thermo scientific

On suspicion of sepsis every second counts

B·R·A·H·M·S PCT: Early sepsis diagnosis and monitoring in critically ill patients

Procalcitonin (PCT) in INTENSIVE CARE

ThermoFisher SCIENTIFIC

B·R·A·H·M·S PCT facilitates early sepsis diagnosis

PCT – the best in early diagnosis of bacterial infection and sepsis

Early detection and specific clinical intervention is crucial for the improved outcome of patients with sepsis. Every hour delay in receiving antibiotics is associated with 7.6% decrease in survival in adults with septic shock.[1]

PCT levels increase within 3-6 hours after bacterial challenge and make a significant contribution to the clinical diagnosis of sepsis. **In patients with >0.5 µg/L PCT a bacterial infection is likely and the administration of antibiotics is recommended.**[2-4]

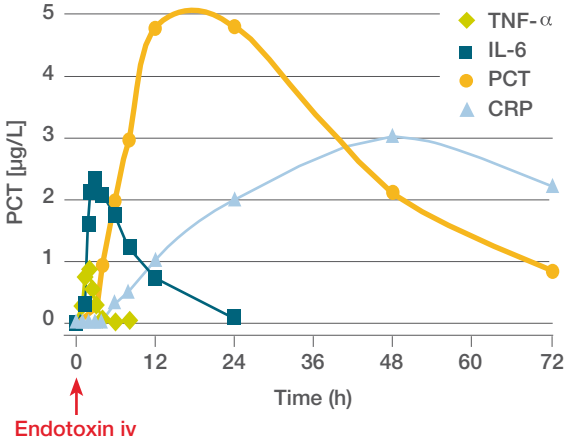


Figure 1 Kinetics of PCT compared to other inflammatory markers upon infection[2,3,5,6]

PCT levels rise with increasing severity of infection[2]

<0.5 µg/L

Systemic infection not likely

≥0.5 – <2 µg/L

Significant, but moderate systemic inflammatory response, sepsis likely

≥2 – <10 µg/L

Severe sepsis: Severe systemic inflammatory response (SIRS), most likely due to infection (sepsis), high risk of developing organ dysfunction

≥10 µg/L

Important systemic inflammatory response almost exclusively due to severe bacterial sepsis or septic shock

Figure 2 PCT reference ranges and their correlation with the patient's clinical condition.[2] As an expression of individually different immune responses and different clinical situations, the same focus of infection may be associated with varying individual elevations in PCT concentrations. Therefore, PCT results should be interpreted in context of the patient's clinical condition and other laboratory findings.

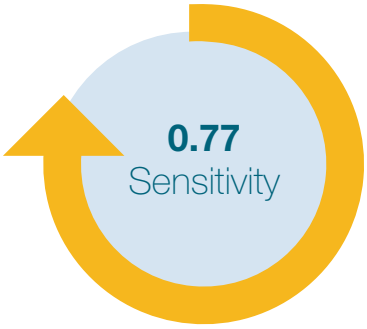
Thermo Scientific™ B·R·A·H·M·S PCT™ meets the needs of sepsis diagnosis

Early response

Levels increase within 3-6 hours after bacterial challenge[5]

Fast results

Incubation time 16-30 minutes (except B·R·A·H·M·S PCT™ LIA)



Highly sensitive and specific

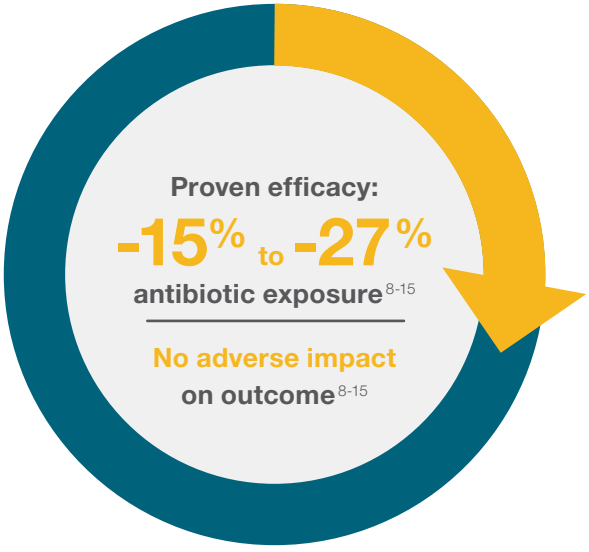
A mean sensitivity of 0.77 and a mean specificity of 0.79 to discriminate sepsis from SIRS of non-infectious origin – based on meta-analysis of 3244 patients[7]

B·R·A·H·M·S PCT – effective and safe

PCT-guidance reduces antibiotic exposure

Strong evidence supports safe reduction of antibiotics using PCT-guided antibiotic stewardship protocols

- Reproducible, randomized clinical trials with more than 10,000 patients
- Proven utility across diverse clinical settings: ICU, ED, Pediatrics, Neonatology, Surgery



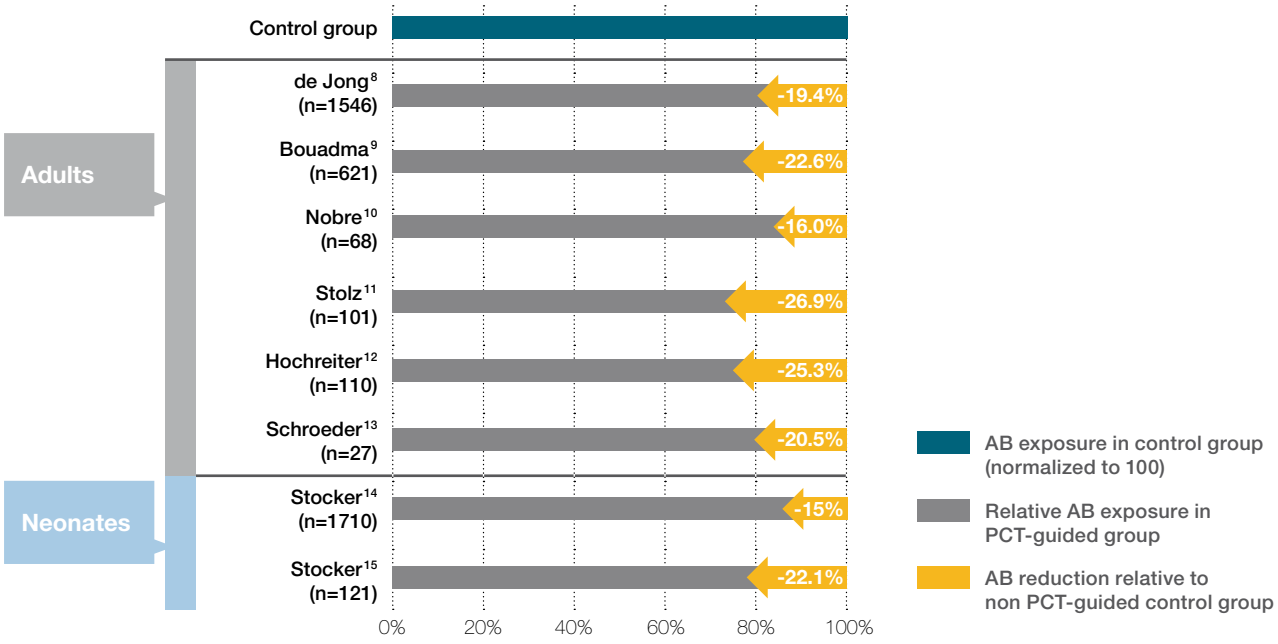
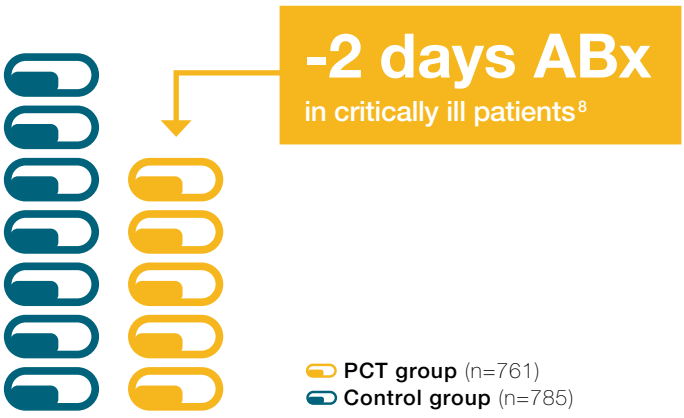


Figure 3 Relative reduction in AB exposure with PCT-guidance
AB exposure in control group is normalized to 100, shown by a blue bar at the top. The gray bar depicts the relative exposure in PCT group and the orange bar shows the relative AB exposure reduction. All studies reported significant reduction in AB exposure.

PCT-guided reduction in antibiotic exposure could also reduce mortality rates

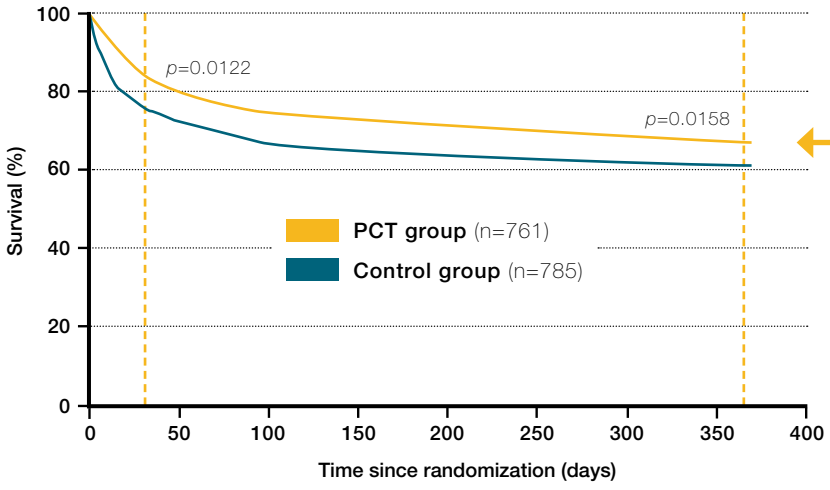
Data from: The Stop Antibiotics on Procalcitonin Guidance Study[8]

- Largest prospective, multi-centre, randomized, controlled, open-label intervention trial with PCT in critically ill patients
- Conducted in the Netherlands – a healthcare system with comparatively low use of ABx[16]
- 1575 critically ill patients, 15 centers



PCT could help customize the duration of antibiotics to individual patient needs.
By avoiding unnecessary antibiotics, it could also reduce the side-effects associated with them.

Figure 4 Median duration of AB treatment in PCT-guided group = 5 days, in control group = 7 days[8]



-6% mortality
at 1 year compared with control group[8]

Appropriate antibiotic use translates into survival benefit

Figure 5 Probability of survival to day 365 in the PCT-guided group vs standard of care group[8]

Tailoring antibiotic therapy to individual patient needs

Monitoring with B·R·A·H·M·S PCT provides therapeutic guidance

Effective antibiotic treatment is reflected by declining PCT values,[17] consistent with its half-life time of about 20-24 hours.[3]

Serial determinations of PCT can be used to monitor the course of infection in sepsis patients. Appropriate empiric antibiotic therapy was associated with a significant decline in PCT from day 2 to day 3 (ΔPCT ≥30%).[17]

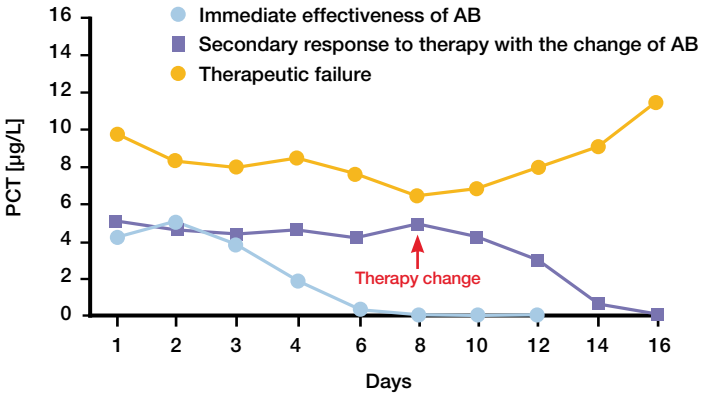


Figure 6 Typical course of PCT serum level according to patient's response to antibiotic treatment (n=109)[18]

B·R·A·H·M·S PCT guided algorithms for antibiotic therapy

When to START antibiotics?

PCT sepsis cut-off
<0.5 µg/L

Yes → Bacterial infection unlikely
▶ ABx NOT recommended*

No → Bacterial infection likely
▶ ABx recommended

When to STOP antibiotics?[8]

Daily measurement of PCT is advised

Decline in PCT from peak value
ΔPCT ≥80%

Yes → Stop ABx

No → Current PCT value
<0.5 µg/L

Yes → Stop ABx

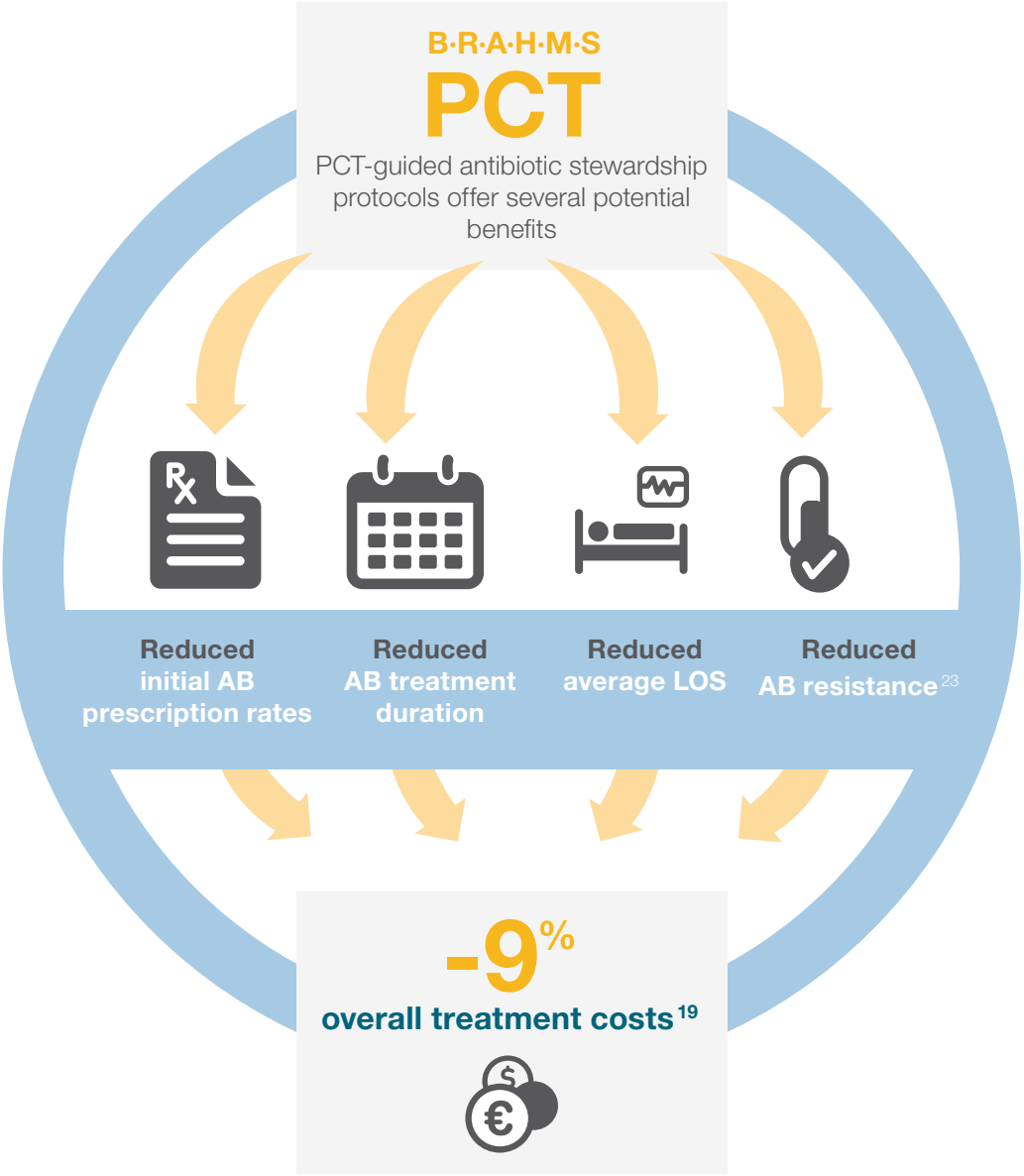
No → Continue/Change ABx

$$\Delta PCT = \frac{\text{Peak PCT} - \text{Current PCT}}{\text{Peak PCT}} \times 100\%$$

* PCT values should always be interpreted in context of the patient's clinical condition.
Antibiotic treatment should be started/continued on suspicion of infection, particularly in high-risk patients.

Saving costs

The economic impact of PCT-guided treatment has been studied through health economic modeling. [19-21] Treatment cost reductions ranging from 9% to 12% have been demonstrated across various countries. [22]



Surviving Sepsis Campaign: "We suggest that measurement of procalcitonin levels can be used to support **shortening the duration of antimicrobial therapy** in sepsis patients."

Source: International Guidelines for Management of Severe Sepsis and Septic Shock, 2016 [24]

thermoscientific

B·R·A·H·M·S PCT – Secured clinical decision making independent of platform

thermo scientific	B·R·A·H·M·S PCT sensitive KRYPTOR™
Abbott	ARCHITECT® B·R·A·H·M·S PCT
BIOMÉRIEUX	VIDAS® B·R·A·H·M·S PCT
DiaSorin	LIAISON® B·R·A·H·M·S PCT II GEN
FUJIREBIO Diagnostics, Inc.	Lumipulse® G B·R·A·H·M·S PCT
Roche	ELECSYS® B·R·A·H·M·S PCT
SAMSUNG	Samsung IB B·R·A·H·M·S PCT
SIEMENS	ADVIA Centaur® B·R·A·H·M·S PCT ATELLICA® IM B·R·A·H·M·S PCT

Automated sensitive assay

Point-of-Care-Test

Not all intended uses and applications mentioned in this printing are registered for every product in every country.

References

1. Kumar et. al., Crit Care Med 2006; 34(6): 1589-96
2. Harbarth et al., Am J Respir Crit Care Med 2001; 164: 396-402
3. Meisner M, Procalcitonin – Biochemistry and Clinical Diagnosis, ISBN 978-3-8374-1241-3, UNI-MED, Bremen 2010
4. Müller et al., Crit Care Med 2000; 28 (4): 977-83
5. Brunkhorst et al., Int Care Med 1998; 24: 888-92
6. Dandona, J Clin Endocrinol Metab 1994; 79: 1605-8
7. Wacker et al., Lancet Infect Dis 2013; 13: 426-35
8. de Jong et al., Lancet Infect Dis 2016; 3099: 1-9
9. Bouadma et al., Lancet 2010; 375: 463-74
10. Nobre et al., Am J Respir Crit Care Med 2008; 177: 498-505
11. Stolz et al., Eur Respir J 2009; 34: 1364-1375
12. Hochreiter et al., Crit Care 2009; 13: R83
13. Schroeder et al., Langenbecks Arch Surg 2009; 394: 221-226
14. Stocker et al., Lancet 2017; 390: 871-81
15. Stocker et al., Neonatology 2010; 97: 165-74
16. Filippini et al., Health Policy 2006; 78(1): 77-92
17. Charles et al., Crit Care 2009; 13: R38
18. Stüber, 21st Int. Congress of Intensive Care and Emergency Medicine (ISICEM), Brussels 2001
19. Kip et al., J Med Econ 2015; 1-10
20. Schuetz et al., Clin Chem Lab Med 2015; 53(4): 583-92
21. Maas et al., Poster, ISPOR 18th Annual European Congress, Milan, 2015
22. Steuten, Cost effectiveness of biomarker testing in sepsis patients; ISICEM Brussels, March 15-19, 2015
23. Hohn et al., Infection 2015; 43(4): 405-12
24. Rhodes et al., Int Care Med 2017; 43(3): 304-77

Clinical Diagnostics

Thermo Fisher Scientific
B·R·A·H·M·S GmbH
Neuendorfstr. 25
16761 Hennigsdorf
Germany

+49 (0)3302 883 0
+49 (0)3302 883 100 fax
info.pct@thermofisher.com
www.thermoscientific.com/brahms

Find out more at **thermoscientific.com/procalcitonin**

Not all products are CE marked or have 510(k) clearance for sale in the U.S. Availability of products in each country depends on local regulatory marketing authorization status.

ThermoFisher SCIENTIFIC

107629.3