

# BD Diagnostics

Integrated Solutions



Blood Culture Diagnostics



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## BD integrated solutions in blood culture diagnostics that answer your needs

We are facing new challenges in clinical microbiology including the integration of new technologies, laboratory automation and information system networking. Innovations provide key support in the fight against sepsis but require an enhanced level of integration in the healthcare organisation (e.g. training, expertise, communication).

For blood culture diagnostics, everything starts at the patient's bedside with sample collection, and the key issue is to provide timely and accurate actionable results to guide the correct antimicrobial therapy for the patient. It is necessary to involve the microbiology lab as well as other healthcare workers involved in this clinical diagnosis.

In this magazine, we have selected various fictitious healthcare workers that could be yourself, or someone you are working with, and we show how BD's blood culture integrated solutions can contribute to answering their specific needs.

Do you recognize yourself in one of these testimonials?

Contact us to discuss your challenges!

# Sepsis:

A medical emergency and a clinical priority

Globally, an estimated **18 million** cases of sepsis occur each year.<sup>1</sup>

There are approximately **20,000 deaths** per day from sepsis worldwide.<sup>2</sup>

Every minute, about **14 people** die from sepsis.<sup>2</sup>

Sepsis causes more deaths per year than:  
+ **prostate cancer**  
+ **breast cancer**  
+ **HIV/AIDS** combined.<sup>1</sup>

Each hour of delay in initiation of effective antimicrobials can increase mortality rates by **7.6 %**.<sup>3</sup>

- Blood culture is the most important evidence-based method for the microbiological diagnosis of sepsis.<sup>4</sup>

# BD blood culture integrated solutions:

A commitment in the fight against sepsis

With more than 40 years of experience in microbiology sepsis diagnosis BD has developed an integrated solution in blood culture from specimen collection to actionable results.

BD is committed to delivering solutions which are centered around two principal axes:

## SOLUTIONS FOR **CLINICAL RESPONSIVENESS**



We provide innovative infectious disease diagnostic and information systems that dramatically reduce time-to-result, and provide clinicians with reliable, actionable, more comprehensive information sooner, resulting in improved patient outcomes.

## SOLUTIONS FOR **LAB EFFICIENCY**



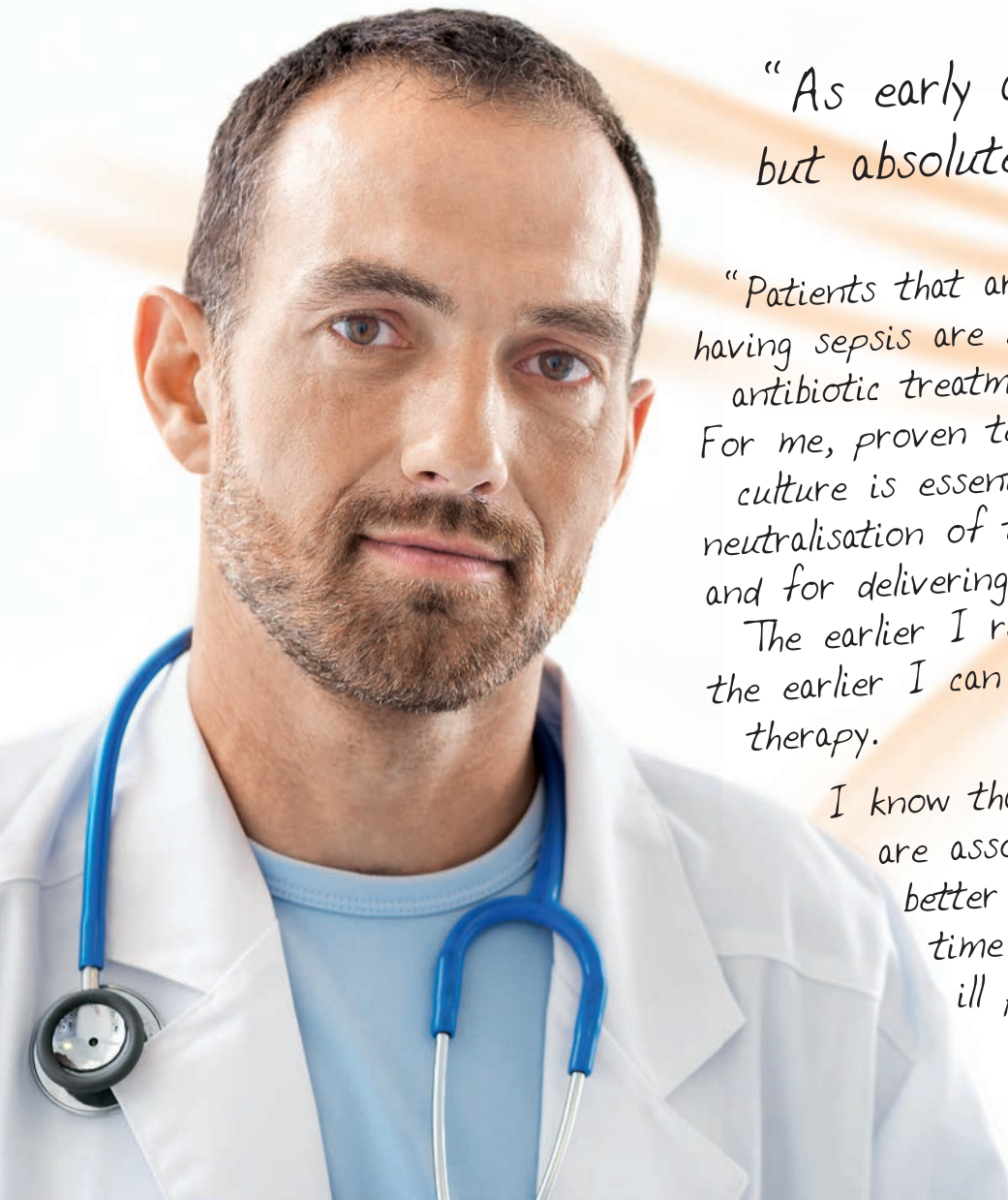
We provide integrated systems and lean processes for infectious disease diagnostics that drive laboratory efficiency and optimize the flow of diagnostic information.

<sup>1</sup> Global Sepsis Alliance. International Organizations Declare Sepsis a Medical Emergency; issued by an expert panel representing 20 adult and pediatric intensive care societies, 2010.  
<sup>2</sup> Daniels R. Surviving the first hours in sepsis: getting the basics right (an intensivist's perspective). Journal of Antimicrobial Chemotherapy, 2011; 66 (suppl2): ii11-ii23.  
<sup>3</sup> Kumar A, Roberts D, Wood KE, Light B, Parrillo JE, Sharma S, Suppes R, Feinstein D, Zanotti S, Taiberg L, Gurka D, Kumar A, Cheang M. Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock. Crit Care Med, 2006; 34: 1589-96.  
<sup>4</sup> Leitliniengerechte Blutkulturdiagnostik bei Sepsis und schweren Organinfektionen in der Intensivmedizin – ein unterschätztes Defizit. DDI 1 / 2010 (März); 23-30.



## Blood culture medium:

Fast and reliable results despite antibiotic treatment



*"As early as possible,  
but absolutely proven."*

*"Patients that are suspected of  
having sepsis are usually given empirical  
antibiotic treatment immediately.  
For me, proven technology in blood  
culture is essential for the effective  
neutralisation of these antibiotics,  
and for delivering rapid results.*

*The earlier I receive the results,  
the earlier I can adjust my patient's  
therapy.*

*I know that de-escalation strategies  
are associated with significant  
better survival and that  
time for these critically  
ill patients really matters."*

Eric De Kayser  
(Clinican, Belgium)



### Some facts

- According to the "Surviving Sepsis Campaign", it is recommended to obtain appropriate cultures before starting antibiotics provided this does not significantly delay antimicrobial administration.<sup>5</sup>
- However, one of the greatest challenges in blood culture is the fact that among patients from whom blood cultures have been obtained, 28–63 % are on antibiotic therapy at the time of blood draw. This can negatively affect the recovery of the etiologic agent.<sup>6</sup>

<sup>5</sup> Dellinger et al.: Crit Car Med 2008

<sup>6</sup> Flayhart et al: J Clin Microbiol. 2007

<sup>7</sup> Comparison of Two Blood Culture Media Shows Significant Differences in Bacterial Recovery for Patients on Antimicrobial Therapy by Zadroga et al., Hennepin County Med Ctr ePublished in Clinical Infectious Diseases Jan. 3, 2012.

## BD BACTEC™ Plus media:

Proven performance

### Unique, clinical head-to-head study proving BD BACTEC™ PLUS superiority<sup>7</sup>



Increased  
strain recovery

Shorter time  
to detection



Broader antibiotic  
neutralization



An independent study published in Clinical Infectious Diseases highlights the importance of antimicrobial removal systems in blood culture to rapidly and accurately aid in the diagnosis of sepsis.



#### Broader antibiotic neutralization

51% of patients in the General Wards, and 82 % of patients in the Medical ICU were already on antimicrobials within four hour prior to blood culture collection. Throughout the 241 day study period, 59 septic events were only identified from BACTEC media.<sup>7</sup>



#### Increased strain recovery

In the presence of antibiotics, BD BACTEC™ Plus Aerobic medium recovered 141% more organisms compared to another commonly used aerobic blood culture medium.<sup>7</sup>



#### Shorter time to detection

BD BACTEC™ Plus Aerobic medium demonstrated faster time to detection of up to 6 hours compared to another commonly used aerobic blood culture medium. Across all time points, BD BACTEC™ outperformed competitive system.<sup>7</sup>



To learn more please visit <http://cid.oxfordjournals.org/content/56/6/790>  
or contact your BD representative.

**BD BACTEC™ Plus Prime: next generation of resin-based medium  
with even broader range of antibiotic neutralization coming soon!**



# Blood culture sample collection:

Everyday safety in clinical practice



## Some facts

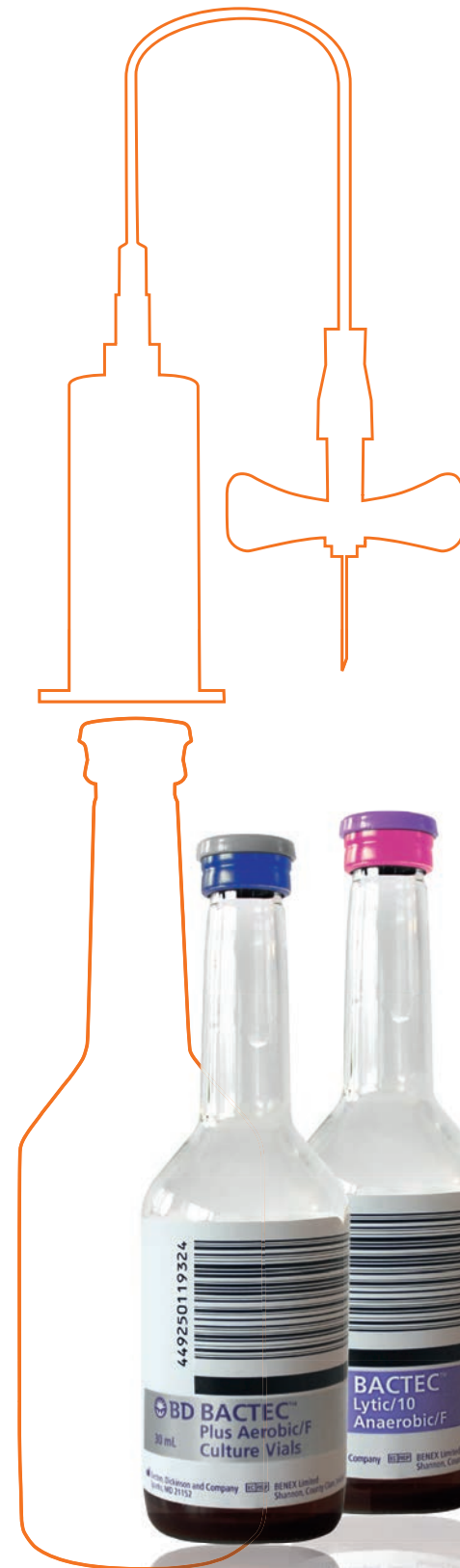
- In the EU, more than one million needlestick injuries occur every year.<sup>8</sup>
- A European Parliament report described needlestick injuries as: "...one of the most serious health and safety threats in European workplaces..."<sup>8</sup>
- Independent studies have shown that training, safer working practices and the use of safety-engineered devices can prevent more than 80 % of needlestick injuries.<sup>9</sup>

<sup>8</sup> European Parliament. Preventing needle-stick injuries in the health care sector, 11th February 2010.

<sup>9</sup> Sharps injuries – stepping up to the challenge in Europe. Available at <http://www.efnweb.eu/version1/en/documents/HHESharpsarticlePaulDeRaeyeEFN.pdf> (accessed April 2011).

# BD Vacutainer™ blood collection system:

Integrated solutions for convenience and safety during blood collection



**As the worldwide leader** in safety-engineered medical devices BD has designed its BD BACTEC™ blood culture bottles to be fully compatible with the widely available BD Vacutainer™ safety blood collection systems – thus reducing the risk of contaminations and accidental needle-stick injuries during blood collection and sub-culturing.



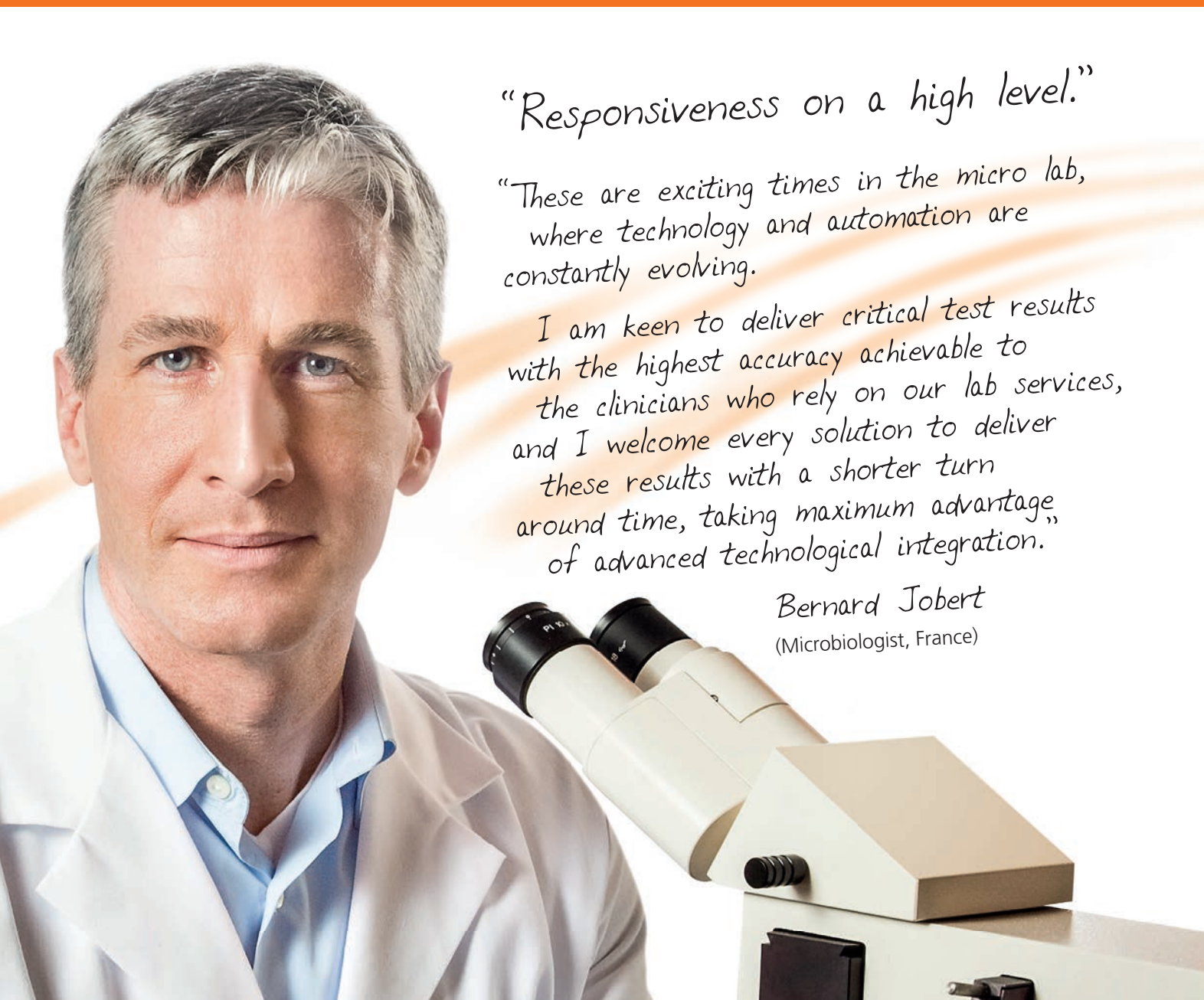
**BD's new blood culture bottles in plastic are smaller and lighter to facilitate handling during collection and transport.**

**Join us on our website dedicated to improving healthcare worker safety:**  
[www.bd.com/europe/safety](http://www.bd.com/europe/safety)



## Positive blood cultures:

Urgent need for accurate, rapid detection and identification



*"Responsiveness on a high level."*

*"These are exciting times in the micro lab, where technology and automation are constantly evolving."*

*"I am keen to deliver critical test results with the highest accuracy achievable to the clinicians who rely on our lab services, and I welcome every solution to deliver these results with a shorter turn around time, taking maximum advantage of advanced technological integration."*

Bernard Jobert  
(Microbiologist, France)



### Some facts

- Blood cultures are the best approach to establishing the etiology of bloodstream infections and infectious endocarditis. Moreover, rapid identification of the etiological agents of such severe infections is pivotal to guiding antimicrobial therapy.<sup>10</sup>
- Thus, more-rapid identification of the causative organism would be highly desirable to facilitate targeted treatment in the critical phase of septic illness.<sup>11</sup>

<sup>10</sup> Prod'hom et al: J Clin Microbiol. 2010.  
<sup>11</sup> Christner et al: J Clin Microbiol. 2010.

## BD and Bruker microbiology systems:

Partnering for quicker results

**The BD and Bruker microbiology systems:  
Direct identification and susceptibility testing of  
micro-organisms from positive blood cultures.**

The overall systems integration of the Bruker MALDI Biotyper, BD BACTEC™ Plus PRIME and BD Phoenix™ via BD EpiCenter™ enables a highly efficient workflow with rapid and accurate results for microbiology laboratories.



**BD BACTEC™  
PLUS PRIME**

**BRUKER  
MALDI BIOTYPER  
+ BD PHOENIX™**



# Optimal blood fill volumes:

More or less really matters

*"Trust, but monitor."*

*"Blood cultures are clinically critical and I welcome any tools which allow improved monitoring of this precious sample, and which could be used for lab accreditation purposes."*

*I need advanced tools to better track the activities in my lab, and especially to monitor the key clinical parameter of blood culture diagnosis: blood volume."*

Peter Evans  
(Quality Control Manager, UK)



## Some facts

- Each ml of blood, up to 10 ml, can increase the sensitivity of the blood culture by 3-5%.<sup>12</sup> While overfilling of bottles may cause false-positivity, underfilling reduces the sensitivity of blood cultures.
- It is recommended to collect 2-3 blood culture sets per patient.<sup>13</sup>
- Laboratories should routinely monitor the volume of blood cultured as a quality assurance activity and provide feedback to clinical staff to ensure that an adequate volume of blood is drawn for blood culturing.
- However, manual blood volume monitoring is time consuming and tedious, therefore not commonly done.

<sup>12</sup> Cockerill et al: Clin Infect Dis 2004.

<sup>13</sup> European Manual of Clinical Microbiology, 1st edition 2011.

# BD BACTEC™ Best Practices Program:

Automatic monitoring of blood volumes and blood culture bottles collected per patient

**BD BACTEC™ blood volume monitoring and blood culture bottles collected per patient are new and unique tools, in conjunction with BD BACTEC™ FX and BD EpiCenter™.**

The BD BACTEC™ blood volume monitoring tool measures initial blood volumes by analyzing the background signals from negative blood culture bottles.

The BD BACTEC™ blood cultures collected per patient module determines the number of blood culture vials per patient and links this parameter with the positivity rate.

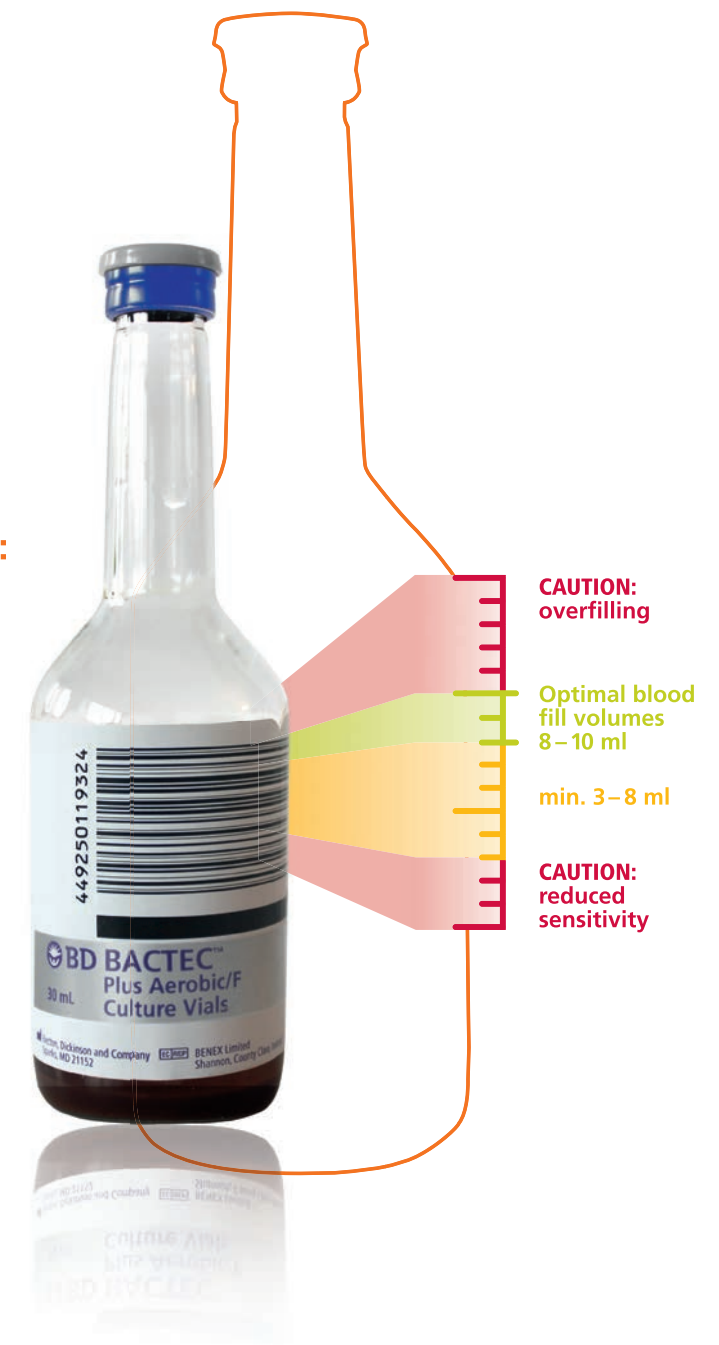
Comprehensive descriptive statistics allow detailed visibility on blood volumes and number of bottles per patient collected in different settings (e.g. wards or satellite hospitals), as well as over time.

The BD e-learning program (page 15) addresses guidance and recommendations to ensure that these parameters are correctly followed by clinical staff.

**BD EpiCenter™ enables the tracking of blood culture results by monitoring:**



- The optimal blood fill volumes
- The number of blood culture bottles per patient per day
- The percentage rate of contamination
- The percentage rate of organism recovery





# Assurance in best outcomes for patients:

Quality diagnostics starts at the patient's bedside

# BD BACTEC™ Best Practices Program:

E-learning program for guideline compliant blood culture preanalytics

*"Continuous learning for improved patient care."*

*"I want my nursing staff to be fully aware that the very first step in obtaining an accurate blood culture result, is crucially important and that a professionally collected blood sample may well save a patient's life."*

*"They need to understand how and when blood needs to be taken, and that the collected blood volume is key."*

*"Updating and upgrading their knowledge and skills is crucial. Continuous learning? We owe it to our patients."*

Ingrid Wahlstrom  
(Head Nurse, Norway)

## The BD e-learning tool:

- Is designed to give clinicians, nurses, and medical students guidance and recommendations on the optimal guideline-based collection of blood cultures in order to ensure accurate and clinically relevant results, thereby helping to provide appropriate patient treatment.
- Quickly and easily conveys knowledge about the clinical relevance and diagnostic value of blood cultures.
- Interactively explains in a series of four different modules how to perform guideline-conform blood culture collection.
- Confirms and documents the acquired knowledge through a final assessment.



## Some facts

- Poorly collected specimens will not only yield poor diagnostic results, they also generate significant unnecessary costs. For example, blood culture contamination is common, accounting for up to 50 % of positive blood cultures. Blood culture contamination leads to unnecessary therapy, prolonged stay and additional costs (> 3,300 €/episode).<sup>14</sup>
- High quality blood culture collection can be achieved through use of guideline-based, proper sampling techniques and continuous medical staff education.<sup>14</sup>



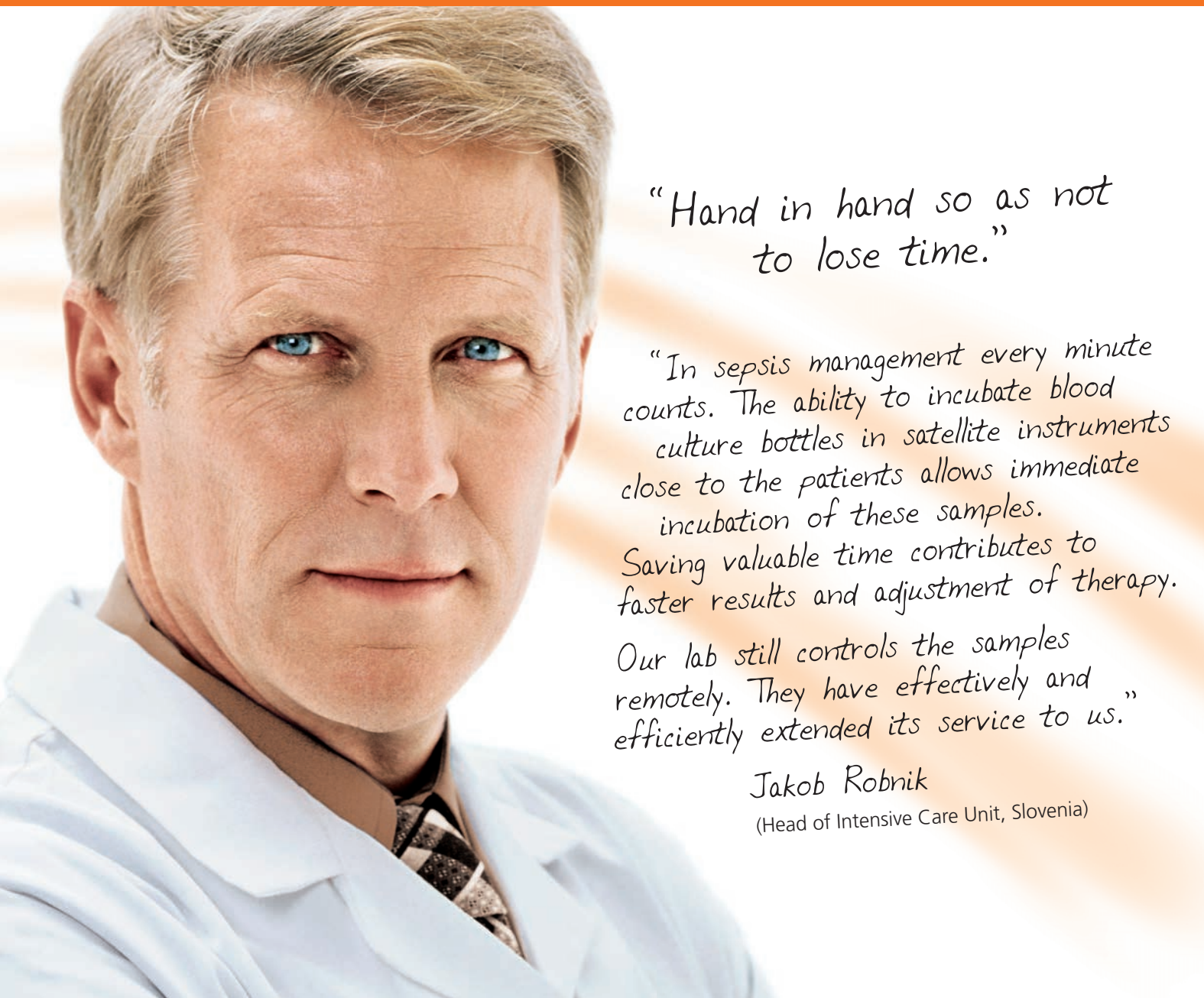
<http://bd.elmg.net/ets/content/home.php>

**In addition, BD offers its vast pre-analytical expertise and leading solutions in blood collection at on-site trainings.**



## Immediate incubation:

Every minute counts



*"Hand in hand so as not to lose time."*

*"In sepsis management every minute counts. The ability to incubate blood culture bottles in satellite instruments close to the patients allows immediate incubation of these samples.*

*Saving valuable time contributes to faster results and adjustment of therapy.*

*Our lab still controls the samples remotely. They have effectively and efficiently extended its service to us."*

Jakob Robnik  
(Head of Intensive Care Unit, Slovenia)



### Some facts

- To optimize the clinical use of blood culture results, the interval between the collection of blood and the entry of the bottles into an automated blood culture system should be kept to a minimum.<sup>15</sup>
- Published guidelines recommend that this interval should not be longer than 2 or 16 hours in the US and Germany, respectively.<sup>16, 17</sup>
- However, because of off-site collection or restricted lab operating hours, there may be substantial delay between blood culture inoculation and entry into the instrument.<sup>18</sup>
- Immediate incubation of blood cultures outside laboratory hours reduces turnaround times and accelerates antibiotic switching.<sup>19</sup>

<sup>15</sup> Van der Velden et al.: J Clin Micro 2011.

<sup>16</sup> Thomson RB et al. Specimen collection; transport and processing: bacteriology. Manual of Clinical Microbiology, 8th ed. ASM Press 2003.

<sup>17</sup> Reinhardt et al.: 2010, S-2k guidelines of the German Sepsis Society.

<sup>18</sup> Chapin and Lauderdale J Clin Microbiol. 1996.

<sup>19</sup> Kerremans et al: J Clin Microbiol. 2009.

## BD satellite blood culturing:

Near patient testing

**Our new BD BACTEC™ FX 40 with a capacity of 40 vials and full connectivity features can be easily placed in wards for satellite blood culturing.**

Using the power of the BD EpiCenter™ client-server network system, multiple BD BACTEC™ FX blood culture systems can be controlled via a high speed Local Area Network (LAN), no matter where they are located within a hospital. This allows BD BACTEC™ FX systems to reside in multiple locations (e.g. ICU and micro lab) within a medical center while the data can be accessed from any connected BD EpiCenter™ station (satellite blood culturing).

Immediate incubation of blood cultures outside laboratory hours reduces turnaround times and accelerates antibiotic switching.

A study shows that the median time from specimen collection until growth detection was reduced by 10.1 h with a satellite blood culturing setting. The median time until the first change in the antibiotic regimen was 42.8 h in satellite setting compared to 64.0 h in the centralized setting.<sup>20</sup>





## Value for money – a procurement perspective:

A key challenge – return on investment



*“Investing in diagnostic equipment is a serious matter.”*

*“I need to keep control of my budget and find savings, so I carefully select my suppliers. They need to have recognised expertise in microbiology and demonstrate the returns I can get from their platforms. They must also commit to addressing our growing needs for Lab Automation, and fast/cost efficient diagnostic testing.”*

Barbara Nolte  
(Head of Procurement department, Germany)

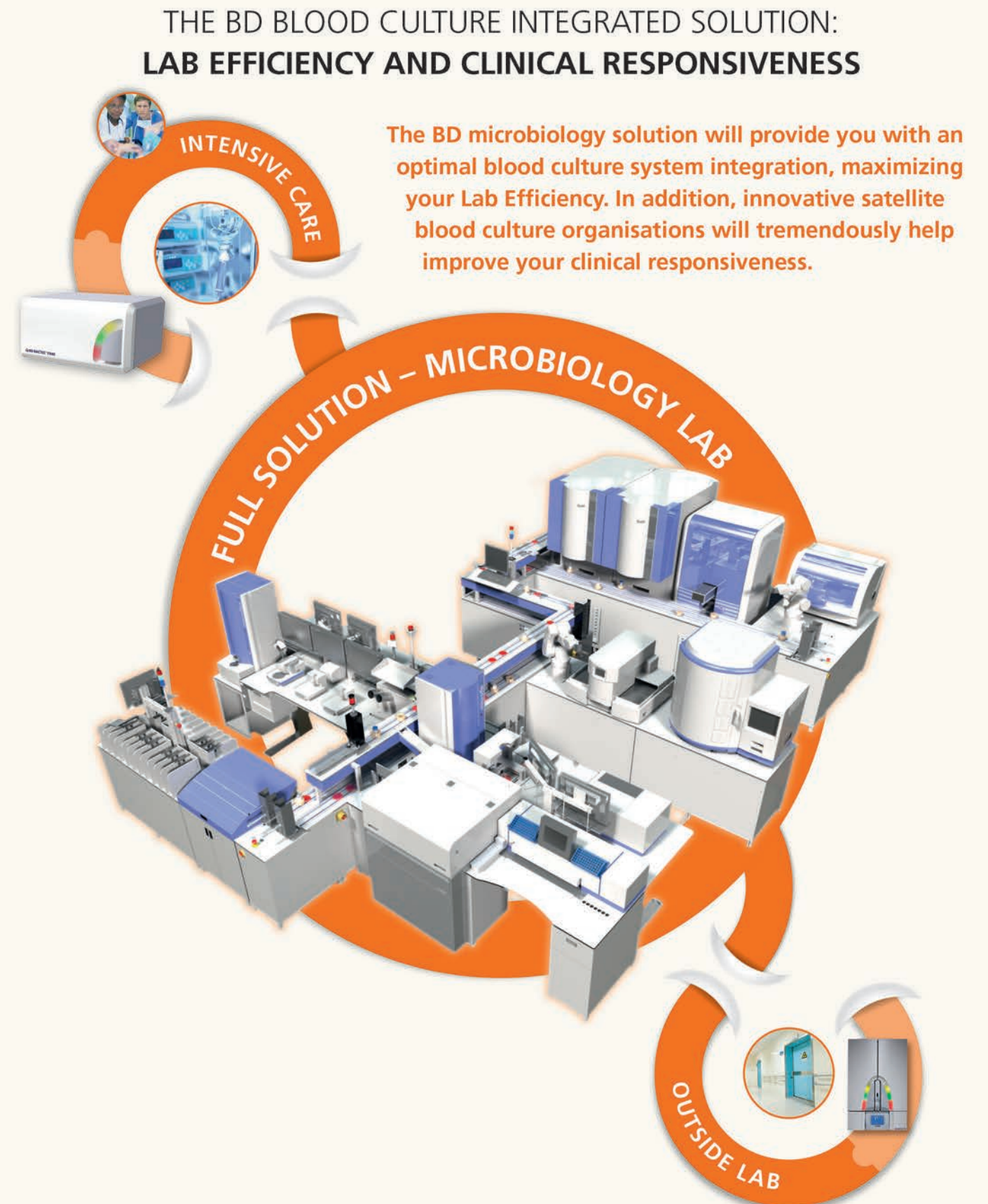


### Some facts

- Health care institutions are under long-term pressure to provide existing health services to patients even as demand increases over time and a significant amount of money needs to be saved in the upcoming years for healthcare to meet the level of demands on the system. These demands include an ageing population, the increasing cost of drugs and equipment, and dealing with lifestyle changes.

## The BD integrated microbiology solution:

The best investment the hospital can make





# BD Diagnostics:

We invite you to experience our other integrated solutions and innovations

**Do you want to learn more about BD microbiology solutions?**



Please visit our website for further information on our total integrated solutions: [www.bd.com/ds/europe](http://www.bd.com/ds/europe)



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