

REDUCTION OF ANTIGEN EXPOSURE TIME IN PATCH TESTS TO 24-HOURS

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Results of patch tests obtained with 24-hour and 48-hour occlusion periods using antigen-impregnated-discs (AID) and antigen-containing-saucers (ACS) were studied in 168 patients. Of the 411 patches applied, the results in 400 (97.32%) patch tests were concordant (91 positive and 309 negative reactions with both the 24-hour and the 48-hour occlusion tests), while 10 patch test reactions were positive only with 48-hour occlusion, and 1 patch test reaction was positive only with 24-hour occlusion. Of the 91 patch test reactions positive with both the 24-hour and the 48-hour occlusion tests, 81 patch test reactions were equally severe, while 10 patch test reactions were stronger with the 48-hour occlusion test. The discordant reactions were obtained with *Lantana camara* (3), *Nerium variabilis* (4), *Allium cepa* (1), and potassium dichromate (1), while concordant results were found with *Parthenium hysterophorus*, *Calotropis procera*, *Argemone mexicana*, nitrofurazone, neomycin, nickel sulphate and paraphenylenediamine. The discordant reactions were obtained almost equally in the summer, winter and rainy seasons.

Key words : Patch tests, Occlusion time.

In a standard patch test, the patches are applied and kept in place for 48 hours,¹ and it is important to avoid wetting of the patches.² Thus, the patients have to avoid taking bath for at least 2 days. Because of this reason, several of our patients hesitate to undergo patch testing as avoiding bath among Indians is rather uncomfortable, especially in summer.

The idea behind the 48-hour occlusion in a patch test is to allow absorption of the antigen in adequate quantities. Sweating under occlusion is believed to facilitate this process. In temperate zones of the world, 48-hour occlusion in a patch test may be essential to cause adequate sweating under occlusion, but in a tropical environment, such as ours, the sweating is much more and this may lead to early absorption of the antigen in adequate quantities. So it was considered that a 24-hour occlusion in a patch test may be adequate under the Indian conditions. It will be more acceptable to the patients as they

will not have to wait for 2 days without taking baths.

Skog and Forsbeck³ and Kalimo and Lammintausta⁴ compared 24-hour occlusion to 48-hour occlusion in patch tests and found concordant results in 74% of cases. We have performed a comparative study with 12 common allergens using antigen-impregnated-discs (AID) and antigen-containing-saucers (ACS) developed in our department.²

Materials and Methods

Patients having contact dermatitis due to common Indian allergens such as plants, topical antibacterial agents, vegetables, metals and hair dye were selected for this study. These allergens included *Parthenium hysterophorus*, *Calotropis procera*, *Lantana camara*, *Nerium variabilis* and *Argemone mexicana* among the plants, nitrofurazone and neomycin among the topical antibacterial agents, *Allium sativum* and *Allium cepa* among the vegetables, nickel sulphate and potassium dichromate among the metals and paraphenylenediamine as the hair dye.

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For patch testing, antigen-containing-saucers (ACS) for neomycin and paraphenylenediamine, and antigen-impregnated-discs (AID) for all the other antigens were used. Each antigen was applied as a standard occluded patch test² in duplicate and the patients were instructed to remove one set of patches after a period of approximately 24 hours and to avoid scratching their backs. The second set of patches was removed approximately 48-hours after the application. The test sites were examined after another half an hour for evidence of dermatitis.

Results

A total of 411 paired patches with these antigens were applied in 168 patients. Of these, 91 tests were positive with both the 24-hour and the 48-hour occlusion periods, 309 tests were negative with both, 10 patch tests were positive with only the 48-hour occlusion time and 1 patch test was positive with only the 24-hour occlusion time. Of the 91 patch tests positive with both the 24-hour and the 48-hour occlusion, 81 patch test reactions were equally severe, while 10 patch test reactions were severer with the 48-hour occlusion as compared to the 24-hour occlusion. To evaluate the effect of seasons on the comparative rates of positivity, 138 patch tests were applied during summer

months, 77 patch tests during the rainy season, and 196 patch tests during winter. The relative rates of positivity in different seasons are shown in table I. There were no significant differences in the number and the intensity of the concordant as well as discordant patch test reactions in different seasons. Analysis of the rates of positivity with each of the 12 antigens separately is shown in table II.

Of the 10 patches which showed severer reactions with 48-hour occlusion compared to the 24-hour occlusion, one was with *Parthenium hysterophorus* (+++ and ++), 2 were with *Calotropis procera* (+ and ±, and ++ and ±), 1 with *Nerium variabilis* (+ and ±), 2 with nitrofurazone (+++ and ++, and ++++ and ++), 1 with *Allium sativum* (++ and ±), 1 with nickel sulphate (+++ and ++), and 2 with paraphenylenediamine (+++ and ++, and ++ and +). Thus the differences in most cases were by one grade only.

In the other 10 instances, where the patch tests with 24-hour occlusion were negative, the intensity of the reaction with the 48-hour occlusion was ++ in 2 cases (1 each with *Lantana camara* and *Allium cepa*), + in 5 cases (2 cases with *Nerium variabilis*, and 1 case each with *Allium sativum*, potassium dichromate

Table I. The effect of seasons on the results of the 24-hour and 48-hour occlusion patch tests.

	Number of patches applied during			Total
	Summer	Rainy season	Winter	
Total number of paired patches applied	138	77	196	411
Number of positive reactions with both the 24-hour and the 48-hour occlusion patch tests	30 (21.73%)	19 (24.68%)	42 (21.43%)	91
Number of equally severe reactions with both the 24-hour and the 48-hour occlusion patch tests	27 (19.57%)	17 (22.08%)	37 (18.88%)	81
Number of reactions stronger with the 48-hour occlusion patch tests	3 (2.17%)	2 (2.6%)	5 (2.55%)	10
Number of reactions stronger with the 24-hour occlusion patch tests	—	—	—	0
Number of reactions positive with only the 48-hour occlusion patch tests	3 (2.17%)	2 (2.6%)	5 (2.55%)	10
Number of reactions positive with only the 24-hour occlusion patch tests	—	1 (1.3%)	—	1

Table II. Relative positivity of the patch test results with different antigens.

Antigens	Total number of patch tests applied	Number of positive reactions with both the 24-hour and the 48-hour occlusion patch tests	Number of equally severe reactions with both the 24-hour and the 48-hour occlusion patch tests	Number of reactions stronger with the 48-hour occlusion patch tests	Number of reactions positive with only the 48-hour occlusion patch tests	Number of reactions positive with only the 24-hour occlusion patch tests
<i>Parthenium hysterophorus</i> AID	59	31	30	1	—	—
<i>Calotropis procera</i> AID	47	4	2	2	—	—
<i>Lantana camara</i> AID	51	—	—	—	2	1
<i>Nerium variabilis</i> AID	51	3	2	1	4	—
<i>Argemone mexicana</i> AID	20	1	1	—	—	—
Neomycin ACS	30	3	3	—	—	—
Nitrofurazone AID	35	20	18	2	—	—
<i>Allium sativum</i> AID	29	8	7	1	1	—
<i>Allium cepa</i> AID	27	1	1	—	1	—
Nickel sulphate AID	31	16	15	1	1	—
Potassium dichromate AID	23	—	—	—	1	—
Paraphenylenediamine ACS	8	4	2	2	—	—

and nickel sulphate), and \pm in 3 cases (2 cases with *Nerium variabilis* and 1 with *Lantana camara*). The only patient who showed a negative reaction with 48-hour occlusion and had a \pm reaction with 24-hour occlusion had been tested with *Lantana camara*.

Comments

There has always been a need to make the technique of patch tests, easy to perform, accurate, reproducible, and more acceptable to the patient. Development of various patch test units such as Al-test,⁵ Finn chambers,⁶ indigenous Finn chambers,⁷ TRUE tests⁸ and the antigen-impregnated-discs (AID) and antigen-containing-saucers (ACS)⁹ have progressively made this procedure easier to perform. Reduction of the occlusion time is expected to make the test more acceptable to the patients. Our data shows that in 80% of the patients with

positive results, the patch test results with 24-hour occlusion are indistinguishable from those with 48-hour occlusion. In another 10% cases, even though the patch test reactions with 24-hour occlusion were milder than those with 48-hour occlusion, the test results would still have been recorded as positive. It is only in the other 10 cases where the test with the 24-hour occlusion was negative, that the positive reaction would have been missed if only the 24-hour occlusion was used.

A detailed analysis of the discordant reactions reveals that when the 24-hour occlusion patch test was less severe compared to the 48-hour occlusion test, the difference in the severity was by only one grade, while when the 24-hour test was negative, the 48-hour test was ++ in 2 cases, + in 5 cases and \pm in 3 cases. Thus, it seems that the 24-hour occlusion test was

negative in those cases where even the 48-hour occlusion test was not very significant. Other factors, like inadequate contact of the patch with the skin or a local defect in the skin at the site of a particular patch test are also likely to operate as chance factors to give a false negative result in a particular test. The negative result with 48-hour occlusion in the patient who gave a \pm reaction with 24-hour occlusion corroborates this possibility.

Our original presumption that in tropical countries, more sweating during summer would ensure adequate absorption of the antigen in a shorter period, does not appear to be substantiated by our data, because in that case most of the discordant results should have been obtained during winter months.

The possibility that some antigens may penetrate faster and thus require only 24-hour (or even shorter) occlusion compared to others which may be slower in penetration, cannot yet be decided from our data. *Nerium variabilis* was responsible for the largest number (4) of discordant reactions, while *Lantana camara* and potassium dichromate produced only discordant results (3 and 1 respectively). The remaining discordant results were seen with *Allium cepa*, *Allium sativum* and nickel sulphate. A study of more cases of these antigens should clarify

the situation, although by and large our results tend to suggest that 24-hour occlusion is nearly as good as 48-hour occlusion for patch tests.

References

1. Mathias CG and Maibach HI : When to read patch test ? *Internat J Dermatol*, 1979; 18 : 127-128.
2. Pasricha JS : *Allergic Diseases of Skin*, Oxford and IBH Publishers, New Delhi, 1981; p 74, 89, 91.
3. Skog E and Forsbeck M : Comparison between 24 and 48 h exposure times in patch testing, *Contact Dermatitis*, 1978; 4 : 362-364.
4. Kalimo K and Lammintausta K : 24 and 48 h allergen exposure in patch testing—comparative study with 11 common contact allergens and NiCl₂, *Contact Dermatitis*, 1984; 10 : 25-29.
5. Fregert S : Side reactions to AI-test, *Contact Dermatitis Newsletter*, 1972; 11 : 256.
6. Pirila V : Chamber test versus patch test for epicutaneous testing, *Contact Dermatitis*, 1975; 1 : 48.
7. Surrinder Kaur and Sharma VK : Indigenous patch test unit resembling Finn chamber, *Ind J Dermatol Venereol Leprol*, 1986; 52 : 332-336.
8. Fisher TI and Maibach HI : The thin layer rapid use epicutaneous test (TRUE-test), a new patch test method with high accuracy, *Brit J Dermatol*, 1985; 112 : 63-68.
9. Pasricha JS : Testing Procedures, Recent modifications, in : *Contact Dermatitis in India*, Editors, Pasricha JS and Sethi NC : Lyka Lab Publications, Bombay, 1981; p 19, 20.