

Moderate increase of serum levels of procalcitonin in diabetic ketoacidosis

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To the editor,

Procalcitonin (PCT) is a helpful marker of systemic inflammatory response to an infection and when detected at levels higher than 2 ng/ml, it is strongly indicative for sepsis of bacterial aetiology.¹ Mild PCT elevations are also detected in many other diseases such as viral infections, autoimmune disorders, myocardial infarction, stroke, burns and multiple trauma.

It is well-established that diabetic ketoacidosis (DKA) is associated with leukocytosis and an increase in acute phase proteins, including C-Reactive Protein (CRP), tumor necrosis factor alpha, interleukin 1 beta (IL-1 β), IL-2, IL-6 and IL-8.² Since infections are the most common precipitating factors in the development of DKA in patients affected by diabetes, it is of paramount importance to rule out bacterial infection.

In this letter, we report the case of a young woman with type 1 diabetes who presented at our emergency department with vomiting and intense abdominal pain. She had not taken her usual dose of insulin therapy the night before because of malaise. Based on her clinical presentation, as well as her arterial blood gas results (high anion gap metabolic acidosis) and her plasma glucose levels (\sim 29 mmol/l), she was diagnosed with DKA. Interestingly, PCT concentration was moderately increased (1.72 ng/ml at presentation and 2.31 ng/ml the day after), no occult infection was detected (chest X-ray, abdominal ultrasound, and urine dipstick) and the patient remained afebrile. Classic treatment for DKA was applied (hydration, intravenous insulin and potassium administration) without administration of any antibiotic, and the patient demonstrated rapid clinical improvement. PCT returned to normal values ($<$ 0.5 ng/ml) after three days of hospitalization, reflecting the half-life of the protein.

Previous studies have suggested that increased PCT and hyperglycemia may be interrelated. In a large cohort (n = 6618), Abbasi and colleagues demonstrated

that PCT is a predictor of incident type 2 diabetes independent of common risk factors such as gender, smoking, waist circumference, hypertension and familial diabetes.³ Moreover, it has also been reported that correction of plasma glucose levels leads to a decrease of PCT concentrations in patients presenting with acute hyperglycemia.⁴ To our knowledge, increased PCT levels within the context of DKA has only been reported once before: In a large retrospective study investigating the discrepancies in the increase of CRP and PCT concentrations in children and adolescents during acute illness, Ivaska et al.⁵ reported that there were mild-to-severe increases of PCT concentrations in four children with DKA. None of them had clinical signs of bacterial infection.

The role of acute phase proteins, including PCT, within the context of DKA warrants further investigation. Furthermore, practitioners should be aware that increases in CRP and PCT may occur in patients with DKA in the absence of a concomitant infection thus, avoiding unnecessary examinations such as blood cultures and treatments (antibiotics) if other signs of infection are absent.

REFERENCES

1. 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*. 2001;164:396-402.
2. Karavanaki K, Karanika E, Georga S, et al. Cytokine response to diabetic ketoacidosis (DKA) in children with type 1 diabetes (T1DM). *Endocr J*. 2011;58:1045-53.
3. Abbasi A, Corpeleijn E, Postmus D, et al. Plasma procalcitonin and risk of type 2 diabetes in the general population. *Diabetologia*. 2011;54:2463-5.
4. Aksu NM, Aksoy DY, Akkas M et al. 25-OH-Vitamin D and procalcitonin levels after correction of acute hyperglycemia. *Med Sci Monit*. 2013;12;19:264-8.
5. Ivaska L, Elenius V, Mononen I, et al. Discrepancies between plasma procalcitonin and C-reactive protein levels are common in acute illness. *Acta Paediatr*. 2016;105:508-13.