

A Simple Advice for the Prevention of Pollen-Induced Allergic Rhinitis

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The best treatment of type I allergic disease is avoidance of the allergen. Because of the general presence of pollen in the air during the pollen season, this strategy is nearly impossible for pollen allergens. Destruction of allergens on the mucosa by a protease cocktail might be a possible strategy to prevent the induction of an allergic reaction [1].

Since it is difficult to find a mixture that degrades all important allergens and that could be used without substantial side effects for the mucosa, the development of such a drug would be a difficult enterprise. Alternatively, one may look for substances which stop pollens from releasing their allergenic molecules onto the mucosa.

Wolters-Arts et al. [2] have recently demonstrated that a certain lipid fraction of the exudate of plant stigmata containing many saturated and unsaturated fatty acids (triacylglycerides) is necessary to allow penetration of the pollen tube, which is essential for the reproduction of higher plants. During pollen germination and pollen tube formation, a number of molecules are released from the pollen, including allergens. Breakdown products of triacylglycerides such as glycerol and free fatty acids, block penetration of the pollen tube.

We tested whether glycerol would inhibit the release of allergens from grass pollen (timothy grass). Using a standard protocol for the aqueous extraction of allergens, pollen was incubated with PBS and increasing amounts of glycerol under standardized conditions. It was shown that the presence of glycerol in the extraction buffer after an increase to 25% glycerol led to a dose-dependent reduction in total protein content of the supernatant (fig. 1). To analyse whether inhibition of protein release from pollen by glycerol includes the allergens, SDS-PAGE of extracts (fig. 2a) and a Western blot (fig. 2b) using patient's

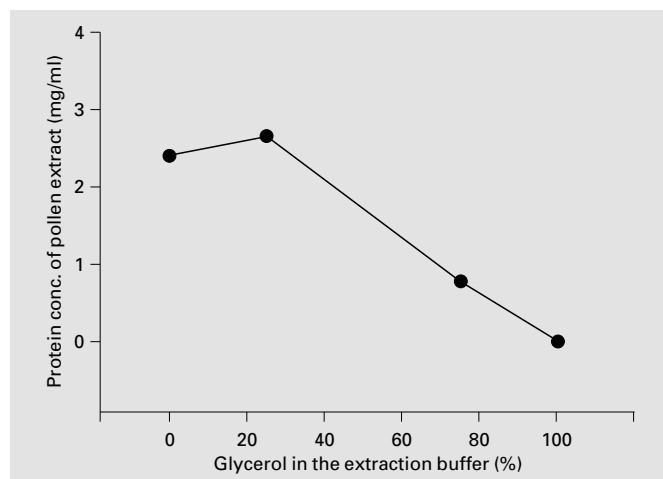


Fig. 1. The protein concentration of timothy grass pollen extract is reduced when prepared in the presence of glycerol. Pollen was purchased from Artu Biologicals N.V. (Lelystad, The Netherlands; *Phleum pratense*, batch No. 24W28-7c); 10 mg of pollen were incubated with 100 μ l of standard phosphate buffer saline (PBS) in the absence or presence of increasing amounts of glycerol (25, 75 and 100%; Merk, Darmstadt, Germany). Protein concentration was measured by the Coomassie protein assay (Pierce, Rockford, Ill., USA).

serum containing specific IgE antibodies to grass pollen allergens were performed. With 25% glycerol in the buffer, the presence of proteins and major allergens in the extract increased, 75% led to a slight reduction and 100% completely blocked the release.

Furthermore, we applied the extracts produced in the presence of increasing amounts of glycerol in standard skin prick tests performed on patients allergic to grass

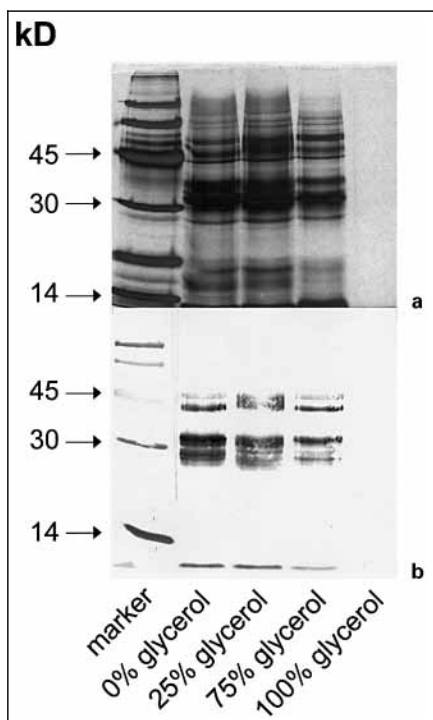


Fig. 2. Allergen release into timothy grass pollen extract is blocked when prepared in the presence of glycerol. Proteins were separated by SDS-PAGE (12%) according to Laemmli [3]. After SDS-PAGE, proteins were either silver stained in the gel (**a**) following a procedure mentioned elsewhere [4] or subsequently transferred onto a nitrocellulose membrane (**b**) by semi-dry blotting for 30 min at 0.8 mA/cm on a Fastblot (Biotra, Göttingen, Germany). Membranes were used for immunological detection of specific IgE antibodies with patient's serum according to a previously described procedure [5].

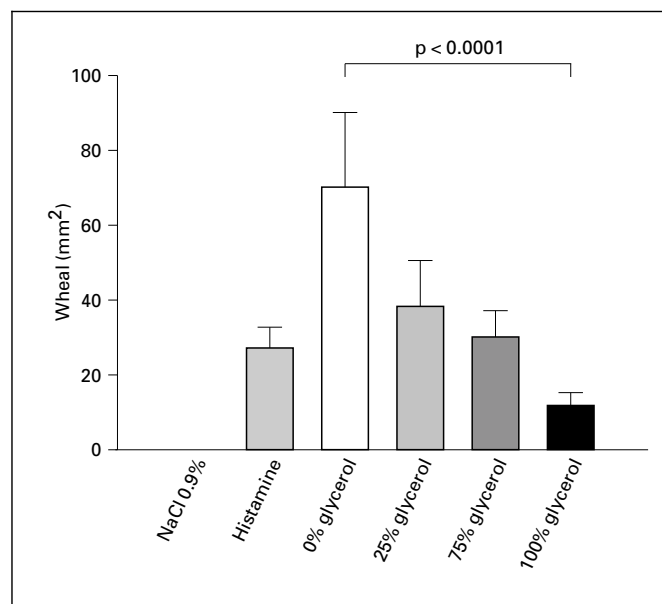


Fig. 3. The allergenic activity of timothy grass pollen extract is reduced when prepared in the presence of glycerol. Skin prick test assays were performed as described earlier [1]. Five patients allergic to grass pollen were tested using NaCl 0.9% (negative control), histamine dihydrochloride 1% (positive control) and timothy grass pollen extracts produced in the absence or presence of glycerol. Statistical analysis was carried out using software from SPSS (SPSS GmbH Software, Munich, Germany). Paired data were analysed by Wilcoxon's two-tailed test. A $p < 0.05$ was defined to be statistically significant.

pollen. This assay is regarded to be a relevant indicator of the allergenic activity of commercial allergen extracts. Figure 3 shows a clear dose-dependent loss in allergenic activity of the extracts with increasing glycerol concentrations. Thus we conclude that glycerol may inhibit the release of allergens from grass pollen.

In a pilot phase of a clinical study, we advised 15 patients with seasonal allergic rhinitis to regularly apply mineral oil to the nasal mucosa during the pollen season. No side effects of mineral oil on the nasal mucosa have been reported in the literature. All patients observed a significant reduction in allergic symptoms, and no side effects have been observed so far. Fatty acids inhibiting the release of allergens from pollen might be helpful in the prevention of allergic rhinitis. A placebo-controlled clinical study is necessary to prove the efficacy of this approach.

References

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