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Guidelines for care of contact dermatitis

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Summary These guidelines for the management of contact dermatitis have been prepared for dermatologists on behalf of the British Association of Dermatologists. They present evidence-based guidance for treatment, with identification of the strength of evidence available at the time of preparation of the guidelines, including details of relevant epidemiological aspects, diagnosis and investigation.

Disclaimer

These guidelines have been prepared for dermatologists on behalf of the British Association of Dermatologists and reflect the best data available at the time the report was prepared. Caution should be exercised in interpreting the data; the results of future studies may require alteration of the conclusions or recommendations in this report. It may be necessary or even desirable to depart from the guidelines in the interests of specific patients and special circumstances. Just as adherence to guidelines may not constitute defence against a claim of negligence, so deviation from them should not necessarily be deemed negligent.

Definition

The words 'eczema' and 'dermatitis' are often used synonymously to describe a polymorphic pattern of inflammation that in the acute phase is characterized by erythema and vesiculation, and in the chronic phase by dryness, lichenification and fissuring. Contact dermatitis describes these patterns of reaction in response to external agents, which may be the result of the external agents acting as either irritants, where the T-cell-mediated immune response is not involved, or as allergens, where cell-mediated immunity is involved.

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Contact dermatitis may be classified into the following reaction types:

1 Subjective irritancy: idiosyncratic stinging and smarting reactions that occur within minutes of contact, usually on the face, in the absence of visible changes. Cosmetic or sunscreen constituents are common precipitants.

2 Acute irritant contact dermatitis: often the result of a single overwhelming exposure or a few brief exposures to strong irritants or caustic agents.

3 Chronic (cumulative) irritant contact dermatitis: this occurs following repetitive exposure to weaker irritants that may be either 'wet', such as detergents, organic solvents, soaps, weak acids and alkalis, or 'dry', such as low humidity air, heat, powders and dusts.

4 Allergic contact dermatitis: this involves sensitization of the immune system to a specific allergen or allergens with resulting dermatitis or exacerbation of pre-existing dermatitis.

5 Phototoxic, photoallergic and photoaggravated contact dermatitis: some allergens are also photoallergens. It is not always easy to distinguish between photoallergic and phototoxic reactions.

6 Systemic contact dermatitis: seen after the systemic administration of a substance, usually a drug, to which topical sensitization has previously occurred.

In practice, it is not uncommon for endogenous, irritant and allergic aetiologies to coexist in the development of certain eczemas, particularly hand and foot eczema. It is important to recognize and seek in the history, or by a home or workplace visit, any recreational and occupational factors in irritant and allergic dermatitis.

Other types of contact reactions are not discussed in these guidelines, which are outlined in Appendix 1.

Epidemiology

Properly designed and conducted studies to determine the prevalence of dermatitis in the general community are few but the point prevalence of dermatitis in the U.K. is estimated at about 20%, with atopic eczema forming the majority.[1] The best studies show a point prevalence of hand dermatitis in south Sweden of 2%[2] and the lifetime risk of developing hand eczema to be 20% in women.[3] Irritant contact dermatitis is more common than allergic dermatitis; allergic dermatitis usually carries a worse prognosis than irritant dermatitis unless the allergen is identified and avoided.

Contact dermatitis accounts for 4–7% of dermatological consultations. Chronicity is commonest in those allergic to nickel and chromate.

The ongoing UK EPIDERM surveillance scheme[4] is addressing the epidemiology of occupational contact skin reactions (79% of which were dermatitis). Recent findings show that skin diseases rank second (29%) to musculoskeletal conditions (57%) as causes of occupational disease.

Contact dermatitis in children was once believed to be uncommon but several reports suggest an increasing prevalence, probably due to an increase in the practice of ear piercing, which may cause nickel sensitization.[5] Fragrance, medicaments, rubber, chromate and footwear adhesive resins are the other common childhood allergens.[6]

Contact allergy to specific allergens has been estimated in the general population to be 4·5% for nickel,[7] and 1–3% of the population are allergic to ingredient(s) of a cosmetic.[8] The prevalence of allergy to the other common allergens in the general population is not known as almost all studies have patch-tested selected groups rather than general populations (Table 1).

Table 1. Occupations with the highest risk (rate per 100 000 employed per year)—using labour force survey data as the denominator and cases of contact dermatitis reported to the U.K. EPI-DERM survey as the numerator

Occupation	Rate per 100 000 per year
Hairdressers	120
Printers	71
Machine tool operators	56
Chemical, gas and petroleum plant operatives	45
Car assemblers	35
Machine tool setters	34

Who should be investigated?

Many authors have identified the unreliability of clinical features alone in distinguishing allergic contact from irritant and endogenous eczema, particularly with hand and facial eczema.[9–12] Patch testing is therefore an essential investigation in patients with persistent eczematous eruptions when contact allergy is suspected or cannot be ruled out (*Quality of evidence II.ii*) (*Strength of recommendation A*). A recent prospective study[13] has confirmed the value of a specialist contact clinic in the diagnosis of contact dermatitis. It highlighted the importance of formal training in patch test reading and interpretation, testing with additional series and prick testing in the investigation of patients with contact dermatitis (*Quality of evidence II.i*) (*Strength of recommendation A*).

Referral rate

An approximate annual workload for a contact dermatitis investigation clinic has been suggested to be one individual investigated per 700 of the population served[14] (*Quality of evidence II.ii*) (*Strength of recommendation B*), i.e. 100 patients patch tested for every 70 000 of the catchment population per year. A positive linear relationship was found between the number of relevant allergic patch test reactions and the number of patients referred by individual consultants.

Diagnostic tests

Patch testing

The mainstay of diagnosis in allergic contact dermatitis is the patch test. This test has a sensitivity and specificity of between 70 and 80%[15] (*Quality of evidence II.ii*) (*Strength of recommendation A*).

Patch testing involves the reproduction under the patch tests of allergic contact dermatitis in an individual sensitized to a particular antigen(s). The standard method involves the application of antigen to the skin at standardized concentrations in an appropriate vehicle and under occlusion. The back is most commonly used principally for convenience because of the area available, although the limbs, in particular the outer upper arms, are also used. A number of application systems are available of which

the most commonly used are Finn chambers. With this system, the investigator adds the individual allergens to test discs that are loaded on to adhesive tape. Two preprepared series of patch tests are available—the TRUE (Pharmacia, Milton Keynes, Bucks, U.K.) and Epiquick (Hermal, Reinbek, Germany) tests. There are few comparative studies between the different systems. Preprepared tests are significantly more reliable than operator-prepared tests[16–20] (*Quality of evidence I*). There is also some evidence that larger chambers may give more reproducible tests,[21] but this may only apply to some allergens[22] (*Quality of evidence II.ii*) and can be used to obtain a more definite positive reaction when a smaller chamber has previously given a doubtful one. The International Contact Dermatitis Research Group has laid down the standardization of gradings, methods and nomenclature for patch testing.[23]

Timing of patch test readings

The optimum timing of the patch test readings is probably days 2 and 4.[24] An additional reading at day 6 or 7 will pick approximately 10% more positives that were negative at days 2 and 4[25] (*Quality of evidence II.ii*) (*Strength of recommendation A*). The commonest allergens that may become positive after day 4 are neomycin, tixocortol pivalate and nickel.

Relevance of positive reactions

An assessment should be made of the relevance of each positive reaction to the patient's presenting dermatitis. Unfortunately this is not always a simple task even with careful history taking and knowledge of the allergen's likely sources and the patient's occupation and/or hobbies. Textbooks on contact dermatitis are an invaluable resource in this regard (Appendix 2). A simple and pragmatic way of classifying clinical relevance of positive allergic patch test reactions is: (i) current relevance (the patient has been exposed to allergen during current episode of dermatitis and improves when the exposure ceases); (ii) past relevance (past episode of dermatitis from exposure to allergen); (iii) relevance not known (not sure if exposure is current or old); (iv) cross-reaction (the positive test is due to cross-reaction with another allergen); and (v) exposed (a history of exposure but not resulting in dermatitis from that exposure, or no history of exposure but a definite positive allergic patch test).

Table 2. British Contact Dermatitis Group recommended standard series

Potassium dichromate 0·5% pet.
Neomycin sulphate 20% pet.
Thiuram mix 1% pet.
*Para*phenylenediamine 1% pet.
Cobalt chloride 1% pet.
Caine mix III 10% pet.
Formaldehyde 1% pet.
Colophonium 20% pet.
Quinoline mix 6% pet.
Balsam of Peru 25% pet.
Isopropyl PPD 0·1% pet.
Wool alcohols 30% pet.
Mercapto mix 2% pet.
Epoxy resin 1% pet.
Paraben mix 8% pet.
PTBPF resin 1% pet.
Fragrance mix 8% pet.
Quaternium 15 1% pet.
Nickel sulphate 5% pet.
Methylchloroisothiazolinone + Methylisothiazolinone 0·01% aq.
Mercaptobenzothiazole 2% pet.
Primin 0·01% pet.
Sesquiterpene lactone mix 0·1% pet.
Chlorocresol 1% pet.
Bromonitropropanediol 0·25% pet.
Cetearyl alcohol 20% pet.
Fusidic acid 2% pet.
Tixocortol pivalate 1% pet.
Budesonide 0·1% pet.
Imidazolidinyl urea 2% pet.
Diazolidinyl urea 2% pet.
Methyldibromoglutaronitrile 0·1% pet.
Ethylenediamine dihydrochloride 1% pet.
PCMX 1% pet.
Carba mix 3% pet.

pet., petrolatum; aq., aqueous.

Patch test series

The usual approach to patch testing is to have a screening series, which will pick up approximately 80% of allergens.[26,27] Such series vary from country to country. There are two principal standard series, differing between the U.S.A. and Europe. Most dermatologists adapt these series by adding allergens that may be of local importance. The standard series should be revised on a regular basis. The North American Contact Dermatitis Group extended their standard series to a total of 49 allergens and the British Contact Dermatitis Group have also recently expanded their series to include several common bases and preservatives (Table 2) and a number of other important allergens. Supplemental series are then used to complement the standard series for particular body sites or types of agents to which the patient is exposed (Appendix 3). The patient's own cosmetics, toiletries

and medicaments should be tested at non-irritant concentrations. This usually means 'as is' (undiluted product) for leave-on products and dilutions for wash-off products. Strong irritants such as powder detergents should not be patch tested. Occupational products should also be tested at non-irritant concentrations. The most useful reference source for documented test concentrations and vehicles of chemicals, groups of chemicals and products is that by de Groot.[28] Guidelines for testing patients own materials can be found in the *Handbook of Occupational Dermatology*.[29] However, false positives and false negatives often occur when patch-testing products brought by the patient.

Photopatch testing

Where photoallergic dermatitis is suspected, photopatch testing may be carried out.[30] Very briefly, the standard method of photopatch testing involves the application of the photoallergen series and any suspected materials in duplicate on either side of the upper back. One side is irradiated with 5 J cm^{-2} of ultraviolet (UV) A after an interval (1 or 2 days) and readings are taken in parallel after a further 2 days. The exact intervals for irradiation and the dose of UVA given vary from centre to centre. The British Photodermatology Group is currently conducting a multicentre study to address some of these issues.

Open patch testing

The open patch test is commonly used where potential irritants or sensitizers are being assessed. It is also useful in the investigation of contact urticaria and protein contact dermatitis. The open patch test is usually performed on the forearm but the upper outer arm or scapular areas may also be used. The site should be assessed at regular intervals for the first 30–60 min and a later reading should be carried out after 3–4 days. A repeated open application test (ROAT), applying the suspect agent on to the forearm, is also useful in the assessment of cosmetics, where irritancy or combination effects may interfere with standard patch testing. This usually involves application of the product twice daily for up to a week, stopping if a reaction develops.

Preparation of the patient

A number of factors may alter the accuracy of patch testing. Principal among these are the characteristics of the individual allergens and the method of patch testing. Some allergens are more likely to cause irritant reactions than others. These reactions may be difficult to interpret and are easily misclassified as positive reactions. Nickel, cobalt, potassium dichromate and carba mix are the most notable offenders in the standard series. As indicated above, preprepared patch tests are better standardized in terms of the amount of allergen applied and are therefore more reproducible, but are prohibitively expensive in the U.K.

Patient characteristics are also important. It is essential that the skin on the back is free from dermatitis and that skin disease elsewhere is as well controlled as possible. This will help to avoid the 'angry back syndrome' with numerous false positives.[31] However, if a patient applies potent topical steroids to the back up to 2 days prior to the test being applied[32–34] (*Quality of evidence I*) or is taking oral corticosteroids or immunosuppressant drugs, then there is a significant risk of false negative results. It has been claimed that patch testing is reliable with doses of prednisolone up to 20 mg per day but that figure is based on poison ivy allergy, which causes strongly positive patch tests[35] (*Quality of evidence II.iii*). The effect of systemic steroids on weaker reactions has not been assessed but clinical experience would suggest that if the daily dose is no higher than 10 mg prednisolone, suppression of positive patch tests is unlikely. UV light may also interfere with patch test results[36] but the amount required to do so and the relevant interval between exposure and patch testing are poorly quantified (*Quality of evidence II.iii*).

Testing for immediate (type I) hypersensitivity

Although not strictly a part of assessment of contact dermatitis this is important particularly in the situation of hand dermatitis. Type I hypersensitivity to natural rubber latex (NRL) may complicate allergic, irritant or atopic hand dermatitis and may be seen in combination with delayed (type IV) hypersensitivity to NRL or rubber additives. The two skin tests in common use are the prick test and the use test. Prick testing involves an intradermal puncture through a drop of NRL extract. A positive reaction consists of an urticarial weal, which is usually apparent after 15 min, although it may take as long as 45 min to develop. A positive control test of histamine should also be performed to check the

patient does not give a false negative reaction from oral antihistamine ingestion. A negative control prick test with saline should be also be performed to check if the patient is dermographic. The use test involves application of a glove that has been soaked for 20 min in water or saline. The prick test is generally favoured over the use test because of reports of anaphylaxis following the latter[37] (*Quality of evidence II.iii*) (*Strength of recommendation A*). There are also occasional reports of anaphylaxis following prick testing with NRL extract.[38] With the advent of standardized commercially available NRL extracts this risk is probably greatly reduced. Some clinicians may prefer to perform a radioallergosorbent test (RAST) for NRL allergy, as they may not have adequate facilities or training to deal with anaphylaxis; however, the sensitivity and specificity may be less for RAST compared with prick testing. Skin prick and use tests are also useful when investigating protein contact dermatitis in occupations at risk such as chefs or veterinarians.

Intervention and treatment

Irritant contact dermatitis

The management of irritant contact dermatitis principally involves the protection of the skin from irritants. The most common irritants are soaps and detergents, although water itself is also irritant. In occupational settings other irritants such as oils and coolants, alkalis, acids and solvents may be important. The principles of management involve avoidance, protection and substitution, as follows.

Avoidance. In general, this is self-evident. However, a visit to the workplace may be necessary to identify all potential skin hazards.

Protection. Most irritant contact dermatitis involves the hands. Gloves are therefore the mainstay of protection. For general purposes and household tasks, rubber or PVC household gloves, possibly with a cotton liner or worn over cotton gloves, should suffice. It is important to take off the gloves on a regular basis as sweating may aggravate existing dermatitis. There is also some evidence that occlusion by gloves may impair the stratum corneum barrier function[39] (*Quality of evidence I*). In an occupational setting, the type of glove used will depend upon the nature of the chemicals involved. Health and safety information for handling the chemical should stipulate which gloves ought to be used[40] (Appendix 4). Exposure time is an important factor in determining the most appropriate glove as so-called 'impervious' gloves have a finite permeation time for any particular substance; a glove may be protective for a few minutes but not for prolonged contact, e.g. NRL gloves and methacrylate bone cement.

Substitution. It may be possible to substitute non-irritating agents. The most common example of this is the use of a soap substitute. Correct recycling of oils in heavy industry and reduction, or changing, the biocide additives may help.

Allergic contact dermatitis

Detection and avoidance of the allergen is often easier said than done. Again, a site visit may be necessary to identify the source of allergen contact and methods of avoidance. It may be necessary to contact manufacturers of products to determine if the allergen is present. It may also be necessary to contact a number of manufacturers to identify suitable substitutes.

Visiting the workplace

Visiting the workplace has an important place in the management of contact dermatitis. Apart from identifying potential allergens and irritants, it may be essential in the effective treatment and prevention of contact dermatitis (*Quality of evidence III*) (*Strength of recommendation B*). More information about the indications for visiting a patient's workplace and how to go about it are given elsewhere.[41]

Barrier creams and after work creams?

Barrier creams by themselves are of questionable value in protecting against contact with irritants[42,43] (*Quality of evidence I*) (*Strength of recommendation E*). Their use should not be overpromoted as this may confer on workers a false sense of security and encourage them to be complacent in implementing the appropriate preventative measures.

After-work creams appear to confer some degree of protection against developing irritant contact dermatitis. There are controlled clinical trials showing benefit in the use of soap substitutes[44] and after-work creams[45] in reducing the incidence and prevalence of contact dermatitis (*Quality of evidence I*) (*Strength of*

recommendation A). They should be encouraged and made readily available in the workplace.

Topical corticosteroids

Topical corticosteroids, soap substitutes and emollients are widely accepted as the treatment of established contact dermatitis. There is one study demonstrating a marginal benefit of the use of a combined topical corticosteroid/antibiotic combination[46] in infected or potentially infected eczema (*Quality of evidence IV*) (*Strength of recommendation C*). There is an open prospective randomized trial demonstrating the long-term intermittent use of mometasone furoate in chronic hand eczema[47] (*Quality of evidence I*) (*Strength of recommendation B*).

Second line treatments

Second line treatments such as psoralen UV, azathioprine and cyclosporin are probably widely used for steroid-resistant chronic hand dermatitis. There are several prospective clinical trials to support these treatments[48–50] (*Quality of evidence I*) (*Strength of recommendation A*). A randomized controlled trial of Grenz rays for chronic hand dermatitis showed a significantly better response with this therapy compared with use of topical corticosteroids[51] (*Quality of evidence I*) (*Strength of recommendation B*).

Nickel elimination diets

There is some evidence[52,53] to support the benefit of low nickel diets in some nickel-sensitive patients (*Quality of evidence IV*) (*Strength of recommendation C*).

Prognosis

Several studies have confirmed that the long-term prognosis for occupational contact dermatitis is often very poor. A Swedish study[54] demonstrated that only 25% of 555 patients investigated as having occupational contact dermatitis over a 10-year period had completely healed; one-half still had periodic symptoms and one-quarter permanent symptoms. Unfortunately, in 40% who changed their occupation, the overall prognosis was not improved. In a large follow-up study from Western Australia[55] 55% of 949 patients still had dermatitis 2 years after diagnosis (*Quality of evidence II.ii*). Prognosis for milder cases of contact dermatitis depends upon the ease of avoidance. If the patient can avoid the cause of the contact dermatitis then dermatitis will clear.

Summary of recommendations

1 Patients with persistent eczematous eruptions should be patch tested (*Quality of evidence II.ii*) (*Strength of recommendation A*).
2 A suggested annual workload for a patch test clinic serving an urban population of 70 000 is 100 patients patch tested (*Quality of evidence II.iii*) (*Strength of recommendation B*).
3 Patients should be patch tested to at least an extended standard series of allergens (*Quality of evidence II.ii*) (*Strength of recommendation A*).
4 An individual who has had training in the investigation of contact dermatitis prescribes appropriate patch tests and performs day 2 and day 4 readings in patients undergoing diagnostic patch testing (*Quality of evidence II.i*) (*Strength of recommendation A*).

*Minimum standards (those marked * are potential audit points)*

1 Aim for a minimum patch test rate for an urban population of 1 per 700 members of the population.*
2 Supply patient information sheets* (available from the BCDG).
3 Reference books and journals on occupational and contact dermatitis should be available.*
4 A dedicated patch test area for storage (refrigerator) and preparation of allergens should be available.*
5 A dermatologist or other individual who has been trained in the investigation of contact dermatitis prescribes appropriate patch tests and performs a day 2 and 4 reading in all patients undergoing patch testing.*
6 Patch testing should be performed using an extended standard series* such as the BCDG extended standard series.
7 Additional series of allergens are essential* to investigate allergies to:
(a) Cosmetics and other agents in contact with the face.
(b) Medicaments, including corticosteroids and antimicrobials.
8 Desirable additional series of allergens include:
(a) hairdressing products
(b) dental materials
(c) plastics and glues
(d) oil and coolant

(e) textile products
(f) plant products
(g) shoe products
(h) perineal products
(i) photopatch test

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Appendix 1

Strength of recommendations

A There is good evidence to support the use of the procedure.
B There is fair evidence to support the use of the procedure.
C There is poor evidence to support the use of the procedure.
D There is fair evidence to support the rejection of the use of the procedure.
E There is good evidence to support the rejection of the use of the procedure.

Quality of evidence

I Evidence obtained from at least one properly designed, randomized control trial.
II.i Evidence obtained from well designed control trials without randomization.
II.ii Evidence obtained from well designed cohort or case–control analytic studies, preferably from more than one centre or research group.
II.iii Evidence obtained from multiple time series with or without the intervention. Dramatic results in uncontrolled experiments (such as the results of the introduction of penicillin treatment in the 1940s) could also be regarded as this type of evidence.
III Opinions of respected authorities based on clinical experience, descriptive studies or reports of expert committees.
IV Evidence inadequate owing to problems of methodology (e.g. sample size, or length of comprehensiveness of follow-up or conflicts in evidence).

Appendix 2: Recommended textbooks and journal on contact dermatitis

Adams RM, ed. *Adam's Occupational Skin Disease*. Philadelphia: WB Saunders Co., 2000.

Contact Dermatitis. Copenhagen: Munksgaard.

Cronin E. *Contact Dermatitis*. London: Churchill Livingstone, 1980.

De Groot AC. *Patch testing. Test concentrations and Vehicles for 3700 Chemicals*, 2nd edn. Amsterdam: Elsevier, 1994.

Kanerva L, Elsner P, Wahlberg JE, Maibach HI, eds. *Handbook of Occupational Dermatology*. Berlin: Springer, 2000.

Rietschel RL, Fowler JF. *Fisher's Contact Dermatitis*. Baltimore: Williams and Wilkins, 1995.

Rycroft RJG, Menne T, Frosch PJ, Lepoittevin J-P, eds. *Contact Dermatitis*, 3rd edn. Berlin: Springer, 2001.

Appendix 3: Commercially available additional patch test series

Trolab®
Antimicrobial, preservative and antioxidant
Cosmetics
Dental materials
Hairdressing
Medicament (including corticosteroids, antibiotics,local anaesthetics and opthalmics)
Metal compounds
Metalworking/technical oils
Perfume and flavours
Photoallergens
Photographic chemicals
Plant
Plastics and glues
Rubber chemicals
Sunscreen agents
Textile and leather dyes
Vehicles and emulsifiers
Miscellaneous

Chemotechnique Diagnostics
Bakery
Corticosteroid
Cosmetics
Dental screening
Epoxy
Fragrance
Hairdressing
Isocyanate
Leg ulcer
Medicament
Adhesives, dental and other (meth) acrylate
Nails—artificial (meth) acrylate
Printing (meth) acrylate
Oil and cooling fluid
Photographic chemicals
Plant
Plastics and glues
Rubber additives
Scandinavian photopatch test
Shoe
Sunscreen
Textile colours and finish
Various allergens

Appendix 4: A guide to the types of gloves giving some degree of protection for specific types of hazard

Hazard	Type of glove
Microorganisms	NRL, thermoplastic elastomer
Disinfectants	NRL, polyvinyl chloride (PVC), polyethylene (PE), ethylene methylmethacrylate (EMA)
Pharmaceuticals	NRL (permeability time very short)
Composite materials	NRL (permeability time in minutes), 4H-glove
Solvents	PE, PVC, nitrile, NRL, neoprene, butyl rubber, Viton, 4H-glove
Corrosives	NRL, PE, PVC, neoprene, butyl rubber, Viton, 4H-glove
Detergents	NRL, EMA, PE, neoprene, PVC, nitrile (if addition of organic solvents)
Machining oils	NRL, PVC, nitrile, neoprene, 4H-glove