

Resident's Forum

Allergic Patch Testing in Dermatology

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INTRODUCTION

Allergic contact dermatitis constitutes about 20% of all contact dermatitis cases, but results in significant morbidity. The challenge in managing these patients lies in deducing the likely allergen responsible for causing the disease and any potential cross-reactors. Although a person may be sensitised to an allergen, the current episode may not be due to the same. Patch testing is a practical and scientific procedure that can aid in the diagnosis of allergic contact dermatitis.

PRINCIPLE OF PATCH TESTING

It depends on the principle that sensitised antigen primed T lymphocytes will home from the lymph nodes and be present throughout the skin. This, when re-exposed to the allergen, triggers a delayed type hypersensitivity reaction [Figure 1]. Thereby, we can conveniently apply allergens on healthy skin at distant sites such as the upper back, to see if sensitisation had occurred previously.

The fundamental steps involved in patch testing include preparation of the patch with allergens, application on the test site, removal of the patch with immediate and delayed reading, interpretation and counselling.

INDICATIONS OF PATCH TESTING

Although a simple procedure; patch test reagents are expensive, require storage and have a shelf life, and the procedure causes inconvenience to the patients due to the requirement of keeping allergens on the skin surface for required length of time and due to the frequent visits involved. The testing is fruitful in situations such as:

- Lesions that are eczematous, where it is suspected to be due to a contact allergen; or where sensitisation has to be excluded
- Lesions that are eczematous and are recalcitrant to therapy
- Chronic eczema of the feet and hands
- Eczematous lesions on the eyelids, perineum, ears and face
- Suspected drug reactions that have an underlying delayed hypersensitivity mechanism (DRESS, maculopapular drug rash and fixed drug eruption)

MATERIALS REQUIRED

Patch test allergens must be engineered such that they bring out a positive result in those sensitised, but do not, themselves, cause sensitisation. A number of pre-designed series exist with standardised concentrations of allergens – ensuring uniformity and safety. These are loaded into chambers; which are fabricated with material that do not cause a reaction on their own and are

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devised to facilitate occlusion with the cutaneous surface. Few commonly used chambers are illustrated [Figure 2].

TEST SITE

The test site chosen should be such that the applied patch is unlikely to get detached, exposed to the environment or look unsightly. In decreasing order, preferred sites are the upper back, lower back and lateral facet of the arm.

PATCH TEST DOSE OF ALLERGENS

Standardised allergens come in prefilled syringes, and the most common vehicle used to suspend the allergen is petrolatum. A 5 mm (20 mg of allergen) length of this semisolid preparation should be expressed onto the chamber. For a liquid allergen, 15 µL of the preparation is blotted onto a filter paper, which is then placed on to the chambers.^[1] One must be cautious as an excessive amount of allergen can increase the risk of sensitisation.

Once used, the test substances must be shielded from light and stored in the refrigerator (4°C) to prevent their degradation. Some allergen test preparations such as isocyanates may need freezing storage conditions.^[2]

Patients should be instructed to avoid heavy exercise, wearing tight garments and wetting their back.

EXPOSURE TIME

In most cases, the readings are to be taken at 48 h post application. At this time, the patch is gently removed and the indentation marks left by the chambers' pressure are marked with gentian violet. The reading is to be taken an hour post removal of patch, to avoid false-negative and false-positive results. A repeat reading is, then, taken at 48 h for most allergens. Some allergens however, such as metals, antibiotics (neomycin) and dyes – produce a delayed reaction that needs to be rechecked 7 days post application.

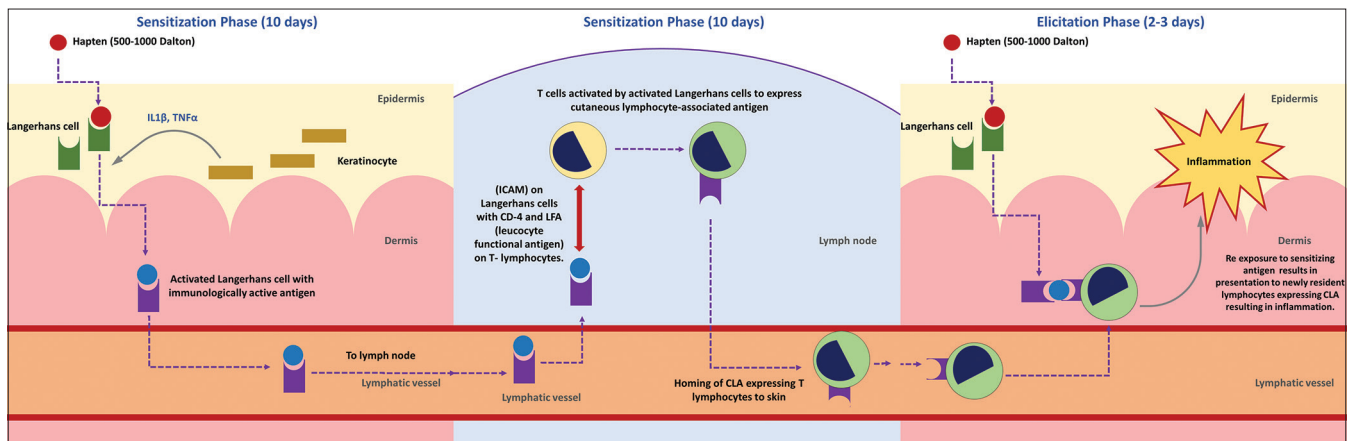


Figure 1: Immunopathogenesis of allergic contact dermatitis.

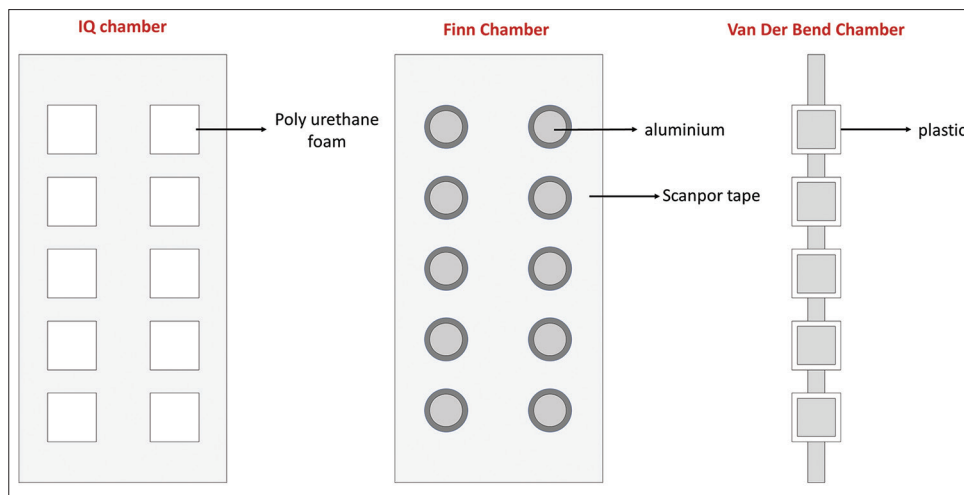


Figure 2: The various chambers that can be used for patch testing.

INTERPRETATION

The patch test reactions are graded according to their severity, following the international contact dermatitis research group classification system [Figure 3].^[3] A few interesting phenomena can be observed while patch testing with corticosteroids [Table 1]. A positive patch test result gives due testimony to prior sensitisation in the host. However, sensitisation is not equivalent to causation, and one needs to scrutinize whether the suspected allergen is the cause of the current incident of dermatitis. A simple way to tabulate the relevance is shown in [Table 2].

PRECAUTION

A few measures must be taken to optimize the procedure of allergic patch testing:

- The test patch should not be applied on sites with on-going eczema
- A 28-day delay should be taken before testing, should the test site be exposed to ultraviolet radiation
- The patient should not be consuming corticosteroids at doses >15 mg of prednisolone per day or its equivalents
- There is no necessity to stop systemic antihistamines, as they do not alter patch test results
- Known concentration of test substances-only standardised preparations should be used.

Rarely, the results of the patch test may be false-positive in case of:

- Impurities
- Excessive concentration of allergen
- Reaction to the chamber or adhesive.

When in doubt, the test must be done over, testing with each individual agent and starting with the lowest possible dilution.

Similarly, one may miss a result and get a false-negative reading due to:

- Excessive dilution of the allergen
- Prematurely performing a reading
- Antecedent exposure to UV radiation
- Unsuitable vehicle.

COUNSELLING

Once the results of the test and its significance are known, the patient must be informed about:

- Eponymous names and sources of the allergen
- Potentially cross-reacting substances
- Precautions to avoid exposure and contact with the allergen
- Non-sensitising alternatives.

SIDE EFFECTS

Although relatively safe and very useful, patch testing at times, may produce inimical effects, such as.

- Itching
- Folliculitis and occlusion
- Localised and generalised flare of dermatitis
- Irritant reactions
- Persistent reactions and pustulation.

SPECIAL FORMS OF PATCH TESTING

Patch testing for drugs should be performed 6 weeks to 6 months after the last dose of the suspect allergen has been taken. In addition to the standard procedure, an immediate reading should be noted 20 min after extirpation of the patch and a delayed reading at 7 days.

While suspecting contact dermatitis due to domestic chemicals, the initial dilution should be 0.01%, which is

Table 1: Some special phenomenon seen while patch testing.

Excited skin syndrome (angry back)	Two or more positive patch test results, which is not reproduced when retested
Compound allergy	Positive patch test to finished product, but not to individual components
Edge effect	While patch testing with corticosteroids, the sensitisation is visible at the edge of the Finn chambers due to the relatively increased concentration at the peripheries

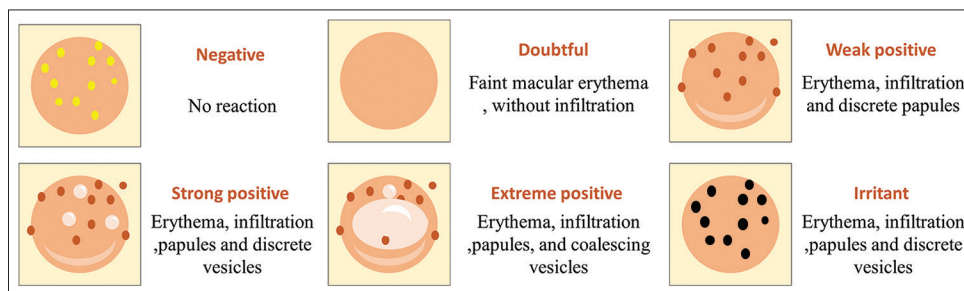


Figure 3: Grading of patch test reactions as per the international contact dermatitis research group.

Table 2: The relevance of a positive patch test result.

Relevance of patch test results		
C	Current relevance	Patient has been exposed to this allergen before the current episode; and disease will improve after exposure cessation
O	Old relevance	Past dermatitis episode from the allergen, but not the current episode
A	Active sensitisation	Sensitisation reaction observed
D	Doubtful	Difficult to assess the relevance, a traceable relationship cannot be derived between the positive test and the disease
E	Exposed	Previous exposure that did not cause dermatitis
X	Cross-reaction	Positive result is due to cross-reaction with an allergen of significance

gradually increased. Products that are intended to be left on the skin are tested as is, while rinse off products are tested at 5%; and soaps, shampoos and detergents at 1% or less.^[4]

CONCLUSION

The procedure of patch testing is an art; and comprehensive patch tests done properly can make a positive impact on patients' lives.

Declaration of patient consent

Patient consent not required as there are no patients in this study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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