

## STUDIES ON THE ECZEMATOUS SENSITIZATION\*

### II. THE EFFECT OF THE ENGENDERING OF AN ECZEMATOUS SENSITIZATION ON THE THRESHOLD OF REACTION TO PRIMARY IRRITANTS

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A well-known clinical observation is that an existing dermatitis, regardless of type or etiology, may be aggravated or kept activated by contact with irritants, such as soap and water, cleaning solutions, solvents, topical medications, rough or woolen clothing, and the like. Various theories have been advanced to explain this phenomenon, such as polyvalence of sensitization or lowering the threshold of reaction to primary irritants. The interrelationship between primary irritation and eczematous sensitization is poorly understood, but that primary irritation affects the development of an eczematous sensitization has been definitely established (1, 2). It should be borne in mind that many eczematous sensitizers are also primary irritants. To our knowledge, the influence of the development of an eczematous sensitization on the threshold of reaction to primary irritants has not been studied. The purpose of this study was then to determine the influence, if any, of the genesis of an eczematous sensitization on an individual's threshold of reactivity to primary irritants.

#### METHOD

To answer this question we (1) determined in a series of individuals the threshold irritant dose to various substances by patch tests with graded dilutions of these materials, (2) then in one half of the subjects endeavored to engender an eczematous sensitization, and (3) after a suitable interval both groups were "repatched" with the original substances to determine whether there was any change in the threshold of irritation.

The substances chosen as primary irritants were (1) hydrochloric acid, (2) tincture of green soap, and (3) croton oil. Dilutions were made up of the first two in water and of the last in olive oil. After preliminary trials on other individuals, the dilutions were selected so that the most concentrated gave a weakly positive reaction in the majority of individuals tested, whereas, the least concentrated gave a negative in the majority of the individuals tested. This provided a range of dilutions which should make observable a shift in the threshold, should this occur as a result of this experiment. The actual dilutions used are given in table 1.

Because of the variability of reactions to testing with primary irritants considerable care was required to make the test applications as uniform as possible.

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To this end the chamber patch as described by Rokstad (2) was used with uniform pieces of blotting paper and approximately uniform amounts of test solution dropped from dropping bottles. It was found that maximum clarity of reading was obtained by removing the patches after approximately 24 hours, and allowing several hours to elapse before reading the tests. In reading the tests, the papule formation as described by Rokstad was ignored. The reactions were of three morphologic types and were recorded according to the code: 1 = erythema corresponding to the circle of the blotting paper, 2 = erythema spreading from the site in a more diffuse fashion, and 3 = follicular pustules over the area. In each type stronger reactions were recorded as "a" and milder reactions as "b".

For the purpose of sensitization 2,4 dinitrochlorobenzene was employed. This chemical was chosen because it is known to be a potent sensitizer and because it is a substance not likely to be encountered by our subjects in ordinary life. The technic employed for sensitizing was the dropping on of approximately 0.03 cc. of a 30 per cent acetone solution on the volar surface of the arm. At

TABLE 1

	1	2	3	4	5	
	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	<i>per cent</i>	
HCl.....	1	2.5	5	10	20	In water
Tincture of green soap.....	10	20	30	40	50	In water
Croton oil.....	2.5	5	10	20	40	In olive oil

the same time, approximately 0.03 cc. of a 0.1 per cent acetone solution was applied to the volar surface of the other arm in order to be certain that none of the subjects were already sensitive to this material.

Because of the necessity of observing our patients over a reasonably long period of time, and because of the fact that we wished to do as many as possible of them at the same time, we did not believe that ordinary clinic patients would be suitable, and accordingly, inmates of a tuberculosis sanatorium were used.<sup>1</sup>

## RESULTS

Table 2 gives the readings to graded dilutions of primary irritants in eight cases before and after sensitization, and a like number of controls in whom no sensitization was engendered.

<sup>1</sup> The fact that the subjects were tuberculous may have affected our results. We had a rather low yield of sensitizations and also the development of the sensitivity seemed slower than our previous experience in the sensitization of non-tuberculous individuals had led us to expect. We are aware that there is a considerable literature on the interference of a tuberculous infection with the development of other allergic phenomena, but we thought that because of the other reasons mentioned these subjects would nevertheless be most suitable.

TABLE 2

CASE NO.		HCl					GREEN SOAP					CROTON OIL					INITIAL TEST TO IRRITANTS	SENSITIZED TO 2, 4	POSITIVE TO 1:1000 WITH 2, 4	RETEST TO IRRITANTS
		1	2	3	4	5	1	2	3	4	5	1	2	3	4	5				
Group A. Sensitized to 2, 4 dinitro chlorobenzene																				
1	Before	0	0	0	0	1a	0	1b	1b	1a	1a	0	0	0	0	3b	4/ 7/47	5/27/47	6/ 9/47	6/ 9/47
	After	0	0	0	0	1b	0	?	1b	1b	1b	0	0	0	0	2b				
2	Before	0	0	1b	1a	1a	0	0	1b	1a	1a	0	0	0	0	3b	4/ 7/47	5/27/47	6/17/47	6/17/47
	After	0	0	1b	1a	1a	0	0	1b	1b	1b	0	0	0	2b	2b				
3	Before	0	0	1b	1b	1a	0	0	1b	0	1b	0	0	0	0	0	4/14/47	5/27/47	6/17/47	6/17/47
	After	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
4	Before	0	0	1b	1b	1a	0	?	1b	1b	1a	0	0	0	3b	3b	4/21/47	5/27/47	6/17/47	6/17/47
	After	0	0	0	1b	1b	0	0	0	?	?	0	0	0	1b	1b				
5	Before	0	0	1b	1b	1b	0	1b	1b	1a	1a	2b	2b	3b	3a	3a	4/28/47	5/27/47	6/ 9/47	6/ 9/47
	After	0	0	1b	?	?	0	1a	1a	1b	1b	0	0	2b	2b	2b				
6	Before	0	0	0	1a	1a	0	0	1b	1b	1a	0	0	2b	2b	2b	4/14/47	5/27/47	7/ 1/47	7/ 1/47
	After	0	0	0	1b	1b	0	0	1b	1b	1b									
7	Before	0	0	1b	1b	1a	1b	1b	1a	1a	1a	0	0	0	3b	3b	4/21/47	5/27/47	7/ 1/47	7/ 1/47
	After	0	0	0	1b	1b	0	0	1b	1b	1b									
8	Before	0	0	1b	1b	1a	0	0	0	0	1b	0	0	0	1b	1b	4/28/47	5/27/47	7/ 1/47	7/ 1/47
	After	1b	0	0	1b	1b	0	1b	1b	1b	1a									
Group B. Control																				
9	Initial	0	0	0	1b	1b	0	?	1b	1b	1b	0	0	0	2a	2a	3/31/47			6/ 9/47
	Final	0	?	?	1b	?	0	0	1b	1b	0	2b	0	0	2b	2b				
10	Initial	0	0	0	0	1b	0	0	1b	1b	2b	0	0	0	0	0	3/31/47			6/ 9/47
	Final	0	0	0	1b	1a	0	0	0	0	0	0	1b	1b	0	0				
11	Initial	0	0	1b	1a	1a	0	0	?	1a	1a	0	0	0	2b	2b	4/ 7/47			6/ 9/47
	Final	0	0	0	0	1b	0	0	0	1b	1b	0	0	?	0	0				
12	Initial	0	0	1b	0	1a	0	0	0	0	1a	0	1b	1a	1a	1a	4/ 7/47			6/ 9/47
	Final	0	0	0	1b	1a	0	0	1b	1b	1b	0	0	0	0	0				
13	Initial	0	0	0	0	1a	0	1b	1a	1a	?	0	0	0	3b	3a	4/ 7/47			6/ 9/47
	Final	0	0	0	0	1a	0	0	0	0	0	0	0	0	2b	2b				
14	Initial	0	0	1b	1b	1a	0	0	1b	1a	1a						4/ 7/47			6/17/47
	Final	0	0	0	1b	1a	0	0	?	1b	1b									
15	Initial	0	0	?	1b	1a	0	?	1b	1b	1b	0	0	3b	3b	3b	4/ 7/47			7/ 1/47
	Final	0	0	0	1b	1b	0	0	1b	1b	1b	0	0	0	2b	2b				
16	Initial	0	0	1b	?	1a	0	0	1b	1b	1b	0	0	0	2b	2b	4/14/47			6/ 9/47
	Final	0	0	0	0	1a	0	0	1b	1b	1b	0	0	0	0	0				

The numbers 1 through 5 at the tops of the columns refer to the corresponding dilution strengths given in table 1.

## SUMMARY AND CONCLUSION

With the technic employed the development of an eczematous sensitization did not have any effect on the threshold of irritation to the primary irritants

used. We do not believe that it is possible to generalize from our observations that an eczematous sensitization may never affect cutaneous irritability towards primary irritants.

#### REFERENCES

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