Adult Procalcitonin (PCT) Testing Guidelines

Background

- Procalcitonin (PCT) is an amino acid precursor of calcitonin, which under normal circumstances is produced by thyroid C-cells.
- In bacterial infections, PCT is produced by different body tissues resulting in increased PCT levels in the blood.
  - Higher specificity compared to other tests such as CRP.
- PCT levels generally do not increase in pure viral infections.
- PCT is detectable within 2-4 hours and peaks within 6-24 hours; it has a half-life of 24 hours.
- PCT levels decrease rapidly as infections are treated.
- PCT levels are elevated in proportion to the severity of the bacterial infection giving it utility as a prognostic indicator.
- PCT guidance has been shown in studies to reduce antibiotic utilization without affecting patient outcomes.

Limitations

- PCT may be elevated without bacterial infection in the following situations:
  - Massive stress (such as severe trauma, surgery, burns) – PCT levels trend downwards after the inciting event in the absence of infection.
  - Prolonged, severe cardiogenic shock or organ perfusion abnormalities causing profound hypotension.
  - Significantly compromised renal function, especially ESRD/hemodialysis.
  - Some forms of vasculitis and acute graft versus host disease.
  - Paraneoplastic syndromes due to medullary thyroid and small cell lung cancer.
  - Malaria.
  - Some fungal infections.

- PCT may not be elevated in site-specific bacterial disease and localized infections.

Decisions regarding antimicrobial therapy should NOT be based solely on PCT serum levels.
Indications for ordering PCT at SUNY Downstate Medical Center

- Differentiation of bacterial versus viral respiratory tract infection
- Differentiation of pneumonia versus other causes of respiratory distress such as CHF or COPD exacerbation
- Determination of duration of antibiotic treatment in respiratory infections
- Diagnosis of sepsis
- Determination of duration of antibiotic treatment in sepsis

There are limited data and no official recommendations in the following conditions:

- Diagnosis of bacterial skin and soft tissue infections
- Differentiating bacterial versus viral meningitis
- Diagnosis of bacterial infection in neutropenic patients
- Diagnosis of bacterial infection in sickle cell disease crisis patients
- Patients on hemodialysis

Procalcitonin will be available 24 hours a day and will be run as needed. STAT order results should be available within 90 minutes, while results of routine testing should be available during the same shift. A value of 0.1 ng/mL will be flagged as elevated. Interpretation should be based upon clinical context and protocols provided below.

References

Procalcitonin Algorithm for Management of Lower Respiratory Tract Infections (LRTI)

Initial Level

**STRONGLY CONSIDER ANTIBIOTIC INITIATION IN ALL PATIENTS WITH SUSPICION OF INFECTION**

- **PCT Value**
  - <0.1 ng/mL: **Strongly Discouraged**
  - 0.1 – 0.24 ng/mL: **Discouraged**
  - ≥0.25 – 0.5 ng/mL: **Encouraged**
  - > 0.5 ng/mL: **Strongly Encouraged**

  - Consider alternative diagnosis
  - Repeat PCT in 6-12 hours if antibiotics not begun and no clinical improvement
  - If clinically unstable consider overruling

Follow Up Level

- **PCT Value**
  - <0.1 ng/mL or drop by >90%: **Cessation Strongly Encouraged**
  - 0.1 – 0.24 ng/mL or drop by >80%: **Cessation Encouraged**
  - ≥0.25 – 0.5 ng/mL: **Cessation Discouraged**
  - > 0.5 ng/mL: **Cessation Strongly Discouraged**

  - If PCT rising or not adequately decreasing consider possible treatment failure
  - Consider clinical reassessment and further intervention including need for ID consult
Procalcitonin Algorithm for Management of Sepsis

Initial Level

STRONGLY CONSIDER ANTIBIOTIC INITIATION IN ALL PATIENTS WITH SUSPICION OF INFECTION

FIRST DOSE OF ANTIBIOTICS SHOULD NOT BE DELAYED BY PENDING PROCALCITONIN LEVELS

Follow Up Level

Approved by P&T Committee 11/2016