard counterpart, but there was no statistically significant difference in overall recovery between the FAN aerobic and FAN anaerobic bottles. As might have been anticipated, the FAN aerobic bottle recovered more yeast and the FAN anaerobic bottle recovered more anaerobic bacteria. The choice of a single bottle type may be influenced by specimen type as well as bottle type. For example, anaerobic isolates are much less common in synovial fluids than in peritoneal fluids. Nonetheless, if a single bottle is to be used, a

TABLE 3. Comparative yield of clinically significant isolates of bacteria and yeast from four bottle types

Microorganism(s)	Total no. of isolates	No. of isolates from:				*P*	
		Standard aerobic	FAN aerobic	Standard anaerobic	FAN anaerobic	Aerobic standard vs FAN aerobic	Anaerobic standard vs FAN anaerobic
Gram-positive cocci	138	100	125	109	127	<0.001	<0.001
S. aureus	51	36	50	38	50	<0.001	<0.001
Coagulase-negative staphylococcus	50	39	48	41	45	0.003	NS
Enterococci	18	11	12	14	15	NS[a]	NS
Streptococci	19	14	15	16	17	NS	NS
Gram-positive bacilli	4	4	3	2	2	NC[b]	NC
Gram-negative bacilli	54	44	46	39	45	NS	NS
Enterobacteriaceae	39	31	34	31	37	NS	0.03
Other GNB[c]	15	13	12	8	8	NS	NS
Anaerobes	9	1	1	5	9	NC	NC
Yeast	20	20	19	8	4	NS	NC
All microorganisms	225	169	194	163	187	<0.001	<0.001

[a] NS, not significant ($P > 0.05$).
[b] NC, not calculated when total number of isolates was ≤10.
[c] GNB, gram-negative bacilli.

FAN aerobic bottle seems best. In our experience, empiric antimicrobial therapy is more likely to lack coverage for yeast than coverage for anaerobes.

In this study, we demonstrated that significantly more isolates were recovered with the FAN bottles than with standard bottles or routine culture from both synovial and CAPD fluids. Of these two specimen types, CAPD fluids usually have the greater specimen volume, particularly when the collection bag is sent to the laboratory. We are aware of no studies which have specifically addressed the question of whether the number of significant isolates increases when more than 10 ml of a sterile body fluid other than blood is cultured in FAN bottles. Is there any incremental benefit to culturing 20 or 30 ml or more, such as is done with blood cultures? We attempted to analyze our data to provide that answer. Unfortunately, only about one-quarter of our CAPD fluids were submitted with sufficient volume to permit full (10-ml) inoculation of each bottle type.

Overall, the FAN bottles recovered about 17% more clinically significant isolates than either the standard bottles or the routine culture method used in this study. A legitimate question that was beyond the scope of this study is whether this increase in yield was meaningful to the management of the patients in the study. In their evaluation of the significance of the increased yield of FAN bottles compared with that for the standard BacT/Alert bottles for culture of blood, McDonald et al. concluded that the majority of isolates and septic episodes detected only by the FAN bottles, or only by the standard bottles, were clinically important (8). Intuitively, it makes sense to us that at least some of the increased yield in this study should be clinically significant, particularly for types of infections in which empiric therapy or duration of therapy is not always predictable.

In an evaluation of the clinical importance of isolates recovered only from broth cultures, Morris et al. concluded that the broth, inoculated as an adjunct to direct plating, seldom yields results that benefit patient management (9). Of the specimen types included in our study, Morris et al. now utilize a broth culture in their laboratory only for CAPD specimens (9). The use of broth-based systems or methods for CAPD specimens is generally well accepted (14).

Bobadilla et al. demonstrated the benefit of using blood culture bottles for culture of peritoneal fluid for patients suspected of having spontaneous bacterial peritonitis (SBP) (2). Indeed, at our institutions, blood culture bottles are routinely used for diagnosis of SBP. Specimens from patients suspected of having SBP were not included in this study, in part because bedside inoculation of blood culture bottles is routinely performed. However, given the increased yield which we have demonstrated in this study for the FAN bottles compared with the standard blood culture bottles, it seems prudent to use FAN bottles for this purpose.

Excepting specimens for diagnosis of SBP as well as the dialysate from patients undergoing continuous ambulatory peritoneal dialysis, is there a benefit to using blood culture bottles for culture of specimens from patients suspected of having routine peritonitis? Although the results of our study were not statistically significant, there was a trend favoring increased recovery from FAN bottles ($P = 0.09$). It is reasonable to postulate that with larger numbers of specimens, statistical significance might be achieved. Nonetheless, we believe that there are several arguments against the routine use of blood culture bottles for culture of peritoneal fluid. Of the specimen types included in this study, polymicrobic infections were seen most frequently with peritoneal specimens. The costs associated with subculturing multiple organisms on selective and nonselective aerobic and anaerobic media may not be justified. Perhaps, if a Gram stain were used to screen out specimens with multiple morphotypes, mixed cultures would not be as common. Another reason not to culture routine peritoneal specimens in blood culture bottles is because, in our experience, suspected cases of peritonitis are often treated with broad-spectrum antimicrobials targeted toward mixed aerobic and anaerobic infections. Complete identification of every potential bacterial pathogen is not always necessary.

There have been few published studies which examined the potential benefits of culturing synovial fluid in blood culture bottles. von Essen and Holtta reported that with a blood cul-

ture bottle, 21% of joint fluids that were negative by routine culture were positive (12). The percentage of false-negatives increased to 40% when the patients were receiving antibiotics at the time of specimen collection.

Yagupsky et al., who cultured joint fluids of children, reported that 10 of 11 isolates of *Kingella kingii* grew only from a Bactec blood culture bottle but not from a routine culture method (18). We did not recover any *K. kingii* isolates in this study. However, Yagupsky et al. cultured specimens from pediatric patients, whereas few of our synovial fluids were collected from children.

In our study, 72% of significant isolates from synovial fluid were recovered by the routine method, 78% were recovered in the standard blood culture bottles, and 100% were recovered in the FAN bottles. We believe that the increased sensitivity of the FAN bottles merits further study of the clinical utility of the increased yield. Treatment of septic arthritis is prolonged and, in our experience, often involves prosthesis infections. It is not unusual for us to have patients who have been partially treated at referring hospitals or patients who have been given preoperative antibiotics before cultures were obtained. The increased yield of the FAN bottles could be particularly beneficial for these types of patients.

The small number of amniotic and pericardial fluid specimens included in this study does not permit any meaningful conclusions to be made about culture of these specimens in BacT/Alert bottles.

We could not demonstrate any benefit from culturing pleural fluid in BacT/Alert bottles. The overall low yield as well as the lack of difference in results among the three culture methods leads us to advocate not using blood culture bottles for these specimens.

Another advantage of using BacT/Alert (or other similar continuous monitoring blood culture systems) for the culture of sterile body fluids other than blood may be to lower labor costs associated with processing and interpreting these specimens. Overall, in this study, about 75% of all specimens yielded negative results. With an automated system, such as BacT/Alert, linked to a laboratory information system, a combination of sensitivity and lower labor costs can be achieved. Again, this would not necessarily apply to all of the fluid types tested in this study, as we have already stated. This approach clearly has the potential for selective application.

In summary, the BacT/Alert system gave excellent results when used for the culture of sterile body fluids other than blood. The FAN bottles demonstrated superior recovery compared to either the standard bottles or routine culture. The extent to which the BacT/Alert system could be used as a replacement for or supplement to routine culture methods will be influenced by specimen type, patient population, institutional supply versus labor costs, and further analysis of the clinical utility of results produced by broth-based culture methods. Currently, two of our laboratories use aerobic FAN bottles for culture of synovial and CAPD fluids, while the third laboratory uses aerobic FAN bottles for all of the fluid types included in this study. Two of our laboratories use no plated media in addition to the FAN bottles, while the third laboratory uses one piece of plated media in addition to the FAN bottle.

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