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STUDY OF THE ANTIGENIC PROPERTIES OF AN ALLERGOID FROM RAGWEED POLLEN

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The most effect method of treatment of allergic diseases at the present time is by repeated and prolonged administration of increasing doses of allergens to the patients. Disadvantages of this method include cases of the development of general and local allergic manifestations. These complications can largely be avoided by the use of allergoids and, in particular, of formalinized derivatives of allergens from plant pollen or other objects [2, 3].

However, whereas the mechanism of formation of toxoids, substances to some degree analogous with allergoids, under the influence of formaldehyde has been comparatively extensively studied, the conditions which determine loss of allergenic properties by allergens although they retain their immunogenicity have been inadequately discussed in the current literature. Because of the inadequacy of this research, methods of obtaining such preparations on a commercial scale are not yet available.

The object of the present investigation was to study the allergenic properties of an allergoid from ragweed pollen, prepared by the method of Haddad et al. [3], with the aim of establishing a basis for the technology of production of a Soviet allergoid from ragweed pollen on a commercial scale.

EXPERIMENTAL METHOD

Preparation of the allergoid was based on formalin treatment of a dialyzed extract from plant pollen for 32 days at a temperature of 32°C. Two preparations not treated with formalin served as the control: the initial allergen, kept at 4°C, and also the allergen heated to 32°C for 32 days. Three batches of allergoid and three batches of each of the control preparations were obtained.

The properties of the preparations were studied in Ouchterlony's precipitation test with antisera prepared by hyperimmunization of rabbits with the test preparations by Averkina's scheme [1] and also by scarification skin tests on 30 patients sensitized to ragweed pollen and on 30 healthy subjects.

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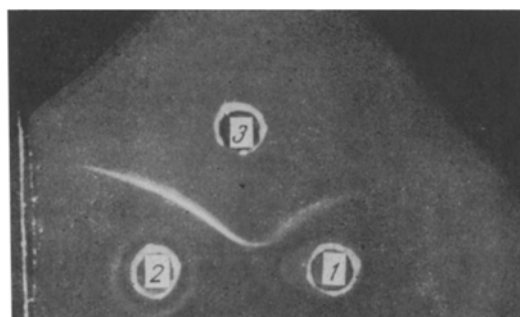


Fig. 1. Precipitation test in agar. 1) Hyper-immune serum against allergoid; 2) hyper-immune serum against original allergen; 3) initial allergen.

TABLE 1. Crossed Precipitation Reactions

Hyperimmune sera against	Preparation		
	original allergen	aller- goid	heated allergen
Original allergen	+	+	+
Allergoid	+	+	+
Heated allergen	+	—	+

TABLE 2. Conditions of Formation of Precipitation Lines

Hyperimmune sera against	Preparation		
	original allergen	aller- goid	heated allergen
Original allergen	$\frac{A}{a} \frac{B}{b}$	$\frac{B}{a} \frac{b}{b}$	$\frac{A}{a} \frac{b}{a}$
Allergoid	$\frac{A}{a} \frac{B}{b}$	$\frac{B}{b}$	$\frac{A}{a} \frac{b}{a}$
Heated allergen	$\frac{A}{a} \frac{B}{b}$	$\frac{B}{a} \frac{b}{a}$	$\frac{A}{a}$

EXPERIMENTAL RESULTS

The experiments showed that hyperimmune rabbit sera against allergoid and allergen formed identical precipitation lines with the original allergen (Fig. 1). However, no precipitation was found between heated allergen and immune serum to the allergoid, or between the allergoid and the serum of rabbit hyperimmunized with the heated allergen (Table 1).

The results indicate that the original allergen possessed common antibodies with the allergoid and heated allergen. No common antigens were found in these tests between the two last substances, for during their preparation partial loss of different antigenic components evidently took place, although the components common with the original, unmodified allergen were preserved.

Under the influence of formalin and the temperature factor, one of these groups of antigens, possibly group A, is evidently reduced. In that case, during heating without formalin antigens of group B will be destroyed. Consequently, precipitation lines may be expected to appear only between homologous groups of antigens (A, B) and antibodies against them (a, b). In the precipitation test with hyperimmune serum against allergoid and heated allergen, and also with hyperimmune serum against this allergen and allergoid, these homologous antigen-antibody pairs are absent, as a result of which no precipitation lines are formed. Loss of a particular group of antigens in the allergoid is accompanied by a sharp decline in its allergenic properties. Heating the allergen without formalin did not lead to any significant loss of the allergenic properties of the preparation.

The results of the scarification skin tests on patients sensitive to ragweed pollen showed that the initial allergen gave rise to positive skin tests in all patients, allergoid in only one or two, and heated allergen in six to eight of the same ten patients tested.

It was thus shown that an allergoid can be prepared from pollen of ragweed growing in Stavropol'. The use of the scheme, described above, for the comparative study of changes in the antigenic properties of an allergen under the influence of the temperature factor and of formaldehyde demonstrated that formaldehyde selectively neutralizes the antigenic determinants responsible for allergenicity. The allergoid preserves the property of inducing antibodies specific for the original allergen in animals.

It can be claimed that this preparation will have advantages over commercial allergens in the treatment of pollinoses, for it will enable the dose of material injected to be greatly increased in the course of hyposensitization without the risk of inducing marked allergic reactions in the patients.

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