

CRITERIA OF CHANGES OF PROCALCITONIN AND C-REACTIVE PROTEIN IN BLOOD DURING INFLAMMATION

Soliyeva Shaxnoza Baxtiyor kizi

Doctor-laboratorian, Zangiota Hospital of Infectious Diseases No.1

Annotation. *The human body is a complex and intricate system, constantly battling against invading pathogens and internal imbalances. When this delicate equilibrium is disrupted, inflammation emerges as a crucial defense mechanism, a complex cascade of cellular and molecular events aimed at containing damage and promoting healing.*

Key words: *sensitivity, monitoring disease activity, chronic manifestation, clinical applications, prognostic indicator.*

Introduction. While inflammation is essential for survival, its uncontrolled or chronic manifestation can lead to severe complications. Therefore, accurate and timely detection of inflammation is paramount for effective diagnosis and treatment. Two key players in this intricate dance of inflammation are procalcitonin (PCT) and C-reactive protein (CRP), both offering valuable insights into the inflammatory process.

Understanding the Players: Procalcitonin and C-Reactive Protein

a) Procalcitonin (PCT)

Procalcitonin is a precursor protein produced primarily by the thyroid gland. Under normal conditions, PCT levels are negligible in the bloodstream. However, in the presence of severe bacterial infection, particularly sepsis, PCT levels surge dramatically.

b) C-Reactive Protein (CRP)

C-reactive protein is an acute-phase reactant, a protein synthesized primarily by the liver. CRP levels rise rapidly in response to inflammation, regardless of its origin, be it bacterial, viral, or even traumatic.

The Dynamic Duo: Procalcitonin and CRP in Inflammation Detection

a) PCT: A Marker of Bacterial Infection

- **Specificity for Bacterial Infection:** PCT is remarkably specific for bacterial infections, particularly sepsis, showing minimal elevation in response to viral infections or sterile inflammatory processes.

- **Early Detection of Sepsis:** PCT levels rise rapidly within 4-6 hours of bacterial infection, often before clinical signs become apparent, making it an invaluable tool for early sepsis diagnosis.

- **Monitoring Severity and Prognosis:** PCT levels correlate with sepsis severity and mortality risk, providing valuable prognostic information for patient management.

b) CRP: A General Marker of Inflammation

- **Sensitivity to Various Inflammatory Stimuli:** CRP is highly sensitive to a broad spectrum of inflammatory triggers, including bacterial, viral, fungal, and parasitic infections, as well as autoimmune disorders and tissue injury.

- **Early Detection of Inflammation:** CRP levels rise within 6-8 hours of inflammatory onset, making it a useful marker for early detection and monitoring of inflammatory processes.

- **Monitoring Disease Activity:** CRP levels often correlate with disease activity, serving as a valuable tool for monitoring treatment efficacy and disease progression.

Interpreting Changes in PCT and CRP Levels

a) PCT: A Guide for Bacterial Infection

- **Elevated PCT:** A significantly elevated PCT level, particularly above 0.5 ng/mL, strongly suggests a bacterial infection.

- **PCT Trends:** Monitoring PCT trends over time can provide valuable information about infection severity and treatment efficacy. A declining PCT level indicates a positive response to therapy.

b) CRP: A Window into Inflammation

- **Elevated CRP:** An elevated CRP level indicates active inflammation, but does not pinpoint the specific cause.

- **CRP Level Correlation:** The magnitude of CRP elevation can provide insights into the severity of inflammation. Higher CRP levels typically correlate with more severe inflammation.

- **CRP Trends:** Monitoring CRP trends over time can help assess treatment efficacy and disease progression. A decreasing CRP level indicates a positive response to therapy.

Clinical Applications of PCT and CRP

a) Diagnostic Tool for Sepsis

- **Early Sepsis Detection:** PCT measurement can aid in early diagnosis of sepsis, allowing for prompt initiation of appropriate antibiotics and intensive care.

- **Sepsis Severity Assessment:** Elevated PCT levels can help stratify sepsis severity and guide treatment decisions, particularly in critically ill patients.

b) Monitoring Treatment Response in Inflammation

- **Inflammatory Disease Management:** PCT and CRP levels can help monitor treatment response in a wide range of inflammatory conditions, including pneumonia, arthritis, and inflammatory bowel disease.

- **Guiding Antibiotic Therapy:** PCT levels can help guide antibiotic therapy, minimizing unnecessary antibiotic use and preventing resistance development.

c) Prognostic Indicator for Severity and Mortality

- **Sepsis Prognosis:** Elevated PCT levels are associated with increased mortality risk in patients with sepsis, providing valuable prognostic information.

- **Inflammatory Disease Progression:** CRP levels can provide insights into the progression of inflammatory diseases, helping to predict potential complications and adjust treatment strategies.

Limitations of PCT and CRP

a) PCT

- **Limited Sensitivity:** PCT may not always be elevated in milder bacterial infections, especially in immunocompromised individuals.

- **Influence by Non-Bacterial Conditions:** While rare, certain non-bacterial conditions, such as severe trauma, burns, or surgery, can cause a mild increase in PCT.

b) CRP

- **Lack of Specificity:** CRP is not specific for bacterial infections, making it less useful for distinguishing between bacterial and viral infections.
- **Influence by Other Factors:** Factors like age, sex, and underlying chronic conditions can influence CRP levels, requiring careful interpretation.

Conclusion. Procalcitonin and C-reactive protein stand as valuable tools in the arsenal of healthcare professionals. By offering insights into the dynamic process of inflammation, these markers contribute significantly to early diagnosis, accurate treatment, and improved patient outcomes.

Understanding the nuances of PCT and CRP changes within the context of a patient's clinical presentation, along with careful interpretation of individual laboratory results, empowers healthcare providers to effectively manage inflammation and optimize patient care.

Future Directions:

- **Development of Point-of-Care Tests:** Developing rapid, point-of-care tests for PCT and CRP will facilitate faster diagnosis and treatment decisions, especially in emergency settings.
- **Integration into Electronic Health Records:** Integrating PCT and CRP data into electronic health records can streamline data analysis and improve decision support systems for healthcare providers.
- **Further Research on PCT and CRP in Specific Inflammatory Conditions:** Continued research to refine the diagnostic and prognostic utility of PCT and CRP in specific inflammatory conditions, such as COVID-19, will refine clinical management.

REFERENCES:

1. Pfafflin A, Schleicher E. Inflammation markers in point-of-care testing (POCT) *Anal Bioanal Chem.* 2009;393:1473–80. [[PubMed](#)] [[Google Scholar](#)]
2. Levy MM, Fink MP, Marshall JC, Abraham E, Angus D, Cook D, et al. 2001 SCCM/ESICM/ACCP/ATS/SIS International Sepsis Definitions Conference. *Crit Care Med.* 2003;31:1250–6. [[PubMed](#)] [[Google Scholar](#)]
3. Brunkhorst FM, Al-Nawas B, Krummenauer F, Forycki ZF, Shah PM. Procalcitonin, C-reactive protein and APACHE II score for risk evaluation in patients with severe pneumonia. *Clin Microbiol Infect.* 2002;8:93–100. [[PubMed](#)] [[Google Scholar](#)]