

DETECTION OF COMMON ANTIGENIC PROPERTIES
OF THE POLLEN OF VARIOUS SPECIES OF RAGWEED
BY PASSIVE SENSITIZATION OF STRIPS OF MONKEY
ILEUM

T. A. Avdeeva and L. M. Rybchinskaya

UDC 616-022.854:582.998]-078

The antigenic properties of the pollen of common ragweed (*Ambrosia artemisiaefolia* L.) and giant ragweed (*Ambrosia trifida* L.) were investigated. The most sensitive method of determining reagins in the blood serum of allergic patients was used for this purpose: the passive sensitization reaction of strips of monkey ileum. The pollen of these species of ragweed was shown to have a common antigenic structure. At the same time, the pollen of common ragweed contains additional components absent from the pollen of giant ragweed.

Common antigenic properties of the pollen of certain species of related plants (grasses, trees, etc.) have now been detected by various methods [2, 5, 6, 9-11].

The existence of a common antigenic structure of the pollen of related species of plants is probably responsible for the development of crossed allergic skin reactions in patients with pollinoses [3].

In the investigation described below common antigenic properties of the pollen of common ragweed (*Ambrosia artemisiaefolia* L.) and giant ragweed (*Ambrosia trifida* L.) were studied by the method of passive sensitization of strips of monkey ileum, now recognized to be the most sensitive test for determining reagin antibodies in vitro in the blood sera of allergic patients [1, 8, 12, 13].

EXPERIMENTAL METHOD

The blood serum from 18 patients with ragweed pollinosis and giving positive allergic skin reactions to allergens from the pollen of common and giant ragweed was used. The sera for testing were kept until required at -20°C .

Saline extracts (3%) of pollen of common and giant ragweed (without phenol), prepared by the method adopted at the Allergologic Scientific-Research Laboratory, Academy of Medical Sciences of the USSR [7], were used as the specific allergens. The test object for detecting reagins consisted of strips of ileum from *Macaca rhesus*.

Passive sensitization of the smooth-muscle preparations was carried out at 37°C in 3 ml serum diluted with 10% sucrose solution (1:5,000) for 12 min with a continuous supply of oxygen.

The strips of monkey intestine were washed after sensitization with fresh Krebs' solution at 4°C for about 24 h and were then placed in a Schultz-Dale apparatus [4].

The smooth-muscle contractions were recorded under isometric conditions on a two-channel ink-writing plethysmograph (type P42-SKhÉ). The sensitivity of the smooth muscle to a working concentration of acetylcholine (50-100 ng/ml) was determined first. The strip of ileum was then treated with the specific

Allergologic Scientific-Research Laboratory, Academy of Medical Sciences of the USSR, Moscow. (Presented by Academician of the Academy of Medical Sciences of the USSR A. D. Ado.) Translated from *Byulleten' Éksperimental'noi Biologii i Meditsiny*, Vol. 77, No. 6, pp. 66-69, June, 1974. Original article submitted June 18, 1973.

© 1974 Consultants Bureau, a division of Plenum Publishing Corporation, 227 West 17th Street, New York, N. Y. 10011. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, microfilming, recording or otherwise, without written permission of the publisher. A copy of this article is available from the publisher for \$15.00.

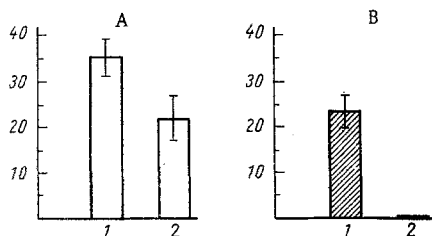


Fig. 1.

Fig. 1. Detection of common antigenic properties of common and giant ragweed pollen by passive sensitization of strips of monkey ileum: A) anaphylactic reaction of strips of ileum in response to addition of allergen from common ragweed pollen before (1) and after (2) desensitization with allergen from giant ragweed pollen; B) anaphylactic reaction of strips of ileum to addition of allergen from giant ragweed pollen before (1) and after (2) desensitization with allergen from common ragweed pollen. Ordinate – magnitude of anaphylactic contraction of strips of ileum expressed in acetylcholine equivalents (in ng).

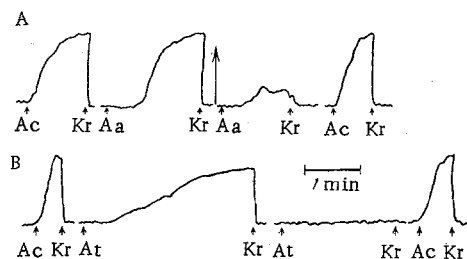


Fig. 2.

Fig. 2. Changes in magnitude of anaphylactic contraction of strip of monkey ileum passively sensitized by blood serum from patient with atonic bronchial asthma as a result of desensitization with allergen from giant ragweed pollen (A) and allergen from common ragweed pollen (B). Ac) Acetylcholine (50 ng/ml); Aa) allergen from pollen of *A. artemisiaefolia*; At) allergen from pollen of *A. trifida*; Kr) washing with Krebs' solution. Small arrows indicate time of application of substances and of washing; large arrows denote treatment of strip of ileum with allergen from pollen of giant ragweed (A) and common ragweed (B).

allergen (0.5 ml of a 1:100 dilution), after which its sensitivity to acetylcholine was tested again. The magnitude of the anaphylactic contraction of the smooth-muscle preparation was expressed in equivalent doses of acetylcholine (nanograms) inducing a contraction of that magnitude.

EXPERIMENTAL RESULTS

The presence or absence of common antigenic properties in the pollen of the common and giant ragweed was judged by comparing the intensity of the anaphylactic reaction of the passively sensitized strips of monkey ileum before and after desensitization of the smooth-muscle preparations by each of the test allergens separately.

For this purpose the magnitude of the anaphylactic reaction of sensitized strips of ileum was first determined in response to the action of each of the test allergens. Immediately thereafter complete desensitization of the smooth-muscle preparation was carried out with the test allergen (dilution 1:1–1:10). After complete desensitization of the tissue, as shown by the absence of anaphylactic contraction to the desensitizing allergen, the second allergen was added to the strip of ileum.

Analysis of the results showed that as a result of complete desensitization by allergen from common ragweed pollen of the strips of monkey ileum sensitized by blood serum from patients with ragweed pollinosis, the response of the smooth-muscle preparations of the ileum to subsequent administration of allergen from giant ragweed pollen was negative in all cases: before desensitization ($M \pm m$) 22.4 ± 3.04 ng, after desensitization 0 ($P < 0.001$).

On the other hand, preliminary complete desensitization of sensitized strips of monkey small intestine by allergen from giant ragweed pollen, although it induced a statistically significant decrease in the magnitude of the anaphylactic response of the smooth-muscle preparations to subsequent addition of allergen from common ragweed pollen compared with the magnitude of the response before desensitization, did not prevent its development completely in most cases: before desensitization ($M \pm m$) 35.8 ± 3.70 ng, after desensitization 21.3 ± 4.57 ng ($P < 0.05$). The results of the tests are shown in Figs. 1 and 2.

The results thus showed that the pollens of common and giant ragweed have common antigenic determinants; meanwhile the pollen of common ragweed, which probably contains the whole antigenic composition of the pollen of giant ragweed, also has certain additional components not present in the pollen of giant ragweed.

On the basis of these results, the use of allergen from the pollen of common ragweed alone can be recommended instead of a complex of allergens of ragweed pollen for desensitizing therapy, as having the most complete antigenic composition.

LITERATURE CITED

1. T. A. Avdeeva, Byull. Éksperim. Biol. i Med., No. 11, 118 (1969).
2. T. A. Avdeeva, in: Problems in Allergology [in Russian], Moscow (1971), p. 10.
3. A. D. Ado and A. A. Polner, in: Modern Practical Allergology [in Russian], Moscow (1963), p. 5.
4. L. M. Ishimova, in: Modern Practical Allergology [in Russian], Moscow (1963), p. 279.
5. F. F. Lukmanova, Byull. Éksperim. Biol. i Med., No. 11, 80 (1964).
6. N. V. Medunitsyn and F. F. Lukmanova, Byull. Éksperim. Biol. i Med., No. 10, 85 (1965).
7. S. M. Titova, in: Modern Practical Allergology [in Russian], Moscow (1963), p. 137.
8. C. E. Arbesman, I. P. Girard, and N. R. Rose, J. Allergy, 35, 535 (1964).
9. R. Augustin, J. Immunol., 2, 148 (1959).
10. A. F. Coca and E. F. Grove, J. Immunol., 10, 445 (1925).
11. R. A. Cooke, J. H. Barnard, S. Hebal, et al., J. Exp. Med., 62, 733 (1935).
12. S. Kobayashi, I. P. Girard, and C. E. Arbesman, J. Allergy, 40, 26 (1967).
13. J. L. McGerity, C. E. Arbesman, and K. Wicher, J. Allergy, 43, 200 (1969).