

SKIN TESTS IN DOGS WITH COMMON ALLERGENS*†

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WITTICH¹ in 1941 obtained positive skin reactions to ragweed antigen in a dog with typical clinical symptoms of hay fever. Passive transfers of the cutaneous sensitivity to dog and man were successful. A systemic reaction followed the intracutaneous tests in the dog and consisted of vomiting, scratching of the body and nose, lacrimation of the eyes, and generalized urticaria.

Brunner, Altman, and Bowman,² in 1944, reported positive skin reactions to canine and pig ascaris extracts in dogs with nematode infestations. Positive transfer of the skin sensitizing antibodies in the blood serum to normal dogs and humans were successfully demonstrated. Active sensitization of two normal dogs with ascaris extract was likewise successful. Constitutional reactions occurred in two dogs following intracutaneous tests with ascaris antigen.

Moreno and Bentolila,³ in 1945, obtained positive skin reactions in a dog to corn, oats, cocoa, and dust; and described the occurrence of spontaneous allergy in this animal. Following these tests a generalized reaction characterized by pruritis, erythema, and dyspnea appeared and was controlled by injections of epinephrine. Passive transfer of the positive cutaneous reactions to a normal dog was successful.

Hence, there is sufficient evidence to indicate that reaginic allergy is a canine problem as well as a human one. The writers, therefore, decided to study a series of unselected animals for evidences of allergy.

Sixteen dogs ranging from 4 months to 12 years of age were tested with a series of inhalant and food allergens; each dog was shaved on the anterior part of the abdomen which was found to be the most suitable area for the cutaneous tests. Testing was done after an interval of two or more days when all of the irritation of the skin caused by shaving had subsided.

The allergens used were those most commonly employed in the routine testing of humans, but the concentrations of the extracts were stronger. The allergens in terms of total nitrogen content or stock dilutions included the following inhalants and foods: house dust, undiluted; feathers, 0.1 mg. nitrogen per ml.; wool, 0.1; goat hair, 0.1; cottonseed, 0.01; orris, 1:10; ragweed, 0.1; timothy, 0.1; flaxseed, 0.01; cat epithelia, 0.1; dog epithelia, 0.1; pyrethrum, 1:100; tobacco, 1:10 dilution; and yeast, 1:10 dilution.

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Tests were reported according to the size of the wheal (mm. of the diameter).

0	negative	
±	negative slight	4 mm. in diameter
+	slight	5 mm. in diameter
++	slight moderate	6 mm. in diameter
+++	moderate	7 mm. in diameter
+++±	moderate marked	7-8 mm. in diameter
++++	marked	9-10 mm. in diameter or more.

The results of all tests are tabulated in Table I. The number of positive and doubtful reactions obtained with various allergens are listed in Table II.

TABLE I C. CUTANEOUS REACTIONS IN DOGS WITH COMMON ALLERGENS

NUMBER	9	10	11	12		9	10	11	12
SEX	F	M	M	F		F	M	M	F
AGE	2 YR.	12 YR.	5 YR.	8 YR.		2 YR.	12 YR.	5 YR.	8 YR.
INHALANTS					FOODS				
Dust (undil.)	±	+++	+++	+	Wheat 1:10	0	+	0	+++
Feathers 0.1	0	+++	0	0	Chocolate 0.025	0			0
Wool 0.1					Egg 0.001	0	0	0	+
Cow Epithelium 0.1	0	++	0	0	Chicken 0.1	0			
Goat Epithelium 0.1	+	0	+	0	Herring 0.001	0	0	0	0
Pyrethrum 1:100	0	0	0	0	Milk 1:10	0	0	0	+++
Tobacco 1:10	0	±	0	0	Beef 0.025	0	0	0	0
Cottonseed 0.01					Oats 1:10	0	0	0	0
Orris 1:10	0	±	0	0	Yeast 1:10	0	0	0	0
Ragweed 0.1	0	+	0	0	Soy Bean 1:10	0	+	0	0
Timothy 0.1	0	0	0	0	Corn 1:10	0	0	0	0
Cat Epithelium 0.01					Peanut 0.005	0	0	0	±
Dog Epithelium 0.01									
Horse Epithelium 0.01					Ascaris 0.1	±	±	±	±
Rabbit Epithelium 0.01									
Glue 0.01									
Flaxseed 0.01									

TABLE I D. CUTANEOUS REACTIONS IN DOGS WITH COMMON ALLERGENS

NUMBER	13	14	15	16		13	14	15	16
SEX	M	M	M	F		M	M	M	F
AGE	3 YR.	4 YR.	3 YR.	4 YR.		3 YR.	4 YR.	3 YR.	4 YR.
INHALANTS					FOODS				
Dust (undil.)	+++	+++	+++	+++	Wheat 1:10	0	0	0	0
Feathers 0.1				++	Chocolate 0.025	0	0	0	0
Wool 0.1				±	Eggs 0.001	0	0	0	0
Cow Epithelium 0.1				±	Chicken 0.1	0	0	0	0
Goat Epithelium 0.1				±	Herring 0.001	0	0	0	0
Pyrethrum				0	Milk 1:10	0	0	0	0
Tobacco 1:10				0	Beef 0.05	0	0	0	0
Cottonseed 0.01				0	Oats 1:10	0	0	0	0
Orris 1:10				0	Yeast 1:10	0	0	0	0
Ragweed 0.1				0	Soy Bean 1:10	0	0	0	0
Timothy 0.1				0	Corn 1:10	0	0	0	0
Cat Epithelia 0.01				0	Peanut 0.005	0	0	0	0
Dog Epithelia 0.01				0					
Horse Epithelia 0.01				0	Ascaris 0.1	++	+++	+++	+++
Rabbit Epithelia 0.01				0					
Glue 0.01				0					
Flaxseed 0.01				0					

TABLE II. SUMMARY OF POSITIVE REACTIONS TO COMMON ALLERGENS

ALLERGEN	NUMBER OF DOGS TESTED	POSITIVE REACTIONS + TO +++	DOUBTFUL REACTIONS ±
*Ascaris 0.1	14	14 (100%)	
Dust (undiluted)	16	11 (68%)	
Goat Epithelia 0.1	13	7 (53%)	
Wool 0.1	5	0	2 (40%)
Feathers 0.1	13	3 (23%)	
†Tobacco 1:10	13	0	3 (23%)
Cottonseed 0.01	5	0	1 (20%)
Cow Epithelium 0.1	13	1 (8%)	1 (8%)
Orris 1:10	13	1 (8%)	1 (8%)
Pyrethrum 1:100	13	1 (8%)	
Ragweed 0.1	13	1 (8%)	
Wheat 1:10	16	2 (12%)	
Milk 1:10	11	1 (9%)	
Soy Bean 0.01	14	1 (7%)	
Egg 0.001	16	1 (6%)	

*Dilutions indicated in mg. Nitrogen per ml.

†Dilutions of stock extract.

All 14 dogs tested with ascaris antigen containing 0.1 milligrams nitrogen per milliliter gave positive cutaneous reactions. Eleven (68 per cent) showed positive skin tests to foods or inhalants. Five showed no inhalant or food reactions. House dust antigens produced positive cutaneous reactions in eleven dogs.

It is to be noted that the inhalants produced more reactions than foods. Moreover, most of the inhalant reactions were strong. In only two dogs were reactions obtained to food allergens. None showed positive reactions to foods without positives to inhalants as well.

The three allergens which gave the highest number of positive reactions were ascaris extract (100 per cent), house dust (68 per cent), and goat epithelium (61 per cent).

Three dogs (No. 10, No. 1, and No. 16) gave six or more positive reactions. Dog No. 10 showed 11 positive reactions, 8 to inhalants, 2 to foods, and 1 to ascaris. Dog No. 1 showed 9 positive reactions, 8 to inhalants, and 1 to ascaris. Dog No. 16 showed 6 positive reactions, 5 to inhalants and 1 to ascaris.

Age was a factor, since the three youngest dogs between 4 and 5 months of age did not react to any of the inhalants or foods. However, they gave positive cutaneous reactions to ascaris antigens.

Dogs in which positive reactions occurred were studied for clinical manifestations. Dog No. 1 had paroxysmal attacks of sneezing whenever the home was swept. Cutaneous tests were positive to house dust, feathers, goat epithelium, pyrethrum, orris root, and ascaris. A study of the blood smear revealed a differential count of 88 neutrophils, 8 lymphocytes, and 4 monocytes. Two nasal smears from each nostril showed no eosinophiles.

Dog No. 12, a short-haired fox terrier, had a dermatitis. The positive cutaneous reactions included wheat, egg, milk, and peanut. When these foods were eliminated from the diet, the skin cleared. Four months later the dog

was fed two slices of whole wheat, soy bean bread, and the dermatitis recurred. A return to rigid diet caused a subsidence of the dermatitis.

A series of passive transfer studies were done in order to determine whether the positive cutaneous reactions were based on a reaginic mechanism. Blood was obtained from dog No. 1 and the serum was prepared in the usual manner. Two dogs, No. 6 and No. 7, were selected as recipients because they both gave negative reactions to all inhalant and food allergens. Four cutaneous sites on dog No. 6 were injected with 0.1 ml. of serum of dog No. 1. Three days later these prepared sites were tested with several allergens and gave the following results: house dust +, feathers +, goat epithelium +, pyrethrum 0. All control tests were completely negative. The results are noted in Table III.

TABLE III. PASSIVE TRANSFER TESTS WITH SERUM FROM DOG NO. 1

ALLERGEN	DIRECT TEST	PASSIVE TRANSFER TEST			
		RECIPIENT DOG NO. 6		DOG NO. 7	
		TEST	CONTROL	TEST	CONTROL
Dust	+++	+	0	+	0
(undiluted)		++	0	++	0
		+±	0	+	0
Feathers*	+++	+	0	+	0
0.1					
Goat Epithelium					
1:100	++	++	0	+	0
Pyrethrum†					
1:100	++	0	0	0	0

*Milligrams nitrogen per milliliter.

†Stock dilution.

Four cutaneous sites on dog No. 7 were injected with 0.1 milliliters of serum from dog No. 1. Three days later the prepared sites were tested and gave the following results: house dust +, feathers +, goat epithelium +, and pyrethrum 0. Control tests were negative. These results are noted in Table III.

Two weeks later the same recipient dogs, No. 6 and No. 7, were each sensitized at two cutaneous sites with the serum of dog No. 1. House dust antigen was injected into these prepared cutaneous sites on each dog. All of the four sites tested gave positive reactions to house dust. Two were ++ one +±, and the other gave a + reaction. Control tests were negative. (Table III).

Summarizing the results, it will be seen that house dust gave a positive transfer reaction in six trials, feathers in two, and goat epithelium in two. Pyrethrum, however, failed to transfer on two trials. Attempts were made to sensitize a human with serum from dog No. 1. The marked local reactions which appeared at the prepared sites after the injection of serum rendered the interpretation of the results of transfer tests impossible.

SUMMARY

1. Sixteen dogs were tested intracutaneously with common inhalants, foods, and with ascaris extract.

2. Positive cutaneous reactions were obtained to house dust, feathers, goat epithelium, cow epithelium, orris ragweed, pyrethrum, tobacco, cottonseed, wheat, milk, and soy bean.

3. Passive transfer was accomplished with antigens of dust, feathers, goat epithelium, but failed with pyrethrum. Transfer tests with other antigens were not made.

4. In two dogs, one with positive reactions to inhalants, the other to foods, the positive reactions were found to be of clinical significance.

REFERENCES

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