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Patch Testing with Nickel Sulphate under Occlusion for Five Hours

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Bruze M. Patch testing with nickel sulphate under occlusion for 5 hours. Acta Derm Venereol (Stockh) 1988; 68: 361–364.

Routine patch testing is usually performed with the allergens under occlusion for 48 h, but a shorter occlusion time would of course be more convenient for the patient. In this study, nickel was chosen as the substance with which to investigate whether routine patch testing with allergen exposure for 5 h is possible. Patch testing, using dilutions of nickel sulphate under occlusion for 48 h and 5 h, was compared in 8 nickel-sensitive females. The results show that equivalent patch test reactions were achieved when using higher concentrations of the nickel solutions under occlusion for 5 h. *Key words: Allergic contact dermatitis; Delayed hypersensitivity; Patch test technique.* (Received October 22, 1987.)

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The patch test technique has some disadvantages, one of which is the inconvenience for the patient, who has to wear the patch test on the back for 48 h. The purpose of this study was to investigate whether it is possible to use a shorter occlusion time, such as 5 h, which for most patients would permit the removal of the test patch before bed-time.

MATERIAL AND METHODS

Eight females with previous positive allergic patch test reactions to the standard patch test preparation with nickel (nickel sulphate in petr. 5% w/w) participated voluntarily in further patch tests with nickel solutions.

Two stock solutions of nickel sulphate $\times 6\ H_2O$ (Merck, West Germany) in water were prepared at 30.0 and 5.000% w/v respectively. The stock solutions were diluted to 20.0, 15.0, 10.0, 7.5% w/v and 0.889, 0.158, 0.028, 0.005% respectively.

Each patient was tested with all aqueous solutions of nickel. The five solutions at 30.0–7.5% were patch tested under occlusion for 5 h on one of the upper arms, while the remaining 5 solutions were tested in the ordinary way on the back under occlusion for 48 h. The Al-test technique (Astra Agency, Sweden) was used and 30 µl of each test solution was applied on the patch unit. All readings were performed after 72 h.

RESULTS

The results of the patch testing are shown in Table I. All patients reacted to the highest concentrated solution in each series, whether under occlusion for 5 h or 48 h.

Patch testing with nickel sulphate in water 30.0% w/v under occlusion for 5 h on the upper arm yielded negative reactions in 5 controls.

DISCUSSION

In this study, nickel was chosen as the model substance for investigating the hypothesis that routine patch testing with allergen exposure for 5 h is possible with the same accuracy as the present patch testing with allergen exposure for 48 h, which is considered to be the standard procedure (1).

The idea of using a shorter occlusion time than 48 h for patch testing is not new. In fact, routine patch testing is performed at some clinics with allergen exposure for 24 h. Patch testing with nickel sulphate under 24 h occlusion has proved insufficient compared with occlusion under 48 h (2). For some patients with contact allergy to nickel, occlusion for 48 h was necessary to elicit a positive patch test reaction, but there were patients who reacted to ordinary concentrations of nickel solutions applied under occlusion for only 20–30 min (3, 4).

The main exogenous factors that may help provoke a patch test reaction in a certain region in a hypersensitive individual may be considered to belong to one of the following three groups (5): 1) surface concentration of the sensitizer and total amount (number of molecules) applied; 2) penetration, i.e. physical and chemical properties of the sensitizer and the vehicle as well as the influence of the patch test technique used; 3) allergen exposure time. A minimum quantity of allergen is required to elicit an allergic response, but this quan-

Table I. *Results of patch testing with nickel sulphate under occlusion for 5 h and 48 h in 8 patients*

Patient no.	Nickel patch test—occlusion time									
	5 h Concentration % w/v					48 h Concentration % w/v				
	30.0	20.0	15.0	10.0	7.5	5.000	0.889	0.158	0.028	0.005
1	+	+	+	+	+	+	+	−	−	−
2	+	+	+	−	−	+	+	+	+	+
3	+	+	+	+	+	+	+	+	−	−
4	+	+	−	−	−	+	−	−	−	−
5	+	−	−	−	−	+	−	−	−	−
6	+	+	+	+	+	+	+	+	+	−
7	+	+	+	+	+	+	+	+	−	−
8	+	+	−	−	−	+	+	+	−	−

tity varies individually (6, 7). Patch testing with routine test preparations may mean that a few individuals with hypersensitivity are not traced (6) and that some persons react to a quantity of the allergen that is close to the minimum amount required. Changing one of the exogenous factors may therefore give an amount of allergen in the skin below the minimum quantity for more persons and that consequently fewer individuals will react, unless another factor is changed in a compensatory manner.

In the present study the allergen exposure time was decreased considerably and since nickel sulphate penetrates very slowly into the skin (4, 8), one of the other factors had to be changed. The metal salt, the vehicle, and patch test technique were all kept unchanged, so the amount of nickel sulphate applied was increased by using higher concentrations. By this adjustment, it was possible to elicit a positive patch test reaction to nickel under occlusion for 5 h in all patients. The purpose of this pilot study was not to find the exact relationship between the test concentration for nickel sulphate occluded for 48 h compared with 5 h, but merely to investigate whether patch testing with occlusion for 5 h would be feasible in an attempt to improve the patch test technique.

Patch testing with occlusion for only 5 h would considerably alleviate the inconvenience of wearing a patch test on the back. However, nickel sulphate and the other contact sensitizers in the routine patch test series have to be investigated carefully in order to achieve the proper concentration and vehicle for occlusion for 5 h to get the same reliability and equivalency as the patch testing with allergen exposure for 48 h. Some substances may be patch tested in the same vehicle and at the same concentration as for 48 h allergen exposure, especially when the test substance is completely discharged from the patch unit within a few h. Otherwise an increase in concentration or an enhanced penetration by changing the vehicle (3) seem to be the easiest ways to compensate for the shorter occlusion time. Some routine patch test preparations are already tested at high concentrations and perhaps the possible changes of concentrations and vehicles will be insufficient to compensate for the shorter occlusion time. However, the use of another patch test technique may facilitate the compensation, in particular when the sensitizers in general have to be incorporated at lower concentrations than in traditional test preparations in order to give equivalent test results (9).

Before a reduction in the occlusion time from 48 h to 5 h can be introduced, it must be shown that adverse reactions will not be more common. The risk of getting irritant patch test reactions and patch test sensitization have to be carefully considered. Even if the routine patch testing were to be changed to occlusion for 5 h, the traditional testing cannot be abolished. Sometimes allergic contact dermatitis is caused by a substance in a composite product, and this substance may not be present in the routine test series. Even with the present technique with occlusion for 48 h, patch testing with the composite product may fail to reveal the hypersensitivity, and the risk of failure would then increase with occlusion for only 5 h in these cases.

The present study indicates that patch testing with nickel exposure under occlusion for 5 h might be sufficient to establish a contact allergy to nickel and thus constitutes encouragement and a challenge for the necessary research required to adjust the routine patch test technique to allergen exposure under occlusion for shorter time periods, which would be considerably more convenient for the patient.

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Skin Blood Flow in Necrobiosis Lipoidica during Treatment with Low-dose Acetylsalicylic Acid

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Beck H-I, Bjerring P. Skin blood flow in necrobiosis lipoidica during treatment with low-dose acetylsalicylic acid. Acta Derm Venereol (Stockh) 1988; 68: 364–365.

Skin blood flow was measured by the laser Doppler technique in lesional and clinically normal skin of 10 diabetic patients with necrobiosis lipoidica during and after treatment with 40 mg acetylsalicylic acid (ASA) daily. The measurements showed that the blood flow during ASA treatment was significantly decreased in the central lesional skin without changes in the peripheral part of the lesions and normal skin. In view of these findings we suggest that low-dose ASA may not be the best treatment for necrobiosis lipoidica. *Key words: Laser Doppler flowmetry.* (Received January 28, 1988.)

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In a previous study (1) concerning treatment of necrobiosis lipoidica (NL) with 40 mg acetylsalicylic acid (ASA) daily we found that the lesions became significantly larger in spite of inhibited aggregation of the platelets. In this context we measured skin blood flow (SBF) in the NL lesions.

MATERIAL AND METHODS

Ten diabetic patients (9 female, 1 male) with NL on the front of the lower legs were examined. All patients, mean age 36 (18–54), had been treated with ASA 40 mg daily for 3–28 months (mean 16). No other ASA-containing drugs or topical steroids were allowed. An inhibition of the aggregation of the platelets was found in 7 patients during the ASA treatment (1); 3 were not tested. SBF was measured by means of a laser Doppler flowmeter (Periflux, Perimed, Sweden) (2).

The patients were examined after 30 min of rest with the legs horizontal at constant room temperature (21–24°C). In each patient, SBF was measured in the central and peripheral part of the NL lesion. For