

# Evaluation of the VersaTREK automated microbial detection system for the detection of bacteria in platelet concentrates

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## BACKGROUND

Bacterial contamination of blood products remains a significant problem in transfusion medicine, despite the interventions of diversion and improved donor arm disinfection. Countries have implemented systems for the screen testing of platelet concentrates. The Bact/Alert automated microbial detection system, which detects a change in pH, which occurs with bacterial growth at present is the market leader for bacterial screen testing.

## AIM

The aim of the study was to evaluate the performance of the VersaTrek automated microbial detection system in comparison to Bact/Alert. VersaTrek uses a novel detection technology, which measures change in pressure inside the culture bottle from the production of or consumption of gas caused by microbial growth.



## METHODS

Two day old buffy coat derived pooled platelet concentrates were spiked with one species of microbe per bag at a concentration of 10 and 100 cfu/mL. The aerobic organisms were *S. epidermidis*, *S. aureus*, *B. subtilis*, *B. cereus*, *S. pyogenes*, *S. viridans*, *Corynebacterium spp.*, *E. coli*, *K. oxyfoca*, *S. marcescens*, *P. aeruginosa*, *E. cloacae* and *C. albicans*. Anaerobes used in the study were *Cl. perfringens* and *P. acnes*. Bact/Alert and VersaTrek culture bottles were inoculated with 4mL of platelet concentrate from the spiked bags. Bact/Alert standard aerobic, standard anaerobic and paediatric bottles were used. Two types of VersaTrek aerobic and anaerobic bottles were used. These differed in the volume of broth present (40mL in one set and 80mL in another). Culture bottles were incubated at 35°C on both systems for 7 days. All positives were subcultured and identified.



## RESULTS

At the 10cfu/mL inoculum level, VersaTrek detected all organisms in appropriate bottles except *B. subtilis* where 80% were detected in the 80ml bottles and 90% in the 40mL bottles. *Corynebacterium spp.* was only detected in 80% of the 40mL bottles. The anaerobic *Cl. perfringens* and *P. acnes* were also detected in aerobic VersaTrek bottles. Bact/Alert bottles at the 10cfu/mL pack concentration detected all organisms in the appropriate bottles. All organisms at 10 cfu/mL were detected with both systems in less than 24 hours, except for *C. albicans* (range 24.2 – 33.4 hours) and *P. acnes* (range 74.6 – 85.5 hours) (Table 1).

Table 1 – Mean Hours to Detection - 10 cfu/ml Inoculum (n=10 per bottle type)

Organism	Bact/Alert		VersaTrek			
	O <sub>2</sub>	Pediatric	AnO <sub>2</sub>	O <sub>2</sub> 80ml	O <sub>2</sub> 40ml	AnO <sub>2</sub> 40ml
<i>S. pyogenes</i>	14.2	14.3	11.6	11.9	11.6	14.6
<i>P. aeruginosa</i>	15.4	15.9	NEG	14.0	16.6	NEG
<i>E. coli</i>	12.0	12.5	10.0	10.4	10.4	16.1
<i>S. epidermidis</i>	12.2	10.8	12.1	9.7	9.8	30.8
<i>S. aureus</i>	11.6	12.5	13.7	10.1	10.2	23.7
<i>B. subtilis</i>	13.9	12.8	NEG	11.6(80%)	11.9(90%)	NEG
<i>B. cereus</i>	9.0	8.6	9.8	6.9	7.1	10.9
<i>S. viridans grp.</i>	19.0	15.9	18.6	16.1	15.8	29.2
<i>Corynebacterium sp.</i>	18.9	20.0	NEG	18.5	26.8(80%)	NEG
<i>K. oxyfoca</i>	11.4	11.2	10.6	9.6	9.7	13.1
<i>S. marcescens</i>	11.5	12.4	12.0	10.1	10.4	14.2
<i>E. cloacae</i>	11.6	11.5	10.7	8.9	9.0	12.9
<i>C. perfringens</i>	NEG	NEG	10.0	NEG	NEG	10.8
<i>P. acnes</i>	NEG	NEG	74.6	NEG	NEG	85.5
<i>C. albicans</i>	26.8	33.4	NEG	24.2	24.4	NEG
Mean	14.4	14.7	17.6	12.5	13.4	23.6

% - indicates percentage of positive bottles when less than 100%  
O<sub>2</sub> - aerobic broth Pediatric - aerobic broth AnO<sub>2</sub> - anaerobic broth

In the 100 cfu/mL part of the study both systems gave positive determinations within 17 hours. The only exceptions were *Corynebacterium sp.* where the VersaTrek mean determination time was 22.7 hours. *P. acnes* and *C. albicans* mean range determination times with both systems was 62.9 – 73.5 and 20.2 – 23.5 hours respectively (Table 2).

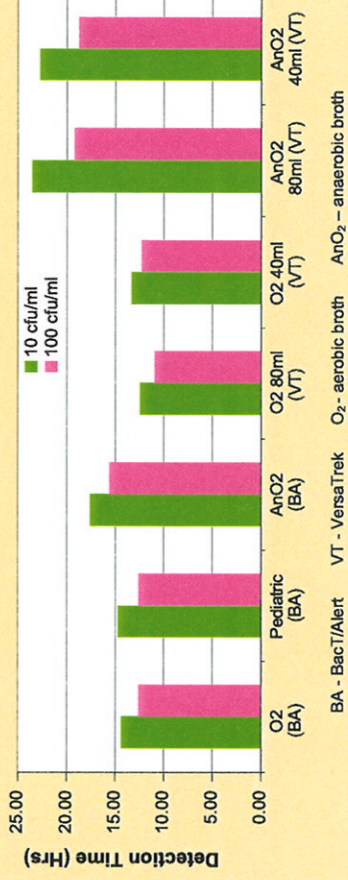
Table 2 – Mean Hours to Detection - 100 cfu/ml Inoculum (n=10 per bottle type)

Organism	Bact/Alert		VersaTrek			
	O <sub>2</sub>	Pediatric	AnO <sub>2</sub>	O <sub>2</sub> 80ml	O <sub>2</sub> 40ml	AnO <sub>2</sub> 40ml
<i>S. pyogenes</i>	12.6	13.0	10.7	10.9	9.9	12.4
<i>P. aeruginosa</i>	13.7	13.9	NEG	12.3	13.9	NEG
<i>E. coli</i>	10.8	11.3	10.1	9.2	9.4	13.5
<i>S. epidermidis</i>	11.9	10.8	11.9	9.4	9.6	20.8
<i>S. aureus</i>	10.2	11.1	11.8	8.7	8.9	19.5
<i>B. subtilis</i>	10.7	10.7	NEG	9.9	9.9	NEG
<i>B. cereus</i>	7.9	7.6	8.7	6.3	6.5	10.3
<i>S. viridans grp.</i>	16.8	13.8	16.3	14.4	14.3	21.9
<i>Corynebacterium sp.</i>	16.3	17.0	NEG	14.6	22.7	NEG
<i>K. oxyfoca</i>	10.2	10.1	9.7	8.8	8.9	10.6
<i>S. marcescens</i>	10.5	10.9	10.8	8.8	9.1	11.7
<i>E. cloacae</i>	10.3	10.4	9.7	8.2	8.4	10.9
<i>C. perfringens</i>	NEG	NEG	9.2	NEG	NEG	10.9
<i>P. acnes</i>	NEG	NEG	62.9	NEG	NEG	64.2
<i>C. albicans</i>	22.1	23.5	NEG	21.3	20.2	NEG
Mean	12.6	12.6	15.6	11.0	11.7	18.8

O<sub>2</sub> - aerobic broth Pediatric - aerobic broth AnO<sub>2</sub> - anaerobic broth

Determination times with both systems decreased with increase in bacterial concentration and were of the same order (Figure).

Figure. Detection Times: Mean Values for Each Bottle Type



## CONCLUSION

The Bact/Alert and VersaTrek systems demonstrated their ability to rapidly detect a wide range of organisms that have been reported in bacterial transfusion transmissions. Both systems will allow the screen testing of a large number of platelet concentrates with specific sample identification and low labour costs. VersaTrek potentially offers an alternative to the Bact/Alert for the screen testing of platelet concentrates to increase blood safety.