

Interferon-alpha Treatment Decreases the Number of Blood Eosinophils in Patients with Severe Atopic Dermatitis

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Eight patients with severe atopic dermatitis were treated with interferon-alpha (IFN- α 2b), given by subcutaneous injection, three times a week. The maximum doses varied from 3 to 9×10^6 U and the period of treatment from 6 to 14 weeks. The therapy was well tolerated. No changes were observed in eczema or IgE levels, although IFN- α 2b treatment significantly decreased blood eosinophils.

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It has been shown that the synthesis of IgE by B lymphocytes is increased by interleukin-4 but decreased by interferon-gamma (IFN- γ) and interferon-alpha (IFN- α) (1,2). On the basis of experimental data, both IFN- γ (3–7) and IFN- α (8,9) have been used to treat patients with atopic disorders (3,5–7,9) and with hyper-IgE syndrome (4,8). Conflicting results concerning either clinical symptoms of disease or serum IgE levels have been reported. In this work we studied whether subcutaneous administration of IFN- α 2b in patients with severe atopic dermatitis could reduce the number of eosinophils and serum IgE levels and improve the clinical symptoms of atopic dermatitis.

MATERIALS AND METHODS

The study included 8 patients with chronic severe atopic dermatitis (4 males, 4 females, age range 22–39 years). All patients volunteered for this study. The patients had eczema on at least 20% of their body surface area. The study included medical history, physical examination, complete blood count, creatinine, aspartate aminotransferase, urinalysis, and total IgE. These evaluations were repeated at 2-week intervals throughout the study period, and 4 weeks after the treatment. Six atopic patients (3 males, 3 females, age range 21–36 years) were also enrolled at the same time to serve as controls (IFN- α 2b was not given to them) in order to exclude for instance seasonal variations in the measurements.

The subjects were treated with IFN- α 2b (Introna®, Schering-Plough Co.) by subcutaneous injections three times a week at doses of 3×10^6 U for 4–6 weeks, and then, with the approval of the patient, the doses were gradually increased to 4.5 (subject 3), 6 (subject 4), or 9×10^6 U (subjects 5, 6, 7, see Fig. 1). The first two injections were given at a dose of 1.5×10^6 U except for subjects 3 and 7, to whom lower doses were used for 2 or 4 weeks, respectively. The patients received paracetamol, 1 g by mouth, 1 h before injection in order to avoid any possible fever reaction. The patients were allowed to continue their earlier medications, which consisted of mild topical corticosteroids, emollients, and occasionally taken antihistamines (hydroxyzine). The longest period of treatment was 14 weeks.

The paired samples *t*-test was used for statistics at the beginning and at the end of the therapy.

RESULTS

The mean serum IgE level was 4200 ± 2400 IU/ml (ranging 600–7000) and the mean number of eosinophils $870 \pm 520 \times 10^6/l$ (ranging 330–1790) at the beginning of the study.

One of the 8 patients discontinued the treatment due to malaise after two injections of 1.5×10^6 U IFN- α 2b. The other tolerated the therapy well, without any side effects.

No clinical improvement was observed in any of the patients during the IFN- α 2b treatment. Also, serum IgE levels showed only a slight random variation, which did not reveal any correlation to the administration of IFN- α 2b.

However, IFN- α 2b treatment decreased the total number of blood eosinophils in all the patients; the mean decrease at the end of therapy was 56% ($p < 0.001$, Fig. 1). After the treatment, the number of eosinophils tended to increase (by 40%, $p = 0.085$). Patient 3 was treated with 1×10^6 U IFN- α 2b for the first 4 weeks and patient 7 with 1.5×10^6 U for the first 2 weeks. The eosinophils from these patients decreased only when at least 3×10^6 U IFN- α 2b three times a week was administered.

In the control group, the number of eosinophils ($500 \pm 370 \times 10^6/l$, ranging 100–1100) varied randomly without any trend during the 3 months of following period (7–38% variations over the mean values), indicating that the decrease in the treatment group was in all probability due to IFN- α 2b.

DISCUSSION

The study showed that IFN- α 2b treatment even with the doses

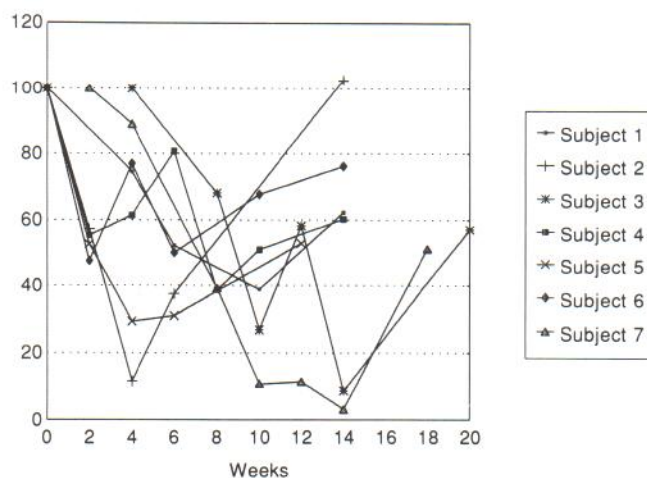


Fig. 1. The decrease in the total number of blood eosinophils during subcutaneous interferon- α 2b treatment in 7 subjects with severe atopic dermatitis. The number of eosinophils at the start of the treatment is presented as 100%. The last point but one indicates the end of the treatment.

of 9×10^6 U three times a week had no effect on either the clinical severity of eczema or on serum IgE levels in patients with severe atopic dermatitis. This is consistent with an earlier observation of IFN- α treatment (3×10^6 U three times a week) in atopic dermatitis (9), but the opposite of the results achieved in hyper-IgE syndrome (3×10^6 U twice a week) (8). This suggests that the pathomechanism of eczema and the regulation of IgE synthesis are different in these two diseases.

However, IFN- α 2b seems to decrease the number of blood eosinophils, which is a new clinical finding. Previously, interferons have been reported to suppress markedly the in vitro proliferation of pluripotent hematopoietic progenitor cells (10, 11). Since interferons seemed to decrease the migration of eosinophils (12), the suppression of bone marrow probably accounted for the decrease in blood eosinophils. On the other hand, interferons may activate mature eosinophils locally in tissue to secrete cytotoxic products, which may aggravate atopic symptoms (12, 13). This might be linked with the poor clinical response observed in this study.

In conclusion, IFN- α treatment decreased the number of blood eosinophils but had no effect on the clinical status of eczema or serum IgE levels in patients with severe atopic dermatitis.

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