QUICK GUIDE
to Clinical Utility of PCT*

EARLY IDENTIFICATION AND RISK ASSESSMENT

Clinical Utility of PCT	Key Message	Why	Scientific Proof
PCT aids in the risk assessment of critically ill patients for progression to sepsis/septic shock.	Combined with clinical assessment, PCT contributes significantly to **early identification and risk stratification** of patients with possible sepsis: - **Low PCT levels** may help to **rule out sepsis risk** and help physicians focus on other medical conditions. - **High PCT levels** help confirm that **sepsis is very likely** and treatment should be initiated.	**-** PCT production is mainly stimulated in response to **severe bacterial infections** **-** Compared to C-reactive protein or lactate, **PCT increases rapidly (within 4-6 hours) upon stimulation**. This helps with early confirmation of sepsis risk allowing clinicians to intervene before complications like organ dysfunction set in.	Meisner M. **Update on procalcitonin measurements**. *Ann Lab Med*. 2014;34:263-273 Christ-Crain M, *et al*. **Procalcitonin in bacterial infections-hype, hope, more or less?** *Swiss Medical Weekly* 2005; 135(31-32):451-460 Harbarth S, *et al*. **Diagnostic value of procalcitonin, interleukin-6 and interleukin 8 in critically ill patients admitted with suspicion of sepsis.** *Am J Respir Crit Care Med*. 2001;164:396-402 Muller B, *et al*. **Calcitonin precursors are reliable markers of sepsis in medical intensive care unit.** *Crit Care Med*. 2000;28:977-983

MONITORING AND PROGNOSIS

Clinical Utility of PCT	Key Message	Why	Scientific Proof
PCT aids in monitoring treatment response and prognosis in patients with sepsis and septic shock.	**Serial measurements of PCT over time** provide valuable information for **patient response to treatment and risk of mortality.**	Following a rapid increase in the presence of a bacterial infection, PCT levels **drop by about 50% daily** if **patient evolution is favorable**, helping to determine treatment success: - with a 24-hour half-life, **decreasing PCT levels are consistent with an improving condition** - PCT levels that **fail to decrease** may be indicative of **treatment failure** - in a large study (n=646), a **PCT decrease >80% between day 1 and 4** showed a **mortality rate of 10%** whereas a **decrease ≤80%** showed a **mortality rate of 20%.**	Schuetz P, *et al*. **Serial procalcitonin predicts mortality in severe sepsis patients: Results from the multicenter procalcitonin Monitoring Sepsis (MOSES) study.** *Crit Care Med*. 2017;45(5):781-789

*PCT: Procalcitonin

ANTIBIOTIC THERAPY GUIDANCE - SBI**/ SEPSIS

Clinical Utility of PCT	Key Message	Why	Scientific Proof
PCT aids in decision-making on antibiotic therapy discontinuation for patients with suspected or confirmed sepsis, or other severe bacterial infections.	When supported by a clinical assessment, **PCT helps in guiding decisions to stop or continue antibiotic therapy**. It thereby contributes to reducing unnecessary prolonged use of antibiotics, patient toxicity, *C. difficile* infections and antimicrobial resistance.	**PCT's unique kinetics help guide physicians** in decisions for antibiotic treatment: - many studies have demonstrated that **PCT is safe and effective** in an algorithm to determine **continuing or stopping antibiotic treatment** - **decreasing PCT levels** are consistent with an **improving condition** - PCT levels that **fail to decrease** may be indicative of **treatment failure** - when supported by an improved clinical condition, PCT levels that show a **constant decrease (drop to ≤0.5 ng/mL or >80%** from peak) over time (1-2 days) are supportive of **discontinuing antibiotic therapy in septic patients.**	Siriwardena AK, *et al*. **A Procalcitonin-based Algorithm to Guide Antibiotic Use in Patients with Acute Pancreatitis (PROCAP): A Single-centre, Patient-blinded, Randomised Controlled Trial**. *Lancet Gastroenterol Hepatol.* 2022;7(10):913-921 Kyriazopoulou E, *et al*. **Procalcitonin to Reduce Long-Term Infection-associated Adverse Events in Sepsis: A Randomized Trial.** *Am J Respir Crit Care Med.* 2021;203(2):202-210 De Jong E, *et al*. **Efficacy and safety of procalcitonin guidance in reducing the duration of antibiotic treatment in critically ill patients: A randomised, controlled, open-label trial.** *The Lancet* 2016;16(7):819-827 Drozdov D, *et al*. **Procalcitonin and Pyuria-based Algorithm Reduces Antibiotic Use in Urinary Tract Infections: A Randomized Controlled Trial**. *BMC Med.* 2015;13:104 Bouadma L, *et al*. **Use of procalcitonin to reduce patients' exposure to antibiotics in intensive care units (PRORATA Trial): a multicentre randomised controlled trial.** *The Lancet* 2010;375(9713):463-74

ANTIBIOTIC THERAPY GUIDANCE - LRTI***

Clinical Utility of PCT	Key Message	Why	Scientific Proof
PCT aids in decision-making on antibiotic therapy discontinuation for patients with suspected or confirmed LRTI - defined as community-acquired pneumonia (CAP), acute bronchitis, or acute exacerbation of chronic obstructive pulmonary disease (AECOPD).	**Most LRTI infections are of non-bacterial origin,** however most patients presenting with these conditions are put on antibiotics. PCT can assist in determining **if antibiotics are really needed** in these patient groups, and once antibiotic therapy is started, PCT can help in determining **when it is safe to discontinue treatment.**	Measuring PCT levels upon patient presentation has been found to **reduce the initiation of antibiotic treatment**: - in the case of a **low PCT level (<0.25 ng/mL)**, it is unlikely that **the patient has a bacterial infection** - once antibiotic treatment has been initiated, **serial PCT measurements** are helpful to determine **if treatment should be continued or if it can be safely discontinued** - PCT levels that **drop below 0.25 ng/ml** are indicative of the **resolution of an infection.** If the **patient condition has improved, antibiotic treatment may be discontinued.**	Tsalik EL, *et al*. **Efficacy and Safety of Azithromycin versus Placebo to Treat Lower Respiratory Tract Infections associated with Low Procalcitonin: A Randomised, Placebo-controlled, Double-blind, Non-inferiority Trial**. *Lancet Infect Dis.* 2023;23(4):484-495 Schuetz P, *et al*. **Effect of Procalcitonin-Guided Antibiotic Treatment on Mortality in Acute Respiratory Infections: A Patient Level Meta-Analysis**. *Lancet Infect Dis.* 2018;18(1):95-107 Albrich WC, *et al*. **Effectiveness and safety of procalcitonin-guided antibiotic therapy in lower respiratory tract infections in «Real Life»: An international, multicenter poststudy survey (ProREAL).** *Arch Intern Med.* 2012;172(9):715-722 Schuetz P, *et al*. **Effect of procalcitonin-based guidelines vs standard guidelines on antibiotic use in lower respiratory tract infections: The ProHOSP randomized controlled trial.** *JAMA* 2009;302(10):1059-1066

*PCT: Procalcitonin **SBI: Severe Bacterial Infection ***LRTI: Lower Respiratory Tract Infection