**Materials and Methods**

We conducted a case-control study of 105 patient volunteers (56 AD, 49 healthy controls (HC)) over 10 weeks of dermatological symptom presentation starting at symptom onset. Within the framework of the set goal, patients were divided by biological sex and IgE sensitization. Inclusion criteria for the patients were: no unstable nondermatological medical conditions or pregnancy; no systemic and/or topical glucocorticoid, immunosuppressant, and psychotropic medications within the month prior to blood sampling; no history of mental or other dermatological disorders; no severe forms of disease, requiring systemic therapy; good general physical health. Following the first blood sample, patients were provided conventional inpatient treatments according to the international guidelines, taking into account severity of disease and anamnesis. Dermatological and psychological statuses of the patients were assessed twice: at entry point (study baseline, disease exacerbation) and at week 10. Severity of dermatitis was assessed using the Scoring of Atopic Dermatitis (SCORAD) index [32]. Severity of depression was assessed according to DSM-V criteria with the Hamilton Depression Rating Scale (HAMD).

*Study Population*

We conducted a case-control, single-center study in Astana, Kazakhstan, of 105 patient volunteers (56 AD, 49 HC) over 10 weeks of dermatological symptom presentation starting at symptom onset. Within the framework of the set goal patients were divided by biological sex: AD (males, *n* = 27; females, *n* = 29), HC (males, *n* = 23; females, *n* = 26); IgE sensitization: extrinsic atopic dermatitis, EAD (males, *n* = 16; females, *n* = 17), and intrinsic atopic dermatitis, IAD (males, *n* = 11; females, *n* = 12). Sex ratios (M/F: HC, 0.88; AD: 0.93) and age (means ± SEM: HC, 34.9 ± 1.3; AD, 41.6 ± 2.3) of recruited volunteers where similar. Group ages by sex were: HC males, 32.4 ± 1.2; AD males, 41.3 ± 3.5; HC females, 37.0 ± 2.1; AD females, 41.9 ± 2.9 years. Dropout numbers were as follows: HC, none; AD, 10. Dropout numbers by sex were as follows: AD males, 5; AD females, 5. Inclusion criteria for the patients were: no unstable nondermatological medical conditions or pregnancy; no systemic and/or topical glucocorticoid, immunosuppressant, and psychotropic medications within the month prior to blood sampling; no history of mental or other dermatological disorders; no severe forms of disease requiring systemic therapy; good general physical health.

The study was approved by the Astana Medical University Health Ethical Review Boards within guidelines established by the 1964 Declaration of Helsinki (IRB No. 4). Patients were enrolled after written informed consent. Following the first blood sample, patients were provided conventional inpatient treatments in the Center of Dermatology in Astana according to the international guidelines, taking into account severity of disease and anamnesis: antihistamines (e.g., diphenhydramine, desloratadine) and topical corticosteroids (e.g., betamethasone, mometasone) up to 3 weeks, and emollients up to 2 months. Psychiatric evaluation of patients did not necessitate the use of antidepressants or other psychotropic agents. Improvement of dermatological symptoms was observed in all patients when evaluated 10 weeks after initial symptom presentation.

*Patient Dermatological and Psychological Scoring*

Dermatological and psychological statuses of the patients were assessed twice: at entry point (study baseline, disease exacerbation) and at week 10. Dermatological status was assessed using the SCORAD index, which included objective (extent and intensity) and subjective (daytime pruritus and sleep loss) criteria (SCORAD index, mild, <25; moderate, 25–50; severe, >50) [32]. Severity of depression was assessed according to DSM-V criteria with the HAMD (absence, ≤7; mild, 8–16; moderate, 17–27; severe, ≤28).

*Sample Collection and Processing*

Blood was taken between 8 and 10 a.m. to prevent daily variations on study baseline and week 10 and collected into serum separation tubes. Samples were cooled (1 h, 4°C) and centrifuged (2,000 *g*, 10 min, 25°C). Serum was stored at –20°C before analysis.

*Analysis of IgE, Cortisol, and Testosterone Levels*

The total IgE (normal ranges up to 100.0 IU/mL), cortisol, and testosterone levels were detected using a solid-phase, chemiluminescent immunometric assay in an Immulite/Immulite 1000 (Siemens, Germany). Normal ranges were as follow: IgE levels, 0.000–100.0 IU/mL; cortisol, 138–690 nmol/L; testosterone, men 20–49 years, 72–853 ng/dL; men ≥50 years, 129–767 ng/dL; women ovulating, 0.010–73.0 ng/dL; women postmenopausal, 0.010–43.0 ng/dL.

*Statistics and Sample Size*

Unpaired, two-way ANOVA and Bonferroni means separation tests were used for multiple group comparisons using an α/m Bonferroni correction to account for missing data and dropped patients. Spearman correlations were conducted using pairwise deletion for missing values at an α = 0.05 threshold for significance. Data are presented as means ± SEM. Based on SCORAD pilot data, we determined that sample sizes of at least 16 patients per group were required to see differences between EAD and IAD patients (1 – β: 0.080, α: 5%).