

Procalcitonin (PCT)

Please note: This test should **NOT** be used as a sole diagnostic tool to guide antimicrobial therapy, and should **NOT** supersede clinical judgment.

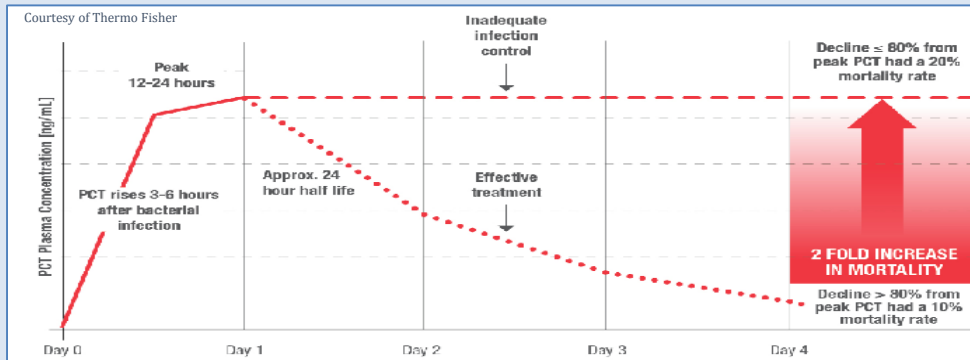
BACKGROUND: Procalcitonin (PCT) is a biomarker produced in large quantities during systemic inflammation, particularly during bacterial infection. PCT rises with severity of infection, and persistently high levels are associated with poor prognosis.

CRITERIA FOR USE:

- **Lower Respiratory Tract Infections (See Algorithm's 1 & 2, next page):** Acute signs and symptoms consistent with a respiratory pathology where bacterial pneumonia, viral pneumonia, COPD exacerbation, bronchitis, congestive heart failure, or other diagnostic uncertainties are part of the differential diagnosis
- **Sepsis (See Algorithm 3 & 4, next page):** SIRS criteria, sepsis, severe sepsis or septic shock

UNACCEPTABLE USES

- Non-systemic or localized infections (e.g. mild skin and soft tissue infections, uncomplicated urinary tract infections)
- As a sole diagnostic tool for infection. Results should be interpreted in context of clinical picture.



KEY PRINCIPLES FOR USE AND LIMITATIONS

1. **Results should be interpreted in context of clinical picture.** For example, do not withhold antibiotics in septic patients with normal PCT; likewise, it is reasonable to monitor patients without signs/symptoms of infection off antimicrobials despite mildly elevated PCT.
2. **Serial measurements are preferred** to determine the need for antibiotic therapy, or to guide discontinuation of therapy. Patients with consistently normal/low PCT levels are unlikely to have infection, and other diagnoses should be considered.
3. **Be cognizant of clinical situations that can cause falsely high or normal PCT levels.**

Potential causes of FALSELY HIGH results

- Major stress (i.e. severe trauma, surgery, cardiac shock)
- Administration of cytokine-stimulating agents
- Some fungal infections; malaria
- Prolonged, severe cardiogenic shock or organ perfusion abnormalities
- Some forms of vasculitis, and acute graft versus host disease
- Paraneoplastic syndromes (medullary thyroid & small cell lung cancer)
- Significant renal dysfunction (e.g. ESRD on hemodialysis)

Potential causes FALSELY NORMAL/LOW results

- Localized infections (i.e. non-systemic)
- Subacute infections
- Early infection (i.e. need for PCT repeat)

COPD= chronic obstructive pulmonary disease; ESRD= end-stage renal disease; ID= infectious diseases; LRTI = lower respiratory tract infection; L= liters; mcg= micrograms; SIRS= systemic inflammatory response syndrome

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LOWER RESPIRATORY TRACT INFECTIONS (LRTI)

Algorithm 1: Interpretation of **BASELINE** result for LRTI

Initial PCT result→	<0.1mcg/L	0.1-0.24mcg/L	≥0.25-0.5mcg/L	>0.5mcg/L
Antibiotic Use Recommendation→	Strongly discouraged	Discouraged	Encouraged	Strongly Encouraged
LRTI Follow-up→	<ul style="list-style-type: none"> Consider alternative diagnosis Repeat PCT in 6-12 hours if no clinical improvement and antibiotics were not initiated If clinically unstable, consider overruling 		<ul style="list-style-type: none"> Repeat every 2-3 days to consider early antimicrobial discontinuation Please See Algorithm 2 for follow-up result interpretation 	

Algorithm 2: Interpretation of **FOLLOW-UP** result for LRTI

Follow-up PCT result→	<0.1mcg/L or decreased by >90%	0.1-0.24mcg/L or decreased by >80%	≥0.25-0.5mcg/L	>0.5mcg/L
Antibiotic Use Recommendation→	Discontinuation strongly encouraged	Discontinuation encouraged	Discontinuation discouraged	Discontinuation strongly discouraged
LRTI Follow-up→	<ul style="list-style-type: none"> Consider continuation if clinically unstable 		<ul style="list-style-type: none"> If PCT remains high, consider treatment failure Further diagnostic evaluation and treatment alterations may be warranted 	

SEPSIS (SIRS, sepsis, severe sepsis, septic shock)

Strongly consider initiating antibiotics in all septic patients with high suspicion for infection, regardless of PCT level!!!

Algorithm 3: Interpretation of **BASELINE** result for SEPSIS

Initial PCT result→	<0.25mcg/L	0.25-0.49mcg/L	≥0.5mcg/L	≥1mcg/L
Antibiotic Use Recommendation→	Strongly discouraged	Discouraged	Encouraged	Strongly Encouraged
Sepsis Follow-up→	<ul style="list-style-type: none"> Consider alternative diagnosis Repeat PCT in 6-12 hours if antimicrobials were not initiated If clinically unstable, consider overruling 		<ul style="list-style-type: none"> Repeat DAILY for 2-3 days to consider early antimicrobial discontinuation Please See Algorithm 4 for follow-up result interpretation 	

Algorithm 4: Interpretation of **FOLLOW-UP** result for SEPSIS

Follow-Up PCT result→	<0.25mcg/L	0.25-0.49mcg/L or decreased by >80%	≥0.5mcg/L and decreased by <80%	≥0.5mcg/L and increasing or not decreasing
Antibiotic Use Recommendation→	Discontinuation strongly encouraged	Discontinuation encouraged	Discontinuation discouraged	Discontinuation strongly discouraged
Sepsis Follow-up→	<ul style="list-style-type: none"> Consider continuation in clinically unstable patients 		<ul style="list-style-type: none"> PCT level that is increasing or not decreasing by at least 10% per day is a poor prognostic factor and indicator of uncontrolled infection May consider further diagnostic evaluation, or broadening therapy, although routine broadening not recommended. Consider ID Consult. 	

COPD= chronic obstructive pulmonary disease; ESRD= end-stage renal disease; ID= infectious diseases; LRTI= lower respiratory tract infection; L= liters; mcg= micrograms; SIRS= systemic inflammatory response syndrome