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On the Relation between the Intracutaneous Reactions of Old Tuberculin and of Staphylococcal Vaccine

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In the previous study (1) on the focal reaction of tuberculous lesions to various vaccines, it was observed that a temporary focal reaction which was similar to that of Old Tuberculin (OT) could be caused by even those vaccines, and Staphylococcal Vaccine (SV) produced the reaction to a lesser degree than the others.

This fact suggested that a similar relationship between OT and SV might be observed in the intracutaneous reaction. As a consequence, the present studies were done in animals and human beings employing OT as the control.

Table 1: Skin Reaction in Tuberculous Rabbits

Injected Material	0.2 mg of Staphylococcal Vaccine (0.1 ml.)		1 per cent Old Tuberculin Solution (0.1 ml.)	
Experimental Rabbit	After 24 hours	After 48 hours	After 24 hours	After 48 hours
No. 61	3×4	9×10	—	11×9
No. 62	—	4×3	—	5×4
No. 63	6×5	10×12	2×3	11×12
No. 64	2×3	9×10	—	8×6
No. 65	10×8	10×9	—	7×8
No. 67	11×9	10×9	—	7×8
No. 68	—	3×4	—	4×3
No. 69	—	9×6	—	9×7
No. 70	3×4	6×5	—	6×5
No. 71	5×4	7×8	—	6×6

Figures indicate the size of erythema in mm.

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(1) Animal Experiment:

In intracutaneous reactions produced in 10 nontuberculous rabbits as a preliminary experiment, no erythema was caused by OT, while after inoculation with SV, a slight erythema was observed at 24 hours and was absent after 48 hours. As for experimental intracutaneous reaction to OT and SV, rabbits were injected subcutaneously with 0.02 mg. of virulent human type strain (H₂-strain) of tubercle

Table 2: Skin Reaction in School Children

Child	Injected Material	0.1 mg of Staphylococcal Vaccine (0.1 ml.)	0.05 per cent Old Tuberculin Solution (0.1 ml.)
1		55×22	—
2		30×25	4×6
3		25×16	4×3
4		4×5	5×4
5		3×3	5×4
6		7×6	6×5
7		4×5	4×5
8		—	—
9		3×5	3×5
10		40×20	4×5
11		40×35	5×5
12		—	—
13		—	—
14		5×4	—
15		6×4	2×3
16		46×31	30×24
17		—	—
18		30×41	15×20
19		20×25	6×5
20		—	3×3
21		3×3	6×5
22		25×30	3×3
23		50×22	5×4
24		—	11×10
25		—	—
26		—	2×3
27		—	11×10
28		50×42	6×6
29		30×40	4×4
30		50×42	12×13
31		35×40	—
32		—	3×4
33		—	3×2

(1) Reading was made after 48 hours.

(2) Figures indicate the size of erythema in mm.

bacilli, the sizes of erythema were compared, and an almost definite relation between them was indicated as may be seen in Table 1. However, in intracutaneous reactions in nontuberculous rabbits infected with staphylostaphylococci, the erythema was produced by only SV.

(2) Experiment in Human Body:

0.1 ml. of a 0.05 per cent solution of OT was injected intracutaneously into the left forearm of 33 healthy school children and 0.1 ml. of SV (1 mg. per ml.) was injected in the same manner into the right forearm and the areas of erythema were measured after 48 hours. As may be seen in Table 2, no definite relation between the intracutaneous reactions to OT and SV was observed. However, in a similar investigation in 8 chronic tuberculous patients, the area of erythema produced by SV reached its maximum size after 24 hours, and decreased considerably after 48 hours, as shown in Table 3. A parallel relationship between the reactions to OT and SV was observed.

Table 3: Skin Reaction in Chronic Tuberculous Patients

Injected Material	0.1 mg. of Staphylococcal Vaccine (0.1 ml.)		0.06 per cent Old Tuberculin Solution (0.1 ml.)	
Patient	After 24 hours	After 48 hours	After 24 hours	After 48 hours
A	23×20	10×9	13×14	12×11
B	9×10	8×8	20×13	20×17
C	28×22	10×9	22×26	33×27
D	7×7	6×7	21×22	47×31
E	22×30	20×19	33×50	25×28
F	13×12	6×5	20×20	18×18
G	8×10	7×7	20×27	17×20
H	13×16	7×7	20×22	17×20

- (1) Figures indicate the size of erythema in mm.
- (2) Each of the patients had moderately advanced or far advanced pulmonary tuberculosis.

DISCUSSION

The parallel relation between the reaction caused by SV in the present study or by a filtrate of a culture of colibacilli as reported by other investigators, and tuberculin allergy should be considered as a nonspecific accompanying phenomenon which may correspond to the "parallergic phenomenon" observed by Moro and Keller (2). The focal reaction of tuberculous lesion to SV reported previously by the present writer may be also a parallergic phenomenon and may correspond to the "nonspecific focal reaction" reported by v. Bergman (3). The theory that a specific reaction can be caused by a nonspecific stimulant in a tuberculous individual in the

parallergic condition noted by Brugsch (4) may hold true. At any rate it is obvious that a very complicated concept of allergy is necessary to explain this reaction. The present writer, however, would prefer to support the theory of Suzuki and others (5), that an antigen existing commonly between the tubercle bacilli and other bacteria makes possible the comprehensive group-reaction.

SUMMARY

In the present study, experiments were conducted to determine whether the parallergic condition which is similar to tuberculin allergy could be demonstrated in the intracutaneous reaction caused by SV. In tuberculous rabbits the parallergic condition was produced concomitantly with tuberculin allergy. In tuberculous patients the reaction to SV was of shorter duration than that to OT, but a parallel relation was observed between the two vaccines. In healthy persons, a parallel relation was observed in less than 60 per cent of them. Positive tuberculin reaction was not demonstrated in the rabbits infected experimentally with staphylococci. Therefore, the possibility of positive tuberculin reaction occurring in nontuberculous rabbits was not substantiated.

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