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TEN CASES OF OCCUPATIONAL HYPERSENSITIVITY TO LABORATORY ANIMALS

By

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Human hypersensitiveness almost may exist to every species of animal in whom a close contact is possible. Respiratory manifestations on the basis of a sensitivity to horse, cow, cat and dog are commonest, but even cases—inter alia—with hypersensitivity to the hair (epithelium or saliva) of guinea pig, rabbit, rat and mice are known. These are often used as laboratory animals and chiefly people with a possibility of contact of long duration develop sensitivity phenomena to them, as laboratory workers, research workers, animal keepers, etc.

Several allergic textbooks and extensive reports mention occupational sensitivity to laboratory animals with asthma and/or rhinitis to guinea pig, rabbit, rat or mouse hair as rare cases. However, details are not given (3, 4, 5, 8, 9, 10, 12). Occupational cases due to rabbit and guinea pig hair are described by Walker (11) and by Rackemann (6). Feinberg (2) mentions that he observed some cases with hypersensitivity to guinea pig hair and three cases in 3 months with respiratory symptoms to rats and mice. Sorrell & Gottesmann (7) report a 22 years old female research worker who developed rhinitis after an exposure time of 3 months to two special mouse strains (Swiss mice, Strain C 57 and C 58). The familial and individual allergic history was negative. The scratch test was positive to these strains, whereas the authors found only slight reaction to the commercial mouse extract and no reactions to

other animal hair. The patient was given specific therapy and thereafter although a scratch by a mouse produced a wheal, the patient could work at least 4 hours in the mouse room without complaints. Braun (1) reports the case of a female laboratory assistant, 38 years of age, who after 3 years exposure to guinea pigs developed rhinitis and one year later asthma bronchiale. The familial and individual allergic history was also negative in this case. In intracutaneous tests with extracts of a concentration of 1:1000 of guinea pig hair and excrement positive results were shown as well as a slight positive reaction to rat excrement, possibly because of contamination with guinea pig antigen. All these reactions were negative in a control person.

THE AUTHOR'S INVESTIGATIONS

On this basis it seems to be of interest to report 10 such cases which have been observed in the last years in the Allergy Research Laboratory, Karolinska sjukhuset, Stockholm.

METHODS

The following more important data of the patients were registered; age, sex, profession, family history, onset and form of the allergic manifestation, and further sensitivity to other animals.

Skin tests. First a scratch test was made with animal hair wetted by aqua dest. as well as with a hair extract of the concentration 1:1000. If the scratch test was negative, an intracutaneous (i.c.) test was made: 0.02 ml of an extract of 1:1000 concentration was injected intradermally. Further an i.c. test was performed with other animal hairs and mold, pollen, food and bacterial series. In patient 9 no skin test could be done.

Passive transfer. At least three persons who were not sensitive to animals were chosen. 0.1 ml of the patient's serum was given i.c. in the back and after 24 hours the sensitivity was challenged:

- i) in the case of guinea pig, by an extract of the concentration 1:1000 (in Cases 2, 3, 6 and 8),
- ii) in the case of rat, (Cases 1 and 5) by an extract of 1:1000 as well as by a scratch test with rat hair,
- iii) in the case of mice, (Cases 5 and 7) by a scratch test with mouse hair.

TABLE
Summary of Findings in Ten Patients

Case	Age	Sex	Profession	Atopic heredity	Period of refractoriness to sensitization (in years)	Symptoms			
						Atopic rhinitis	Asthma	Urticaria	Prurigo Besnier
1.	29	female	labor. work	—	5	+		+	
2.	24	"	"	+	2	+	+		
3.	45	"	"	+	1	+			+
4.	26	"	"	+	1/2	+		+	
5.	22	"	"	—	1	+	+		
6.	24	"	"	+	1	+			
7.	25	male	res. work	+	1/2	+	+		
8.	30	"	"	+	1/2	+			+
9.	36	"	"	—	1/2	+	+		
10.	35	"	"	—	1/4	+			

Abbreviations: labor. = laboratory, res. = research, work = worker.

Exposure and elimination tests to the respective animals were performed and registered with the aid of the patients.

Protective measures. An elimination of the greatest possible degree was recommended. In Cases 1-2, 5-6 and 8 hyposensitization was performed. Technic of hyposensitization: Treatment was preferably started with 0.2 ml of a solution with a concentration of 10-7 and then the dose was increased with 0.2 ml to 1 ml. Thereafter, the next concentration was similarly used. In some cases, the starting dose was determined by quantitative intradermal antigen administration. Treatment was in general given in hospital with 5 daily intra-subcutaneous injections. In out-clinic cases the patient was given 2 injections/week. In cases of severe local or strong general reactions the procedure was recommenced with a lower concentration. Maintenance doses were given subsequently monthly.

RESULTS

The more important data of these 10 patients are summarized in Table 1. (See Table). An example for a scratch test reaction to mouse hair is shown in figure 1 (Case 5).

Passive transfers with guinea pig extract was strongly positive in Cases 3 and 8 and slightly positive in Cases 2 and 6. A transfer reaction with rat extracts was negative, however,

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Sensitivity to Laboratory Animals.

Positive skin test in				Exposure test	Sensitivity to other animals	Protective measures		
Guinea Pig	Rat	Rabbit	Mice			Elimination	Hyposensitization	None
	+			+	-		+ ¹	
+		+		+	cat, horse		+/-	
+				+	cat	+ ¹		
	+	+		+	-	+		
	+		+	+	-		?	
+		(+)		+	-		?	
			+	+	horse, cat, dog ³			×
+				+	horse, cat, sheep		-	
+ ⁴		+ ⁴	+ ⁴	+	horse, cat, dog ³			×
		(+)		+	cat (dog, horse ³)			×

Explanation: ¹ = result of protective measure. + = good effect. +/- = slight effect. - = no effect. ? = cannot yet be evaluated. ² = works at the same place of work as Case 4. ³ = sensitive also to hay. ⁴ = skin test not performed.

positive reactions were observed by scratch challenge with rat hair (see fig. 2, Cases 1 and 5). Similarly, positive reactions were obtained by scratch challenge with mouse hair in both cases (see, e.g. positive reaction of Case 7 in fig. 2).

The exposure tests were positive in all cases.

Protective measures: Cases 7, 9 and 10 continued their work and a certain degree of tolerance was observed. In Cases 3 and 4 the patients discontinued their work and thereafter became free from symptoms. The result of hyposensitization therapy in Cases 5 and 6 cannot yet be decided. Case 1 showed great improvement, Case 2 slight and Case 8 no improvement.

DISCUSSION

Although Table 1 contains ten cases, to judge the frequency somewhat better, it should be added that some other similar cases which could however not be investigated, also occurred at the clinic. One may therefore conclude that the occurrence

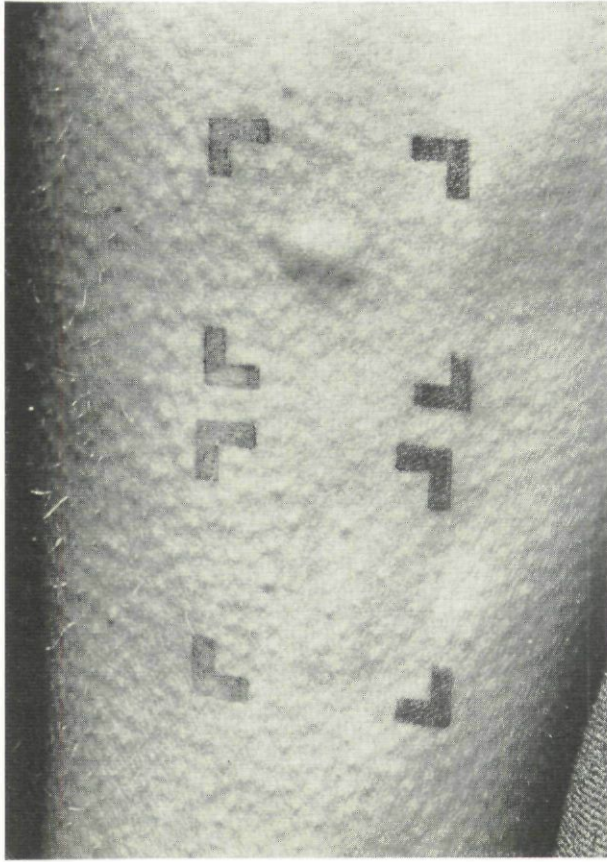


Fig. 1.

Scratch reactions in Case 5. Proximally: to mouse hair.
Distally: to physiologic saline.

of such cases cannot be hold as exceptional but on the ground of slight manifestations, of the fear to lose their employment and of a therapeutic "nihilism" only a few of these patients come to an allergic clinic. As regards the occupational origin, the patients are research workers and their female assistants, who have the closest contact with laboratory animals.

An atopic heredity, i.e. familial occurrence of asthma, rhinitis or prurigo Besnier could be found in 6 cases, which means

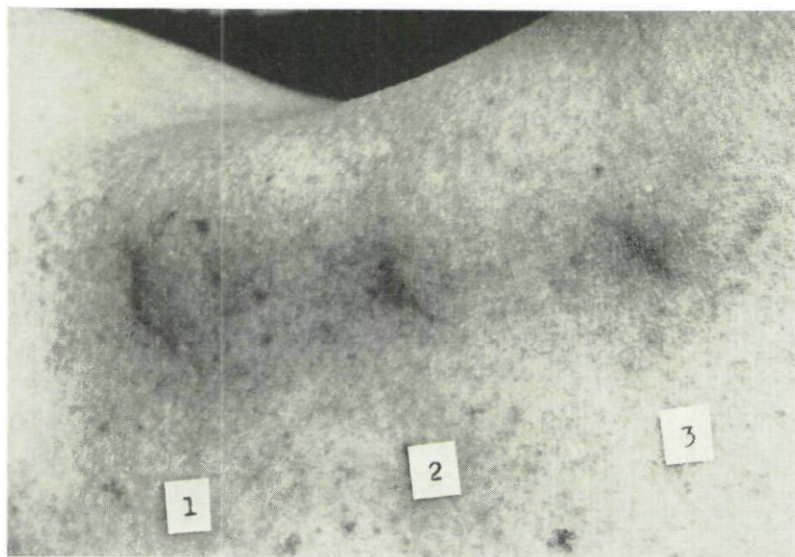


Fig. 2.

Transfer reactions.

- 1: Serum of Case 1, challenge by rat hair, strong positive reaction.
- 2: Serum of Case 7, challenge by mouse hair, positive reaction.
- 3: Serum of Case 5, challenge by rat hair, positive reaction.

that this disposition is an important but not solely decisive factor.

The resistance to sensitivity, i.e. the interval of time during which the patient could work without complaints, has been of different duration, mostly $\frac{1}{4}$ – $\frac{1}{2}$ year. Naturally, these data can only be considered as having an informative value without the knowledge of the real expositional conditions. The importance of the exposure is shown even by the circumstance that Cases 4 and 5 worked at the same working place during different periods.

From the point of view of the allergic manifestations, it should be emphasized that all the patients had rhinitis atopica and further 4 also had asthma and 2–2 urticaria or Prurigo Besnier, respectively. The development of rhinitis in allergic patients can possibly be explained by the fact that the animal

hair because of its size is stopped in the upper respiratory passage and so affects the nasal mucosa. By analogy to the conditions in pollen sensitivity, asthma may occur in certain instances. The majority of the sensitive cases had rhinitis after a contact of some minutes, whereas asthma bronchiale generally developed after a longer time, frequently after some hours or in the evening and at night respectively.

The majority of the cases gave positive scratch tests. In certain cases there was a discrepancy between the results of scratch tests with hair and with extract as the former was more frequently positive. Passive transfers as an important proof of sensitivity, could be performed in some cases. The challenge by scratch test with animal hair gave regularly positive reactions even in cases where the i.c. challenge by extract failed (Cases 1 and 5). On the basis of these experiences, it should be emphasized that the animal hair itself—at least in the author's series—is a more reliable antigen than the extracts made of it.

The result of the reactions to different animal hair can be seen from Table 1. Except in Case 1, the patients were sensitive to several species.

The exposure test was positive in each case and consequently the allergic symptoms disappeared with elimination. For the evidence of the contact, the exposure test could be easily done, however it was more difficult to evaluate the results of elimination tests because some patients had group sensitivity to animals. Diagnostically there were difficulties in that in three cases hypersensitivity to pollen and hay also existed. As the majority of the laboratory animals lay on hay it is difficult to exclude this possibility. In these cases the question could however be solved in favour of the animal hair sensitivity origin on the basis of special exposure conditions. Further the patients were mostly sensitive only to fresh and not to the dry hay which was used in the cages (the patients were not sensitive to molds either). In certain cases, even an epicutaneous test with animal food pellets was done with negative results.

As regards the possibilities of protection in Case 9, tole-

rance only applied to the weakest allergen. Further, in Case 10 the degree of sensitivity was rather low. Antihistaminics gave some temporary or quantitative relief. Only minor local complications and no general reactions occurred during the hypsensitization of the five patients. No conclusions can of course be drawn from this small number of cases of the effectiveness of the protective measures mentioned. It can however be stated that in case of a slight contact and a low degree of sensitivity to laboratory animals, a tolerance can be expected. Furthermore success cannot be guaranteed by hypsensitization but this therapy can be tried in those cases where the most effective measure, elimination, cannot be performed.

SUMMARY

Hypersensitivity to laboratory animals is not so uncommon in research and laboratory workers having a close contact with these animals. The author reports 10 cases which were sensitive to laboratory animals on basis of skin and exposure tests. Passive transfer in some cases corroborated this. On basis of skin and transfer reactions animal hair was a more reliable antigen than the extract made of it. Generally there was a group sensitization to animal hair or to laboratory animals only but in one case the sensitivity to rat hair was specific. Guinea pig and rabbit hair were the cause of most of the sensitivity cases but in three patients there was a sensitivity to mouse hair. A rhinitis occurred in all cases asthma in 4 patients and in 2-2 patients urticaria or prurigo Besnier, respectively. Familial atopic heredity was found in 6 cases. Regarding protective measures, tolerance may develop in cases with a low degree of sensitivity and slight contact to animals. In patients in whom elimination which is the most effective measure, cannot be carried out, hypsensitization can be tried.

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