Kentucky Antimicrobial Stewardship Innovation Consortium

Educational Pearl

Paying Attention to Procalcitonin

Procalcitonin is a biomarker that can elevate in response to bacterial infections, but is less likely elevate in other disease states (e.g. viral infections).[1] Procalcitonin may be used to guide antibiotic discontinuation in pneumonia, but is not recommended in diagnosing pneumonia. When incorporating procalcitonin into antimicrobial stewardship, it is important to recognize when serum procalcitonin levels may be falsely high or low. Read on to learn more!

Can procalcitonin be low in a bacterial infection?

Yes. Procalcitonin increase in response to bacterial infection can take several hours to occur. Peak concentrations occur 6 – 24 hours after onset, therefore procalcitonin may be low in the early stages of a bacterial infection.[2] Additionally, mild or localized infections may not increase procalcitonin. Therefore procalcitonin should be interpreted with caution in the following settings.

Examples of Bacterial Infections with Low Procalcitonin[1-2]
• Mild infections such as sinusitis, tonsillitis, & cellulitis
• Localized infections such as mediastinitis, parapneumonic effusion, and empyema
• Subacute endocarditis

Can procalcitonin be elevated in the ABSENCE of bacterial infection?

Yes. Procalcitonin may be come elevated in response to several non-infectious causes. Procalcitonin should not be used to determine course of antibiotics in the following settings.

Examples of Non-bacterial Causes of Elevated Procalcitonin
• Chronic kidney disease, including dialysis[3]
• Severe trauma[4]
• Cardiac arrest/circulatory shock[5]
• Surgery[6]
• Severe pancreatitis[7]

Key Takeaway: Procalcitonin is a biomarker that is usually elevated in response to bacterial infections, but has limitations. When utilizing procalcitonin to guide discontinuation of antibiotics, pay attention to causes of false positive and negative procalcitonin.

References

1. Samsudin I, Vasikaran SD. Clinical Utility and Measurement of Procalcitonin. *Clin Biochem Rev*. 2017 Apr; 38(2): 59–68.
2. Christ-Crain M, Muller B, Procalcitonin in bacterial infections--hype, hope, more or less? Swiss Med Wkly. 2005;135(31-32):451.
3. Grace E, Turner RM. Use of procalcitonin in patients with various degrees of chronic kidney disease including renal replacement therapy. Clin Infect Dis. 2014;59(12):1761-1767. doi:10.1093/cid/ciu732
4. Mimoz O, Benoist JF, Edouard AR, et al. Procalcitonin and C-reactive protein during the early posttraumatic systemic inflammatory response syndrome. *Intensive Care Med*. 1998 Feb;24(2):185-8.
5. Annborn M, et al. Procalcitonin after cardiac arrest - an indicator of severity of illness, ischemia-reperfusion injury and outcome. *Resuscitation*. 2013 Jun;84(6):782-7.
6. Meisner M, et al. Postoperative plasma concentrations of procalcitonin after different types of surgery. Intensive Care Med. 1998 Jul;24(7):680-4.
7. Kylanpaa-Back ML, Takala A, Kemppainen EA, et al. Procalcitonin, soluble interleukin-2 receptor, and soluble E-selectin in predicting the severity of acute pancreatitis. *Crit Care Med*. 2001 Jan;29(1):63-9

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