EAST LANCASHIRE

VersaTREK it’s in the blood... an evaluation of a new system

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Abstract

Objectives

The performance of current continuous-monitoring blood systems for the isolation of fastidious microorganisms that infrequently cause bloodstream infections, is poorly documented.

Therefore, we performed a controlled in-vitro simulation in blood culture bottles seeded with fastidious and other microorganisms, using three different blood culture systems: VersaTREK®, BACTEC® 9240 and BacT/ALERT®. We evaluated the performance of the systems using variable blood concentrations and with delayed vial entry protocol.

All three systems detected a wide range of Gram negative and Gram positive organisms, but had variations in detection times. When looking at microorganisms requiring blood for growth, the VersaTREK was found to be more effective in detecting these, especially in bottles containing lower concentrations of blood. This supports the VersaTREK’s inoculum guideline of 0.1ml – 10ml of blood.

We concluded that the VersaTREK, from TREK Diagnostic Systems, is at least a competitive alternative to other Blood Culture systems on the market.

Methods

Aerobic and anaerobic bottles, with and without fresh human blood, were inoculated and monitored in the VersaTREK, BACTEC and BacT/ALERT continuous-monitoring blood culture systems.

A total of 22 clinical and stock bacterial strains were tested.

Listeria monocytogenes, Enterococcus faecalis, Staphylococcus pneumoniae ATCC® 6355, Staphylococcus epidermidis ATCC® 12228, Fusobacterium necrophorum ATCC® 25286, Peptostreptococcus anaerobius ATCC® 13759, Clostridium perfringens ATCC® 13124, Bacteroides fragilis ATCC® 25285, and Clostridium perfringens.

Materials and Procedure

1. A total of 22 bacterial strains were tested.
2. Each isolate was sub cultured on plated media and incubated for 24-72 hours depending on the time needed to obtain adequate growth. A cell suspension was prepared equivalent to a 0.5 McFarland standard. This standard was dialyzed to achieve inoculums of 10–105 CFU per ml.
3. One each of TREK REDOX® 1 and REDOX® 2, BACTEC and BacT/ALERT standard aerobic and anaerobic bottles were inoculated with the diluted culture.
4. Two agar plates were each inoculated with 0.1ml of diluted culture, incubated and the colony counts recorded.
5. All bottles were incubated in their respective incubators until flagged as positive, or for a total of 5 days if negative.
6. Using the above procedure, samples were stored at room temperature for 24 hours prior to loading on the instruments to simulate delayed bottle entry.
7. Subcultures were performed on bottles showing no signal after 5 days incubation.

Results

Results Obtained in the Study

Illustrate That:

The VersaTREK system detected more micro-organisms than the other systems when tested with lower concentrations of blood, thus illustrating the importance of media quality.

The VersaTREK system isolated all the strains tested from at least one bottle of the seeded blood culture sets. However, there was significant variability among the systems in detecting organisms that required blood for growth.

The VersaTREK system was significantly superior at isolating the more fastidious organisms and organisms that require blood for growth.

Terminal subcultures were performed on all bottles that did not signal after 5 days incubation – no growth was observed in any of the negative bottles from any of the three systems.

Conclusions and Observations

The VersaTREK is a well-established system in the US, but is still in its early stages in the UK. During this preliminary time limited study there were a few anomalies in our data which if more time had been available it would have been useful to repeat.

Our data clearly showed that both aerobic and anaerobic media are required in both the VersaTREK, BACTEC and BacT/ALERT blood culture systems to achieve optimal recovery of the microorganisms studied. The study also showed that the VersaTREK media is highly enriched, and can detect fastidious organisms with minimal blood supplementation. This supports the FDA clearance for inoculum levels to be as low as 0.1ml.

The quality of the media had an important effect on isolation of fastidious organisms illustrated by the differing isolation rates from seeded bottles containing varying blood volumes. The excellent isolation results obtained illustrated the quality of the VersaTREK media, often producing better results than the established systems.

The volume of blood placed in blood culture bottles can have an important outcome on the final result, and this can vary upon the system used. The VersaTREK system showed excellent recovery even with 0.1ml of blood, illustrating its suitability for use with paediatric patients with no need for specially bottles.

In conclusion, the VersaTREK system from Trek Diagnostics is at least a comparable alternative to other systems on the market with many advantages as outlined in this study.

Acting as a trial site for a seeded study, staff made the following observations:

- The input and removal of samples was very easy allowing better bottle management than the other two systems.
- The Windows XP software was easy to use and user definable, allowing laboratories to define the software to suit their individual needs. The software also allows instant access, via the touch screen monitor to:
  - QC reports
  - Graphs
  - Patient information
  - Length of incubations
  - Automatic data backup
- Very open system to adjust to individual laboratory needs
- The option of screw cap bottle access or septum piercing was very popular and also gives the option to process non-liquid samples.

In conclusion – can we have one!