Use a keyword, test name or number

Procalcitonin

TEST: 164750 CPT: 84145

Synonyms	• PCT
Special Instructions	This test may exhibit interference when sample is collected from a person who is consuming a supplement with a high dose of biotin (also termed as vitamin B7 or B8, vitamin H, or coenzyme R). It is recommended to ask all patients who may be indicated for this test about biotin supplementation. Patients should be cautioned to stop biotin consumption at least 72 hours prior to the collection of a sample.
Expected Turnaround Time	2 - 3 days Turnaround time is defined as the usual number of days from the date of pickup of a specimen for testing to when the result is released to the ordering provider. In some cases, additional time should be allowed for additional confirmatory or additional reflex tests. Testing schedules may vary.
Related Documents	• Sample Report

SPECIMEN REQUIREMENTS

Specimen	Serum **or** plasma, **frozen**
Volume	0.8 mL
Minimum Volume	0.5 mL (**Note:** This volume does **not** allow for repeat testing.)
Container	Red-top tube, gel-barrier tube, green-top (lithium heparin) tube, **or** lavender-top (EDTA) tube

Collection	Separate serum or plasma from cells and transfer to a plastic transport tube before freezing. To avoid delays in turnaround time when requesting multiple tests on frozen samples, **please submit separate frozen specimens for each test requested.**
Storage Instructions	**Freeze;** stable at room temperature for 24 hours. Stable refrigerated for 48 hours or **frozen** for three months. Freeze/thaw cycles: stable x1.

TEST DETAILS

Use	Used in conjunction with other laboratory findings and clinical assessments, Elecsys BRAHMS PCT is intended for use as follows[11]: • to aid in the risk assessment of critically ill patients on their first day of ICU admission for progression to severe sepsis and septic shock; • to determine the change in PCT level over time as an aid in assessing the cumulative 28-day risk of all-cause mortality for patients diagnosed with severe sepsis or septic shock in the ICU or when obtained in the emergency department or other medical wards prior to ICU admission; • to aid in decision making on antibiotic therapy, for inpatients or patients in the emergency department with suspected or confirmed lower respiratory tract infections (LRTI) — defined as community-acquired pneumonia (CAP), acute bronchitis, and acute exacerbation of chronic obstructive pulmonary disease (AECOPD); • to aid in decision making on antibiotic discontinuation for patients with suspected or confirmed sepsis.
Limitations	The Elecsys BRAHMS PCT is not indicated to be used as a stand-alone diagnostic assay and should be used in conjunction with clinical signs and symptoms of infection and other diagnostic evidence. In cases where the laboratory results do not agree with the clinical picture or history, additional tests should be performed. Changes in PCT should always be interpreted in the context of the clinical status of the patient and other laboratory results. Decisions regarding antibiotic therapy should **not** be based solely on procalcitonin concentrations. There is no uniformly recognized interpretation of the change in PCT concentration levels for the prediction of mortality, and overall mortality is strongly dependent on many factors, including pre-existing patient risk factors and clinical course. The need to continue ICU care at

Day 4 and other covariates (e.g., age, SOFA score) are also significant predictors of 28-day cumulative mortality risk. Validation of the Elecsys BRAHMS PCT test as an aid in predicting mortality was performed in a study population with an overall 28-day mortality of 22%.

Certain patient characteristics, such as severity of renal failure or insufficiency, may influence procalcitonin values and should be considered as potentially confounding clinical factors when interpreting PCT values. Increased PCT levels may be observed in severe illness such as polytrauma, burns, major surgery, prolonged or cardiogenic shock. PCT levels may not be elevated in patients infected by certain atypical pathogens, such as Chlamydia pneumoniae and Mycoplasma pneumoniae. The safety and performance of PCT-guided therapy for individuals younger than age 17 years, pregnant women, immunocompromised individuals or those on immunomodulatory agents, was not formally analyzed in the supportive clinical trials.

For diagnostic purposes, the results should always be assessed in conjunction with the patient's medical history, clinical examination and other findings.

Increased PCT levels may not always be related to systemic infection.[4,15-17] These include, but are not limited to:

• Patients experiencing major trauma and/or recent surgical procedure including extracorporeal circulation or burns;

• Patients undergoing treatment with OKT3 antibodies, OK-432, interleukins, TNF-alpha and other drugs that stimulate the release of pro-inflammatory cytokines or result in anaphylaxis;

• Patients diagnosed with active medullary C-cell carcinoma, small cell lung carcinoma, or bronchial carcinoid;

• Patients with acute or chronic viral hepatitis and/or decompensated severe liver cirrhosis (Child-Pugh Class C);

• Patients with prolonged or severe cardiogenic shock, prolonged severe organ perfusion anomalies, or after resuscitation from cardiac arrest;

• Patients receiving peritoneal dialysis or hemodialysis treatment;

• Patients with biliary pancreatitis, chemical pneumonitis or heat stroke;

• Patients with invasive fungal infections (e.g., candidias aspergillosis) or acute attacks of plasmodium falciparum malaria;

• Neonates during the first 2 days of life.

Methodology	Electrochemiluminescence immunoassay (ECLIA)
Additional Information	PCT is the prohormone of the hormone calcitonin, but PCT and calcitonin are distinct proteins. Calcitonin is exclusively produced by C-cells of the thyroid gland in response to hormonal stimuli, whereas PCT can be produced by several cell types and many organs in response to proinflammatory stimuli, in particular by bacterial products.[1] In healthy people, plasma PCT concentrations are found to be below 0.1 µg/L.[2] Depending on the clinical background, a PCT concentration above 0.1 µg/L can indicate clinically relevant bacterial infection, requiring antibiotic treatment.[3] PCT levels rise rapidly (within 6 to 12 hours) after a bacterial infectious insult with systemic consequences. The magnitude of the increase in PCT concentration correlates with the severity of the bacterial infection.[4] At a PCT concentration >0.5 µg/L, a patient should be considered at risk of developing severe sepsis or septic shock.[5,6] On the other hand, the relief of the septic infection is accompanied by a decrease in the PCT concentration which returns to normal with a half-life of 24 hours,[7,8] (ie, the continuous decline of PCT is indicative of effective source control measures and has been implicated in the safe deëscalation of antibiotic therapy).[9,10] Data support the following interpretative risk assessment criteria[11,12,13]: PCT > 2 ng/mL: A PCT level above 2.0 ng/mL on the first day of ICU admission is associated with a high risk for progression to severe sepsis and/or septic shock. PCT < 0.5 ng/mL: A PCT level below 0.5 ng/mL on the first day of ICU admission is associated with a low risk for progression to severe sepsis and/or septic shock. Note: Concentrations < 0.5 ng/mL do not exclude an infection, on account of localized infections (without systemic signs) which can be associated with such low concentrations, or a systemic infection in its initial stages (< 6 hours). Furthermore, increased procalcitonin can occur without infection. PCT concentrations between 0.5 and 2.0 ng/mL should be interpreted taking into account the patient's history. It is recommended to retest PCT within 6-24 hours if any concentrations < 2 ng/mL are obtained. The change of PCT concentration over time (Delta PCT) provides prognostic information about the risk of mortality[14] within 28 days for patients diagnosed with severe sepsis or septic shock coming from the emergency department, ICU, other medical wards, or directly from outside the hospital. Data support the use of PCT determinations from the day severe sepsis or septic shock is first diagnosed (Day 0) or the day thereafter (Day 1) and the fourth

day after diagnosis (Day 4) for the classification of patients into higher and lower risk for mortality within 28 days. The Delta PCT is calculated in the manufacturer's package insert for the Elecsys BRAHMS PCT[11] as:

The change in PCT (Day 0 value minus Day 4 value) divided by the Day 0 value, all multiplied by 100%.

This calculated result is interpreted as follows:

Delta PCT ≤ 80 %: A decrease of PCT levels below or equal to 80 % defines a positive ΔPCT test result representing a higher risk for 28-day all-cause mortality of patients diagnosed with severe sepsis or septic shock.

Delta PCT > 80 %: A decrease of PCT levels of more than 80 % defines a negative ΔPCT result representing a lower risk for 28-day, all-cause mortality of patients diagnosed with severe sepsis or septic shock.

Notes:

• If Day 0 result is not available, Day 1 result may be used.

• If more than one PCT value is available on Day 0 (or Day 1), enter the highest value.

• If more than one PCT value is available on Day 4, enter the most recent value.

Footnotes

1. Christ-Crain M, Müller B. Procalcitonin in bacterial infections-hype, hope, more or less? *Swiss Med Wkly.* 2005 Aug 6;135(31-32):451-460. PubMed 16208582
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3. Christ-Crain M, Jaccard-Stolz D, Bingisser R, et al. Effect of procalcitonin-guided treatment on antibiotic use and outcome in lower respiratory tract infections: cluster-randomised, single-blinded intervention trial. *Lancet.* 2004 Feb 21;363(9409):600-607. PubMed 14987884
4. Meisner M. ISBN:978-3-8374-1241-3 UNI-MED Science, 2010 *Procalcitonin-Biochemistry and Clinical Diagnosis*.
5. Müller B, Becker KL, Schachinger H, et al. Calcitonin precursors are reliable markers of sepsis in medical intensive care unit. *Crit Care Med.* 2000 Apr;28(4):977-983. PubMed 10809269
6. Harbarth S, Holeckova K, Froidevaux C, et al. Diagnostic value of procalcitonin, interleukin-6, and interleukin-8 in critically ill patients admitted with suspected sepsis. *Am J Resp Crit Care Med.* 2001 Aug 1;164(3):396-402. PubMed 11500339
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8. Brunkhorst FM, Heinz U, Forycki ZF. Kinetics of procalcitonin in iatrogenic sepsis. *Intensive Care Med.* 1998 Aug;24(8):888-889. PubMed 9757936
9. Schuetz P, Christ-Crain M, Thomann R, 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 Sep 9; 302(10):1059-1066. PubMed 19738090
10. Bouadma L, Luyt CE, Tubach F, et al. Use of procalcitonin to reduce patients' exposure to antibiotics in intensive care units (PRORATA trial): a multicenter randomised controlled trial. *Lancet.* 2010 Feb 6;375(9713):463-474. PubMed 20097417
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12. Muller B, Becker KL, Schachinger H, et al. Calcitonin precursors are reliable markers of sepsis in a medical intensive care unit. *Crit Care Med*. 2000 Apr;28(4):977-983. PubMed 10809269
13. Harbarth S, Holeckova K, Froidevaux C, et al. Diagnostic value of procalcitonin, interleukin-6, and interleukin-8 in critically ill patients admitted with suspected sepsis. *Am J Respir Crit Care Med*. 2001 Aug 1;164(3):396-402. PubMed 11500339
14. Schuetz P, Maurer P, Punjabi V, Desai A, Amin DN. Gluck E. Procalcitonin decrease over 72 hours in US critical care units predicts fatal outcome in sepsis patients. *Crit Care*. 2013 Jun 20;17(3):R115. PubMed 23787145
15. Meisner M, Tschaikowsky K, Hutzler A, Schick C, Schuttler J. Postoperative plasma concentrations of procalcitonin after different types of surgery. *Intensive Care Med*. 1998 Jul;24(7):680-684. PubMed 9722037
16. Chiesa C, Panero A, Rossi N, et al. Reliability of procalcitonin concentrations for the diagnosis of sepsis in critically ill neonates. *Clin Infect Dis*. 1998 Mar;26(3):664-672. PubMed 9524841
17. Reith HB, Mittelkotter U, Debus ES, Kussner C, Thiede A. Procalcitonin in early detection of postoperative complications. *Dig Surg.* 1998;15(3):260-265. PubMed 9845596