

Sodium lauryl sulfate irritant patch tests: Degree of inflammation at various times

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Irritant reactions were induced on the forearms of 10 normal subjects with 10 % aqueous sodium lauryl sulfate under patch test occlusion for 24 h. Test sites were observed at 24, 26, 28, 30, 48, 72 and 96 h and the degree of inflammation recorded. Inflammation was most prominent at 28 h and decreased in intensity over the time course of the study. Inflammation at 48 and 72 h was similar to when patches were removed. This suggests that inflammatory responses in skin for at least certain irritants like sodium lauryl sulfate do slowly decrease in intensity after 48 h. However, the inflammatory response may initially accelerate after patch test removal and remain intense for at least 48 h. Fading of irritant reactions by 48 or 72 h may not reliably distinguish irritant from allergic patch test reactions. This does not refute the usefulness of a delayed (96 h) reading since inflammation from sodium lauryl sulfate had decreased significantly by this time.

Key words: Contact dermatitis – irritant dermatitis – patch testing – sodium lauryl sulfate.

Received for publication April 29, 1977

It is frequently difficult to distinguish an irritant patch test reaction from true allergy. On clinical grounds, allergic reactions tend to be more vigorous and extend beyond the margins of the test site. It is often stated that irritant reactions tend to decrease in intensity after removal of the patch test, while allergic reactions tend to accelerate for a period before resolution. This report demonstrates that 24-h sodium lauryl sulfate patch test reactions increase in severity over the first 4 h after patch test removal and are not less inflamed at 48 and 72 h. Significant decrease in intensity of inflammation is, however, apparent by 96 h.

Methods

Patch tests of sodium lauryl sulfate (SLS) were applied to the forearms of 5 male and 5 female volunteers after obtaining informed consent. Subjects ranged in age from 18–34 years and were of fair or average complexion. Two patch tests were applied to each forearm using A1 test® patches occluded with Blenderm® tape. Each patch contained 25 μ l of 10 % aqueous SLS. After 24 h, patches were removed and degree of inflammation graded on an 8 point scale as follows: 0 = no visible reaction, $\pm$ = barely perceptible erythema, 1 = mild erythema, 2 = moderate erythema, 3 = intense erythema, 4 = intense

Table 1. The time course of the inflammatory response

Time (h)	Mean scores 20 untreated sites	<i>P</i> ¹	Mean scores 20 placebo treated sites	<i>P</i> ¹
24	2.00	--	2.00	--
26	2.85	< 0.05	3.15	< 0.05
28	2.88	< 0.05	3.28	< 0.05
30	2.78	NS ²	2.82	< 0.05
48	1.85	NS	1.90	NS
72	2.04	NS	1.82	NS
96	1.08	< 0.05	1.22	< 0.05

1 *P* values determined in comparison with 0 hour reading

2 borderline, *P* = 0.054.

erythema with edema, 5 = intense erythema with edema and vesiculation, and 6 = intense erythema with edema and vesicular erosion.

Each site was evaluated at 24 (5 to 10 min after patch test removal), 26, 28, 30, 48, 72 and 96 h after application of SLS. Two of the four sites of each subject were treated at 24, 26, 28 and 30 h with a placebo solution consisting of 42.1 % isopropyl alcohol, 42.1 % propylene glycol, and 15.8 % water by weight. Two of the four sites were left untreated. Data for untreated and placebo treated sites were analyzed by a nonparametric two-sided Wilcoxon Signed Rank Test (Hollander & Wolfe 1973).

Results

All challenged sites developed inflammatory skin reactions. The mean scores for the 20 untreated sites and the 20 sites treated with placebo solution are listed in Table 1 and graphically depicted in Fig. 1.

The scores at 26 and 28 h are significantly higher than at 24 h just after patch tests were removed (Table 1). The scores at 48 and 72 h were not significantly different from the scores at 24 h. The scores at 96 h were significantly lower than at 24 h.

There was no significant difference between untreated and placebo treated sites, therefore, data from the two groups were combined. The change of inflammatory response for each site relative to the 24-h reading is indicated in Table 2.

Discussion

Patch testing is a reliable and reproducible method for documenting allergic hypersensitivity to a variety of chemical substances. As such, it is a valuable procedure for evaluating patients with eczematous dermatitis. Nonetheless, patch testing is not without peril. False positive and false negative reactions can result from a number of causes (Bett & Calnan 1957). A frequent

Table 2. Change of inflammatory response relative to 24 hours

Time (h)	Increase	No change	Decrease	Not recorded ¹
26	27	11	2	--
28	28	10	2	--
30	26	10	4	--
48	15	9	16	--
72	6	6	16	12
96	3	11	26	--

¹ Sites not recorded due to no-shows.

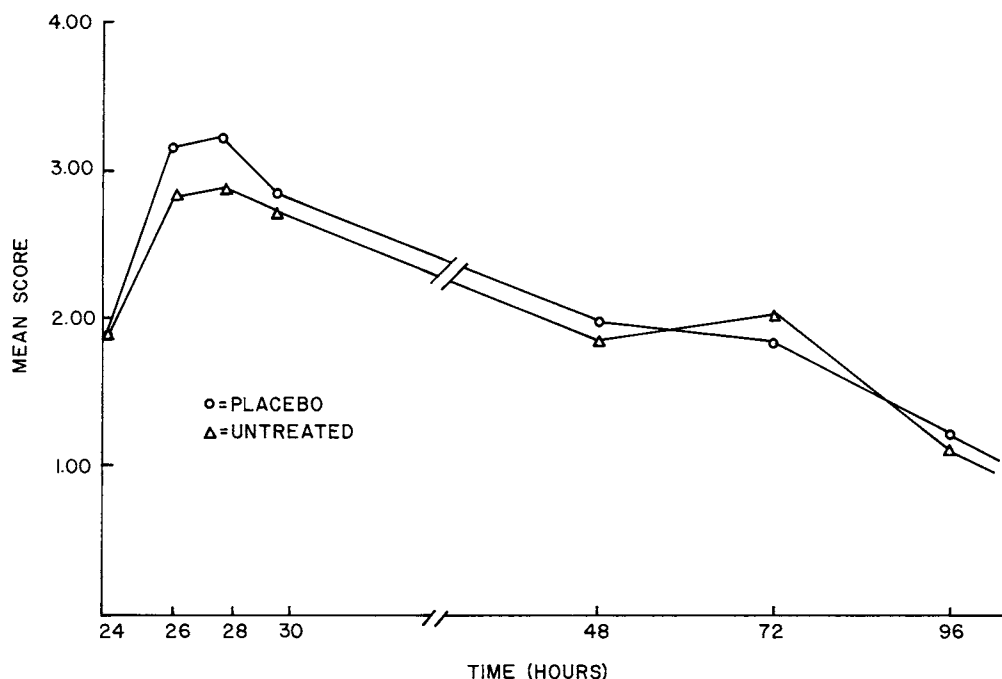


Fig. 1. The time course of inflammatory response.

cause of false positive reactions is an irritant reaction which results in an inflammatory response similar to allergic contact dermatitis (Fischer 1973, North American Contact Dermatitis Group 1976).

A mild inflammatory reaction which disappears within 24 to 48 h after patch removal is usually regarded as an irritant rather than allergic reaction (North American Contact Dermatitis Group 1976, Rokstad 1946, Friedman 1948, Wilson 1955). This suggests that all irritant reactions decrease in intensity during the first 24 to 48 h after patch tests are removed.

This study demonstrates that irritant patch test sites are not necessarily less inflamed 24 or 48 h after patch test removal. While it is apparent irritant reactions do show a tendency to become less inflamed at each time after 4 h, the initial response is one of acceleration. At least with SLS,

more inflammation is usually present at 2, 4, and 6 h than 5–10 min after patch tests are removed.

Several additional points should be made. Patch tests on the forearm may not be comparable to patch tests on the back. Conclusions for the 24-h patch test with irritants may or may not be comparable to the more usual 48-h patch test. Although intensity of inflammation cannot be used as a criterion for distinguishing irritation from true allergy over the first 48 h after patch test removal, inflammation from SLS does become notably less intense at 96 h.

Different irritant chemicals have different potentials for inducing accelerating patch test reactions (Bjornberg 1968). For some irritants, reactions may indeed be less prominent 24 to 48 h after patch tests are removed. However, other irritants

such as benzene (Leder 1943) and SLS induce reactions which are not less prominent 24 to 48 h later. This makes diminution of intensity of patch test inflammation during the first 24 to 48 h an unreliable sign for the distinguishing irritant from allergic reactions.

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