

A Brief Overview: The Role of Procalcitonin in the Emergency Medicine

ȚAPOȘ GABRIELA-FLORENTINA*

Department of Emergency Medicine, Arad County Emergency Clinical Hospital, Romania

***Corresponding author:** ȚAPOȘ GABRIELA-FLORENTINA, Department of Emergency Medicine, Arad County Emergency Clinical Hospital, Calea Victoriei, 310037 Arad, Romania

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ABSTRACT

This review aims highlight the role and need for procalcitonin in emergency medicine. Severe bacterial infections, such as sepsis is medical emergency, thus requiring prompt treatment and diagnosis. Procalcitonin, a precursor to calcitonin, was defined 40 years ago [1,2], that helps in emergency department and in intensive care unit to diagnose bacterial infection. Over time, many articles have emerged on the role and need for procalcitonin in intensive care units, as well as in emergency department. A global problem is resistance on antibiotics.

Keywords: Procalcitonin; Emergency Medicine; Intensive Care; Bacterial Infection; Sepsis

Abbreviation: PCT: Procalcitonin

Introduction

A hard searching in PubMed, MDPI and Google Scholar carried out in July-August 2023 brought to a review of several articles with the approach of procalcitonin (PCT). PCT is defined for the first time in 1984, but in 1993 was recognized as having a diagnostic significance [1-3]. Severe bacterial infections and sepsis leads to multiple organ failure, thus increasing morbidity and mortality, in intensive care unit and in emergency department. PCT can be considered as a first-line test –to diagnose bacterial infection versus viral infection (for example, viral pneumonia compared to bacterial one), especially in emergency medicine, because other diagnostic tests such as blood cultures, urine culture, culture of cerebrospinal fluid or C-reactive protein (CRP) cannot be used in emergency department, thus requiring a few days until the result is received. Across the globe, bacterial resistance to antibiotics is constantly increasing, this is the reason why in emergency medicine PCT dosing plays a crucial role because this marker guides the clinician in deciding if a patient can or cannot start antibiotic therapy; this can significantly reduce the rate of resistance on antibiotics and mortality.

Discussion

About PCT was written a lot of researches, with a particular importance showing the importance of this biomarker in determining the infection, especially in the case of sepsis and the need to start antibiotic therapy. However in emergency medicine the role of PCR is not fully known but in intensive care units this indicator is used more and more often [1]. In 1984, Le Moulllec and colab. define PCT as a biomarker consisting of about 116 amino acids, formed biochemically consisting of three section:

1. Amino-terminal;
2. Imature calcitonin;
3. Ketacalcin.

PCR together with other peptides (for example amyline, related to calcitonin, adrenomodulin I and II genes) grow in an infection process. In about 3-6 hours after onset of infection, PCR, can be detected in a serum of the patient [2,3]. Assicot and colab. demonstrates the role of PCT in a research that PCR shows increased levels in some patients with specific clinical symptoms of bacterial infection, its refer-

ence value decreasing after starting antibiotic treatment. Therefore, the diagnostic significance of PCT has been recognized since 1993 [4]. W. Karzai and colab. quote C. Natanson and colab., W. Şteinberg and colab., F.A. Moore and colab., J.R. Şaffle and colab., thus classifying the major causes of mortality and morbidity in therapy departments. These include: sepsis, multiple organ failure [5,6], pancreatitis [7], major trauma [8] and burns [9]. The latter can give false-positive results, but still maintain a high level of PCR (on average over 48 hours) it makes us think of a major suspicion of bacterial infection. Velissaris D. And colab. Şay that PCR is a biomarker both diagnostic and prognostic especially in patients who are in the emergency department with major suspicion of sepsis [10]. Linscheid P. And colab. in a published research in 2003 demonstrates the production of PCT by dipocytes in presence of systemic inflammation, thus obese patients have a high risk of death compared to normal weight patients [11]. Hirotada K. And colab., in a published research in 2021 prove that PCT in high concentrations causes mitochondrial dysfunction which also associated with a increased inflammation throughout the body [12]. Pierre E.C. and colab., have carried out an observational cohort research involving 180 patients with sepsis, hospitalized in the intensive care unit thus demonstrating the effectiveness of the use of PCR in starting antibiotic treatment. It should be noted that a marked decrease in PCR occurs only when used when appropriate antibiotics are used, otherwise the serum level of PCR will not decrease [13]. Briel M. and colab., mention that PCR-guided therapy thus demonstrating that the prescribing rate of prescription of antibiotics was 72% lower than standard therapy (especially in the case of respiratory tract infections) and the duration of use of antibiotics was one day shorter [14].

Conclusion

This review highlights the importance of PCT in emergency departments, thus being a valuable indicator in the identification of systemic bacterial infections. This marker shows, the importance of the immediate onset of antibiotic therapy in case of bacterial infection, reducing morbidity and mortality especially in intensive care units [15]. This biomarker is easily measurable, sensitive, specific and requires little time to obtain a value. In fact, dosing PCT in emergencies can help reduce antibiotic resistance. The following should be noted: PCR, both in the emergency department and in the intensive care unit, cannot replace clinical evaluation and other markers of inflammation. PCT dosing cannot be realized in all departments of emergency medicine maybe because of costs.

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ȚAPOȘ GABRIELA-FLORENTINA. Biomed J Sci & Tech Res



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