

Levels of soluble ICAM-1 in atopic dermatitis

A new marker for monitoring the clinical activity?

Wüthrich B, Joller-Jemelka H, Kägi MK. Levels of soluble ICAM-1 in atopic dermatitis. A new marker for monitoring the clinical activity? Allergy 1995; 50: 88–89. © Munksgaard 1995.

B. Wüthrich¹, H. Joller-Jemelka²,
M. K. Kägi¹

¹ Allergy Unit, Department of Dermatology, and

² Section of Clinical Immunology, Department of Internal Medicine, University Hospital Zurich, Zurich, Switzerland

Levels of soluble intercellular adhesion molecule-1 (sICAM-1) were measured in sera from patients with an acute exacerbation of their atopic dermatitis (AD) ($n = 16$) on admission to and discharge from our department of dermatology. At admission, the sICAM-1 levels in sera from patients with AD were slightly higher than those of the blood donors ($n = 100$) and dropped at discharge significantly ($P = 0.014$) after improvement of the skin conditions. Therefore, sICAM-1 may be, together with soluble interleukin-2 receptor (sIL-2), eosinophil cationic protein (ECP), and CD14, another marker for monitoring AD.

Key words: atopic dermatitis; intercellular adhesion molecule-1 (sICAM-1).

Prof. Brunello Wüthrich
Allergy Unit, Department of Dermatology
University Hospital Zurich
Gloriastrasse 31
CH-8091 Zurich
Switzerland

Accepted for publication 17 March 1994

Hashimoto et al. (4) reported in this journal on elevated levels of soluble intercellular adhesion molecule-1 (sICAM-1) in sera from patients with atopic bronchial asthma. They also found that the sICAM-1 levels were higher during asthma attacks than those obtained from asthmatic patients in stable conditions, suggesting that sICAM-1 levels reflect the upregulation of cell-surface ICAM-1 expression in allergic inflammation. They postulated that sICAM-1 can attenuate eosinophil adherence to the endothelium and subsequent infiltration in the bronchial mucosa and modulate eosinophil functions by binding itself to CD11a CD18 receptors on eosinophils. Therefore, sICAM-1, together with ECP (eosinophil cationic protein), may be another marker of asthma activity (8). On the other hand, it is well established that, in addition to the serum levels of soluble interleukin-2 receptor (sIL-2) and soluble CD14, a marker for human monocytes, serum levels of ECP correlate with the clinical activity of atopic dermatitis (AD) and can be used to monitor AD (5, 6, 11, 12). To determine further the role of sICAM-1 in atopic skin diseases, we measured sICAM-1 levels in sera from patients with AD.

Material and methods

Patients

We analyzed the sera of 16 patients (6 men and 10 women with a mean age of 37 years, range 19–81 years) with the diagnosis of AD, according to the criteria of Hanifin & Rajka (2), on admission (A) to and discharge (D) from our department of dermatology. Eleven patients suffered from a "pure" form of AD (10) without concomitant respiratory allergies (group a), and five patients (group b) also suffered from bronchial asthma (BA), but this condition was stable when the AD was exacerbated. The duration of hospitalization averaged 22 days. The AD patients were routinely treated with topical steroids, and they displayed a much improved skin condition at D. Serum samples were obtained from all patients at A and D and then stored at -70°C until simultaneous testing.

sICAM-1 determination

sICAM-1 levels were determined by the enzyme-linked immunosorbent assay for quantitative detection of soluble human intercellular adhesion mole-

cule-1, i.e., sICAM-1 ELISA (Bender MedSystems, Bender & Co. Ges.m.b.H. Vienna, Austria), according to the manufacturer's instructions. The mean level of sICAM-1 obtained from the sera of 100 blood donors was 2.46 ± 0.32 ng/ml with an upper range of 2.97 ng/ml.

Statistical analysis

As in previous publications (5, 11, 12), notched-box plots were chosen to display the data. A box plot is a graphic method for displaying the 10th, 25th, 50th, 75th and 90th percentiles of a variable, being especially useful for comparing variable distributions. The notches represent 95% confidence intervals about the median. The data were analyzed with the Wilcoxon signed-rank test (paired samples).

Results

At A, the sICAM-1 levels in sera from patients with AD had a mean of 3.23 ± 1.32 ng/ml and a range between 0.35 and 6.15, which was slightly higher than that of the blood donors. At A nine AD patients and five at D showed sICAM-1 levels above the upper range of 2.97 ng/ml of the blood donors. As shown in Fig. 1, there was a slight but significant decrease in the sICAM-1 levels at D ($P = 0.014$). There were no further significant differences in analyzing group a ("pure" AD) and group b (AD with BA) separately (3.24 ± 1.32 vs. 3.19 ± 1.36 ng/ml at A; 2.21 ± 1.45 vs. 3.08 ± 1.29 ng/ml at D).

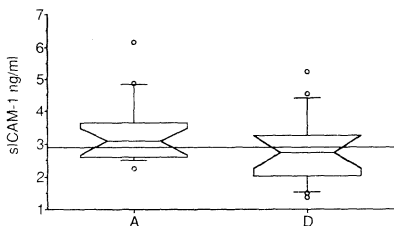


Fig. 1. Levels of soluble ICAM-1 on admission (A) and on discharge (D) in 16 patients with atopic dermatitis (AD). Difference between A and D was statistically significant ($P = 0.014$). Notches represent 95% confidence intervals about median. At A, median values were above and at D below upper range of 100 blood donors.

Discussion

AD is a common inflammatory skin disease characterized by several clinical, immunologic, and bio-

chemical alterations (3, 7, 9). Several lymphokines and especially toxic products derived from eosinophil activation contribute to the inflammatory skin alterations (1). Our data, obtained from a small number of patients, indicate that the determination of sICAM-1 could be, like eosinophil counts and ECP, sIL-2, and sCD14 levels, marker for monitoring AD activity. Our data also suggest that levels of serum sICAM-1 may be a reflection of the leukocyte endothelial cell interaction, which is crucial for leukocyte infiltration into inflammatory skin lesions. However, little is known about synthesis release and clearance of these molecules. What is measured as freely available in the circulation does not necessarily reflect the proportion that is shed. Moreover, further studies should be extended to the skin (biopsies) to measure ICAM-1 expression in lesional skin. Our preliminary results in AD could provide additional information about the pathogenesis of inflammation in atopic diseases and extend knowledge of soluble serum variables monitoring the activity of AD.

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