



Nasaleze cellulose powder delays house dust mite allergen (Der p1) diffusion in vitro

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Background: An inert cellulose powder (Nasaleze®) has been used since 1994 in the alleviation of allergic rhinitis. The powder is applied to the nose where it absorbs water and forms a gel which is thought to act as a mechanical barrier against allergens. The purpose of the study was to investigate this theory about the mechanism of action of the gel in relation to house dust mite allergen (Der p1).

Methods: The amount of Der p1 which diffused through the cellulose gel and an agar gel, which was used as a reference, were measured by ELISA and compared to the baseline allergen content of the solution applied to the gels. The allergen portion that passed the gels was measured at 15, 30, 45, 60, 180 and 300 minutes after application of the standard allergen solution.

Results: The diffusion of Der p1 was delayed by both gel layers. The amount of allergen diffused through the agar gel was not significantly different from the baseline values. After 15 minutes of incubation 69% of the baseline allergen amount had diffused through the agar gel which did not give a significant difference in the one-way ANOVA ($p = 0.15$). The amount of allergen that passed the agar then steadily increased until it reached baseline level after 180 minutes. Diffusion of Der p1 through Nasaleze cellulose powder showed a significant reduction of diffused allergen in all tests ($p = 0.001$ to 0.008). After 15 minutes of diffusion only 1.9% of the baseline amount had diffused through the cellulose gel. After 300 minutes 44.8% of the baseline Der p1 crossed the cellulose gel while 100% had diffused through the agar layer.

Conclusion: Allergens are small, water-soluble molecules that are able to diffuse through gels. However, the mesh size of the polymer chains in the gel determines the size of the molecules that can pass through and the speed of their diffusion. The mesh size in the Nasaleze cellulose powder is smaller than in agar gel.

Nasaleze cellulose powder does delay the diffusion of Der p1 significantly but due to the small size of allergenic proteins it is not able to act as an impermeable barrier. Therefore regular re-application of the powder to the nostrils has to be suggested for optimum efficacy of the product in the prevention and alleviation of allergic rhinitis.

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