Beta-defensin 2: a novel biomarker of infection

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Abstract

Inflammation is a response provided by the immune system, in order to maintain the normal tissue homeostasis systems during infection and tissue injury. The entire process of the inflammatory response is mediated by a variety of regulators involved in the selective expression of proinflammatory molecules such as inflammatory cytokines [e.g. interleukin-6 (IL-6)], chemokines and antimicrobial peptides (AMPs). AMPs have a critical role in the innate immune system on the grounds that they provide protection of the host from microbial infection. One important category of antimicrobial peptides are human defensins. In this study, we sought to evaluate the levels of human β -defensin -1 (hBD-1) in 347 serums, β-defensin -2 (hBD-2) in 422 serums, IL -6 in 414 serums and c – reactive protein (CRP) in 416 serums of patients with inflammation of infectious or noninfectious etiology and 22 healthy individuals. Our aim was to examine the potential of β-defensins to serve as novel markers of inflammation. Our results demonstrate that human β-defensin-2 concentrations in patients with inflammation of infectious etiology were significantly higher than those in patients with inflammation of noninfectious etiology and healthy individuals (t=9,409, p<0,0001), whereas the levels of hBD-1 weren't statistically different in cases of infectious and non infectious inflammation.
On the other hand, the levels of CRP were notably similar in patients with inflammation of infectious etiology (mean: 15,4 mg/dl) and no infectious etiology (mean: 10,9 mg/dl). Furthermore, there is a significant correlation between the levels of IL-6 and hBD-2 (r=0,8681, p<0,0001) and a weak association between IL-6 and hBD-1 (p=0,0246). In addition, the levels of hBD-2 in patients with cancer (without infection) weren't significantly higher compared to the levels in patients without cancer (p=0,0066) and healthy individuals (p=0,0144). Analysis of serial samples indicated that CRP was increased continuously and no specific in every patient with inflammation, whereas hBD – 2 and IL-6 were associated with the appearance of infection.

Materials and Methods

Sera: Sera obtained from 347 patients for hBD-1, 422 patients for hBD-2 and 414 patients for CRP, 414 patients for IL -6 and 22 healthy individuals. Patients had been diagnosed with inflammation of infectious, non-infectious etiology.

IL-6, BD-1, BD-2 quantification: CRP, hBD-1, hBD-2, IL – 6 were measured with standard methods using commercial nephelometry and ELISA assays. The obtained results were calibrated against kit standard reagents. Statistical analysis was followed.

Background

Defensins are cationic, cysteine-rich and amphipathic polypeptides which consist of 28–42 amino acid. They possess a conserved structural fold containing six highly conserved cysteine residues, which form three pairs of intramolecular disulfide bonds. In humans, β defensins are expressed in various mucosa and epithelial cells, where they can be up-regulated in response to infectious and inflammatory stimuli. HBD-2 was first isolated from psoriatic scales and it is expressed in skin as well as in urinary, gastrointestinal and respiratory epithelia.

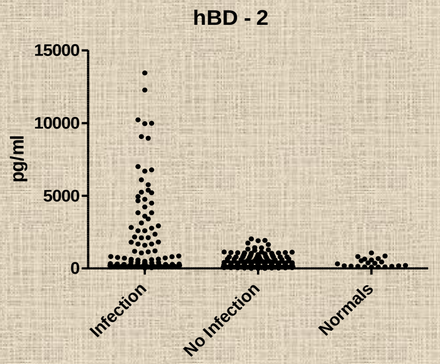
Aim of the Study

To examine if circulating levels of β-defensin 1 and β-defensin 2 are increased during inflammation and to examine their correlation to levels of IL-6 and CRP in serum of patients with inflammation of infectious or non-infectious origin

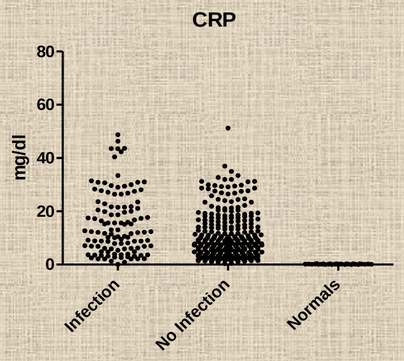
Results

Our results indicate that the levels of hBD-2 are elevated in patients with inflammation of infectious etiology. Pearson's analysis showed that there is a significant association between the levels of IL-6 and the levels of hBD-2. Furthermore, there is a weak correlation between the levels of IL-6 and hBD-1. In addition , the concentration of hBD-2 in patients with cancer (without infection) weren't significantly higher compared to the concentration in patients without cancer.

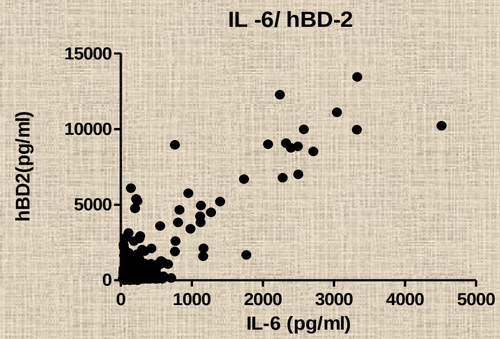
➢ hBD-2 levels in patients with inflammation of infectious or non infectious etiology and healthy individuals (t=9,409, p<0.0001).



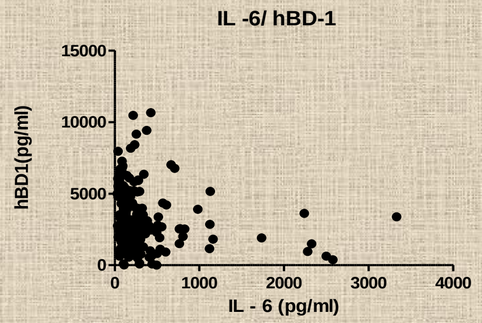
➢ CRP levels in patients with inflammation of infectious (mean: 15,4 mg/dl) or non infectious etiology (mean: 10,9 mg/dl) and healthy individuals.



➢ hBD-2 is correlated with the levels of IL-6. Pearson r=0,8681, p<0,0001.



➢ hBD-1 is correlated with the levels of IL-6. Pearson r=0,1451, p=0,02 .



Conclusions

Taking these evidence together we conclude that hBD-2, could be used as a novel diagnostic marker of infection. In contrast to CRP, which is a very useful nonspecific biochemical marker of inflammation, hBD-2 have the potential to make the distinction between inflammatory of infectious and non infectious etiology.

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