

# Inhibition of the seasonal IgE increase to *Dactylis glomerata* by daily sodium chloride nasal-sinus irrigation during the grass pollen season

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Serum levels of IgE to pollen allergens increase in allergic patients during the pollen season. Nasal tissues appear to play a critical role in this rise because levels of IgE to these allergens may be inhibited by intranasal steroids administered during the season.<sup>1,2</sup>

Sodium chloride nasal irrigation is an old home remedy used for rhinitis relief with a presumably rather simple action: nasal cleansing and secretion removal. Here we have assessed for the first time the effect of nasal irrigation on the seasonal IgE increase in grass-allergic patients.

## METHODS

Twenty-five patients (19-37 years old) with a diagnosis of grass allergy were chosen. None of them were being treated with steroids or were receiving immunotherapy. Patients were randomized in (1) an active group of 12 patients (sodium chloride irrigation) and (2) a control group of 13 patients. The follow-up was 8 weeks from May to July 1998 (Fig 1). No pharmacologic treatment was initially allowed, except antihistamines.

Nasal irrigation was carried out daily (morning, midday, and night) with a WaterPik (Teledyne WaterPik, Ft. Collins, Col) with a nasal adapter (Grossan Sinus Irrigator, Hydro Med, Sherman Oaks, Calif). The irrigation liquid was made with 5 g of a salt mixture of sodium chloride and sodium bicarbonate (SinuSal, Immunotek, Madrid) in 500 mL of warm water, resulting in a slightly alkaline (pH 8.1) isotonic solution. Irrigation was done with a soft pulsating stream entering through one nostril and going out through the other. Both nostrils were irrigated alternatively during 4 to 5 minutes, switching every 30 to 60 seconds, and using at least 400 mL of the solution.

Grass pollen counts were made with a 7-day recording volumetric spore trap (Burkard, Rickmansworth, UK).

Specific IgE to *D glomerata* pollen extract was measured by ELISA and expressed in arbitrary units per milliliter read from a curve established with an internal reference sample. Total IgE was measured by Fast II (BioWhittaker, Walkersville, Md) and expressed in International Units per milliliter. In every measurement, all serum samples were tested at once to avoid interassay variations.

## RESULTS AND DISCUSSION

Sixteen patients (8 in each group) successfully completed the study. Blood samples were obtained before, during and after the season (Fig 1). Both active and control patients had measurable preseasonal IgE to *D glomerata* (mean values 3.13 vs 2.91, log arbitrary units/mL) and total serum IgE (mean values 2.24 vs 2.01, log IU/mL) ( $P > .05$ , Student *t* test). Four (intra-seasonal) and 8 (postseasonal) weeks later, almost all patients raised their serum levels of IgE to *D glomerata*. However, this increase was significantly lower in patients with nasal irrigation than in controls. The mean percentage increase over the preseasonal *D glomerata* IgE activity was (active vs control group) 27% versus 167% intraseasonally ( $P = .032$ ) and 80% versus 378% postseasonally ( $P = .007$ , Mann-Whitney *U* test). By contrast, total IgE increased slightly in most patients, without significant differences between groups (mean values): 16% versus 47% intraseasonally and 35% versus 69% postseasonally.

These findings greatly support the notion that nasal tissues play an important role in the systemic IgE response to pollen allergens,<sup>1,2</sup> even clearer evidence than steroids because irrigation only can be acting locally. The mechanism(s) by which nasal washes impair this response is unknown. Yet some possibilities can be considered. Although the irrigation system used allows an extensive washing of both nasal and sinus cavities,<sup>3</sup> it is unlikely that the effect was solely the result of antigen removal because these washes lasted only a few minutes per day. An anti-inflammatory property of sodium chloride irrigation seems more likely because mucosal inflammation may favor allergen penetration and presentation. The removal of nasal secretions in allergic patients, containing a large array of cytokines-mediators released by the activated epithelial cells or the recruited inflammatory cells, may result in an anti-inflammatory effect. In this regard, Georgitis<sup>4</sup> has shown a significant decrease of inflammatory mediators in nasal secretions from patients with perennial rhinitis with use of the very same irrigation system as in the current study. Interestingly, such a decrease lasted more than 6 hours and was seen for histamine and leukotriene C<sub>4</sub> but not for the mast cell-restricted prostaglandin D<sub>2</sub>, suggesting the removal of basophils.<sup>4</sup> A similar finding was described for intranasal steroids when the late-phase response was studied.<sup>5</sup> In fact, the main effect of intranasal corticoids

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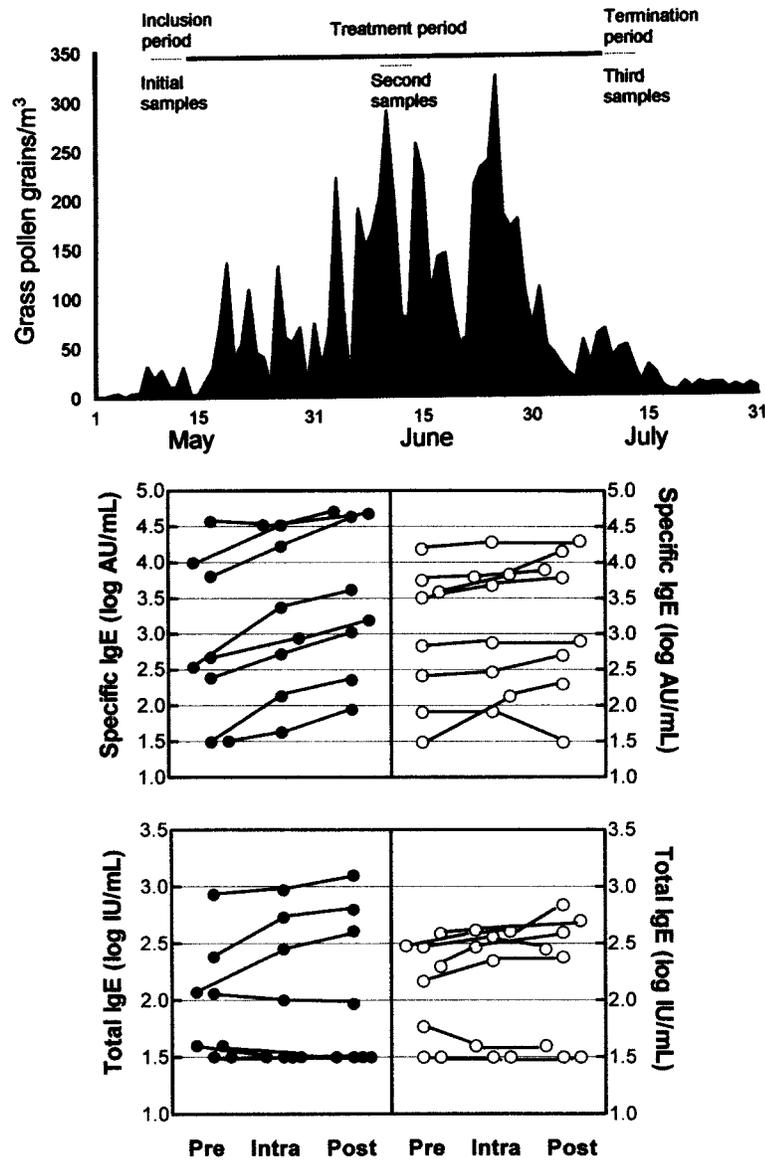


FIG 1. Variations of specific (*Dactylis glomerata*) and total IgE serum levels during grass pollen season. *Upper panel.* Study design and grass pollen count in Madrid (1998) during course of trial. *Solid symbols.* Control patients (n = 8); *open symbols.* patients with nasal irrigation (n = 8). Results are mean of duplicates.

teroids appears to be reduction of the inflammatory cell influx in nasal secretions.<sup>5</sup> Thus a decrease in basophils, and likely other proinflammatory cells, in nasal secretions might be the common effect of both intranasal steroids and sodium chloride irrigation although achieved by complementary mechanisms: inhibition of the cell influx versus removal of the cells already in the nasal secretions. If this is the case, a clinical improvement by combining both treatments is envisaged and therefore clinical studies are encouraged.

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#### REFERENCES

1. Naclerio RM, Adkinson NF, Creticos PS, Baroody FM, Hamilton RG, Norman PS. Intranasal steroids inhibit seasonal increases in ragweed-specific immunoglobulin E antibodies. *J Allergy Clin Immunol* 1993;92:717-21.
2. Pullerits T, Praks L, Sjöstrand M, Rak S, Skoogh B-E, Lötval J. An intranasal glucocorticoid inhibits the increase of specific IgE initiated during birch pollen season. *J Allergy Clin Immunol* 1997;100:601-5.
3. Grossan M. A new nasal irrigator device. *Eye Ear Nose Throat Mon* 1993;53:87-90.
4. Georgitis JW. Nasal hyperthermia and simple irrigation for perennial rhinitis: changes in inflammatory mediators. *Chest* 1994;106:1487-92.
5. Naclerio RM, Baroody FM, Kagey-Sobotka A, Lichtenstein LM. Basophils and eosinophils in allergic rhinitis. *J Allergy Clin Immunol* 1994;94:1303-9.