

Audit of Finn Chamber[®] patch test preparation

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Reproducibility of patch test reactions is an important aspect of patch testing. Thin layer rapid use epicutaneous tests (TRUE Test[™]) are preloaded with allergen, whereas Finn Chambers[®] are empty discs that have allergen applied from a syringe. The amount of allergen applied to each Finn Chamber[®] is therefore potentially variable depending on technique. This may increase the risk of non-reproducibility of reactions. We have performed an audit of patch test preparation in our department looking at weight variation of both individual Finn Chambers[®] and 3 completed panels before and after allergen application. We found that the variance in weight was not significant for 2 of the 3 panels and single Finn Chambers[®] with allergen in petrolatum. The variance in weight was significant for single Finn Chambers[®] with allergen in solution and the third panel, which contains an allergen in solution. The clinical significance of these results is unclear.

Key words: Finn Chamber[®]; patch test preparation; weight comparison. © Blackwell Munksgaard, 2002.

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There is ongoing debate about reproducibility of patch test reactions. Several studies have been performed to look at reproducibility of patch test results (1–4). Many centres in the UK use Finn Chambers[®] (Epitest Ltd OY, Tuusula, Finland) for patch testing, though some centres, particularly in Scandinavian countries, use pre-prepared TRUE Tests[™] (Pharmacia, Uppsala, Sweden). Some centres suggest that patch testing using Finn Chambers is not as standardized and therefore not as accurate as with the pre-prepared TRUE Tests (5–7).

We performed an audit looking at patch test preparation in our department, to establish whether manually prepared Finn Chamber patch tests show significant weight variation.

Materials and Methods

Empty and prepared patch test panels consisting of Scanpor[®] (Alpharma AS, Norway) sheets each containing 10 Finn Chambers[®] and individual Finn Chambers themselves were weighed on scales accurate to 0.001 g.

Twelve unprepared panels and 25 sets of panels following the application of the first 30 allergens from the current British standard series (8), 3 Scanpor sheets for each set) were weighed. In addition, single Finn Chambers[®], 25 empty and 25 with allergen in petrolatum and in solution, were weighed. The allergens were applied using syringes as supplied by the manufacturers (Chemotechnique

Table 1. Weights and standard deviations of the panels

	Number (n)	Mean weight (g) ± Standard deviation	
		Nurse aware of study	Nurse unaware of study
Empty panel	12	1.078 ± 0.007	1.078 ± 0.007
Panel 1 (BSS 1–10)	25	1.238 ± 0.01	1.276 ± 0.012
Panel 2 (BSS 11–20)	25	1.228 ± 0.014	1.272 ± 0.015
Panel 3 (BSS 21–30)	25	1.203 ± 0.012	1.208 ± 0.008

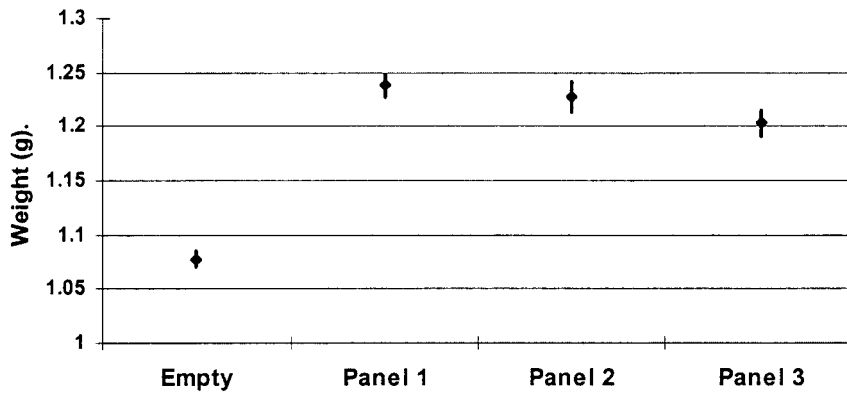


Fig. 1. Graph showing patch test panel weight $\pm$ standard deviation.

Diagnostics, Malmö, Sweden). 2 of the allergens were in solution: formaldehyde on panel 1 and MCI/MI on panel 2.

The nurse preparing the patch tests was aware of the initial study. The study was then repeated without her knowledge.

The *F*-test was used to compare the variance in the weight of the empty panels with each of the 3 panels and the empty Finn Chambers[®] with both of the allergen-prepared Finn Chambers[®].

Results

The average weights and standard deviations of the panels were as follows: empty panel = 1.078 g ($\pm$ 0.007), panel 1 = 1.238 g ($\pm$ 0.01), panel 2 = 1.228 g ($\pm$ 0.014), and panel 3 = 1.203 g ($\pm$ 0.012) (Table 1 and Fig. 1). There was no significant difference in variance of panel 1 (p = 0.18) and panel 3 (p = 0.08) compared to the empty panels (Table 2). There was a significant difference in variance of panel 2 (p = 0.02).

The repeat study (without forewarning the nurse) showed similar p -values for panels 1–3 (0.08, 0.01 and 0.69, respectively), i.e. a significant weight variation only in panel 2.

The average weight of individual empty Finn Chambers[®] was 0.053 g ($\pm$ 0.001) (Table 3). The average weight of Finn Chambers[®] with allergen in petrolatum was 0.064 g ($\pm$ 0.001) and with allergen in solution was 0.101 g ($\pm$ 0.002). The variance was not significant for the allergen prepared in petrolatum (p = 0.32) but was significant for the allergen prepared in solution (p = 0.019).

Discussion

Patch testing using Finn Chambers[®] was developed in the mid 1970s. At that time it was felt to be reliable, reproducible and convenient (1). The active test area is 50 mm². The working volume is 25 μ L, but the optimal volume is 12–15 μ L (9).

Greater than 18–21 μ L gives significant extrusion of test substance, improper adhesive adherence and inadequate dosing on a weight-to-surface-area basis. Less than 9 μ L does not provide proper cover of the test area. When testing solutions, 8 mm filter paper discs are used. These absorb 17.5 μ L of test solution, which evaporates at 1 mg/3 min. Semi-solids, such as petrolatum, are applied directly into the chamber. The Finn Chambers[®] are attached to Scanpor acrylic adhesive porous low irritancy tape, with high and rapid tack, in paired rows of 5.

There has been much debate about the accuracy of patch testing with Finn Chambers[®]. Reproducibility with positive patch tests is around 70% (2). Even with good technique it is considered that there is a significant percentage of false-positives. This may be due to uneven distribution of test substance within the petrolatum, producing droplets of high test substance concentration, which may increase the risk of irritant false-positives (6). This is particularly seen with metal salts (7). Improper technique may raise this percentage. The amount of test substance applied can vary up to 10-fold depending on the amount in weight applied and the pharmaceutical properties, including concentration, of the material (5, 10).

Studies comparing Finn Chamber[®] and TRUE Test patch testing show concordance varying from 67% (11) to 78% (12). Fernandez Vozmediano et al. thought that this reflected both high false-positives with Finn Chambers[®] but also high false-

Table 2. Comparison of the variances of the 3 prepared panels with the empty panel

	<i>p</i> -value	
	Nurse aware of study	Nurse unaware of study
Empty vs panel 1	0.18	0.08
Empty vs panel 2	0.02*	0.01*
Empty vs panel 3	0.08	0.69

* = statistically significant variance

Table 3. Weights and standard deviations of individual Finn Chambers (FC) with and without allergen applied

	Number (n)	Mean weight (g) $\pm$ Standard deviation	p-value (empty vs prepared FC)
Empty FC	25	0.053 $\pm$ 0.001	N/A
FC with allergen in petrolatum	25	0.064 $\pm$ 0.001	0.32
FC with allergen in solution	25	0.101 $\pm$ 0.002	0.019

negatives with TRUE TestsTM (3). Gollhausen et al. found the Finn Chamber[®] test to have 37.9% non-reproducibility compared to 17.9% for the TRUE TestTM (13). However, a recent study suggests that Finn Chamber[®] patch testing is superior to the TRUE TestTM in detecting relevant contact allergens (14).

A study performed by Antoine & Lachapelle (15) showed a significant variation of the quantity of petrolatum applied to individual patch test chambers both between dermatologists and for individual dermatologists from day to day. The authors suggest that standardized patch test materials might avoid this variation, but admit that variations seen are unlikely to be clinically significant if the concentration of allergen applied is within maximum and minimum thresholds.

This study shows that empty patch test panels and individual Finn Chambers[®] show some variation in weight. The prepared panels and Finn Chambers[®] show an increase in weight variance. The increased variance was not significant for 2 of the 3 panels, or for the Finn Chambers[®] prepared with allergen in petrolatum. Panel 2, which contains an allergen in solution (MCI/MI), and the Finn Chambers[®] with allergen in solution show significant weight variation, possibly as a result of a combination of variation in droplet size and use of petrolatum to keep the filter paper in place. The results were comparable when the study was repeated with the nurse blinded to the study. We are fortunate in having a trained and highly motivated nurse to prepare patch tests in our department. It is possible that variation in Finn Chamber weights would be greater with a non-specialist nurse. Further studies to examine such variables would be helpful.

The clinical significance of this study is uncertain. The work by Fischer & Maibach (9) suggests that there is an optimum volume of substance that needs to be applied, and others have shown that, provided the quantity of applied allergen is above a minimal concentration, patch testing is reliable (4).

References

1. Cronin E. Comparison of AI-test and Finn Chamber. *Contact Dermatitis* 1978; 4: 301–302.
2. Fischer T, Rystedt J. Cobalt allergy in hard metal workers. *Contact Dermatitis* 1983; 9: 115–121.
3. Fernandez Vozmediano J M, Hita J C. Concordance and discordance between TRUE Test and Finn Chamber. *Contact Dermatitis* 2000; 42: 182–183.
4. Memon A A, Friedmann P S. Studies on the reproducibility of allergic contact dermatitis. *Br J Dermatol* 1996; 134: 208–214.
5. Fischer T, Maibach H. Amount of nickel applied with a standard patch test. *Contact Dermatitis* 1984; 11: 285–287.
6. Fischer T, Maibach H. Patch test allergens in petrolatum: a reappraisal. *Contact Dermatitis* 1984; 11: 224–228.
7. Fischer T, Maibach H. False-positive, follicular and irritant patch test reactions to metal salts. *Contact Dermatitis* 1985; 12: 93–98.
8. Bourke J, Coulson I, English J. Guidelines for care of contact dermatitis. *Br J Dermatol* 2001; 145: 877–885.
9. Fischer T, Maibach H. Finn Chamber patch test technique. *Contact Dermatitis* 1984; 11: 137–140.
10. Lachapelle J M, Antoine J L. Problems raised by the simultaneous reproducibility of positive allergic patch test reactions in man. *J Am Acad Dermatol* 1989; 21: 850–854.
11. Lachapelle J M, Bruynzeel D P, Ducombs G, et al. European multicenter study of the TRUE TestTM. *Contact Dermatitis* 1988; 19: 91–97.
12. Ruhnek-Forsbeck M, Fischer T, Meding B, et al. Comparative multicenter study with TRUE Test and Finn Chamber patch test methods in 8 Swedish hospitals. *Acta Dermato-Venereologica* 1988; 68: 123–128.
13. Gollhausen R, Przybilla B, Ring J. Reproducibility of patch test results: comparison of TRUE Test and Finn Chamber test results. *J Am Acad Dermatol* 1989; 21: 843–846.
14. Suneja T, Belsito D. Comparative study of Finn Chambers and T.R.U.E. test methodologies in detecting the relevant allergens inducing contact dermatitis. *J Am Acad Dermatol* 2001; 45: 836–839.
15. Antoine J L, Lachapelle J M. Variations in the quantities of petrolatum applied in patch testing. *Dermatosen* 1988; 36: 191–194.

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