



PRACTICE

CLINICAL UPDATES

Contact dermatitis

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Contact dermatitis accounts for 70-90% of all occupational skin diseases.¹ It is an inflammatory skin condition induced by exposure to an external irritant or allergen (table 1⇓). A prevalence of 8.2% was seen in a recent cross sectional study of 12 377 subjects across five European countries, in which a randomly selected group of 3119 patients were patch tested.² The condition can have a detrimental impact on personal and social relationships, quality of life, and even threaten employment.³⁻⁵

What are the different types of contact dermatitis?

Irritant contact dermatitis is a non-immunologic response that occurs as a consequence of direct damage to the skin, by chemicals or physical agents, faster than the skin is able to repair itself.⁶⁻⁷ Approximately 80% of cases of contact dermatitis are irritant contact dermatitis.⁸ Common irritants include soaps, detergents, water, solvents, cutting oils, and food ingredients.⁸ The hands, particularly finger web spaces (fig 1⇓), and the face are commonly affected.⁶

Allergic contact dermatitis comprises 20% of cases of contact dermatitis. It is a type IV delayed hypersensitivity reaction to an external allergen, which occurs only in an individual who has previously been sensitised.⁶ Re-exposure to the allergen results in circulating memory T cells homing in to the skin and eliciting an immunologic reaction that causes skin inflammation, typically within 48 hours.⁹⁻¹³

How is contact dermatitis different from eczema?

The term dermatitis is often used interchangeably with eczema. However, atopic dermatitis (eczema) is an endogenous inflammatory skin condition, whereas contact dermatitis is induced by exogenous factors. Clinically, it is difficult to differentiate the two, and the conditions may co-exist, particularly in hand and foot eczema.¹⁴ Consider contact dermatitis in patients with atopic dermatitis who are unresponsive to treatment (that is, despite the use of potent or ultra-potent topical corticosteroid with emollients and soap substitute) or who flare when they try to stop treatment or have unusual distribution of disease.⁹ For example, chemicals on clothing may produce changes in axillae, groin, and feet suggestive of allergic contact dermatitis. Table 1⇓ provides a

list of the common features of atopic dermatitis, irritant contact dermatitis, and allergic contact dermatitis.

Who gets contact dermatitis?

The rising incidence of contact dermatitis to various allergens is attributed to changing lifestyles and increasing product consumption. More exhaustive allergen research in patch testing has allowed detection of more cases of allergic contact dermatitis. As some chemicals are recognised to be contact allergens and are withdrawn from use, they may be replaced by other products that could potentially induce contact allergy, and so the repertoire of potential allergens is constantly evolving.¹⁵⁻¹⁷

Data from the THOR-EPIDERM project, a national occupational health surveillance scheme, has shown that the highest risk professions for developing contact dermatitis are florists, hairdressers, beauticians, cooks, metalworkers, and other manufacturing and healthcare related occupations.¹⁸ Healthcare workers seem to be at risk because of frequent hand washing. A recent survey showed a prevalence of hand dermatitis of 4% in healthcare workers, with 98% of those affected having irritant contact dermatitis.¹⁹ Women are more likely to be diagnosed with contact dermatitis than men.¹⁹⁻²¹ Allergic contact dermatitis is not uncommon in children and is on the rise.²² Having atopic eczema, increases the risk of irritant contact dermatitis because of impaired skin barrier function.²³ A background of atopy possibly increases the risk of allergic contact dermatitis, although more studies are needed to clarify this.²⁴

How is contact dermatitis diagnosed?

Clinical assessment

The patient's history may reveal potential allergens and irritants and guide further investigations and management. Ask about pruritus, disease course, relationship to sunlight exposure, response to treatment, and personal or family history of atopy.^{6,9} Specifically ask about use of hair dyes, cosmetics, jewellery, skin care products, and any oral or topical medications, including complementary therapies.⁶ If the dermatitis is unresponsive to or worsens after the use of topical corticosteroids, the patient might have a sensitivity to corticosteroids or other ingredients in the topical preparation.^{8,25}

Occupational causes are indicated if symptoms improve during time away from work. Ask specific questions about the workplace, such as the availability of personal protective

What you need to know

- Florists, hairdressers, beauticians, cooks, metalworkers and other manufacturing occupations, and healthcare related professions are at risk
- Diagnosis is made clinically or with patch tests in some cases.
- Interpret patch test results in light of the clinical history to determine relevance
- Avoidance of allergens and irritants is an important aspect of self management
- Treatment options include topical corticosteroids, topical calcineurin inhibitors, and systemic therapies if needed

Methods

We searched PubMed, DynaMed, and the Cochrane Library using the MESH term "contact dermatitis" and various subheadings including epidemiology, classification, diagnosis, and drug therapy. Systematic reviews, meta-analyses, and randomised controlled trials were prioritised, but relevant observational and epidemiological studies were also included. We focused on recent literature, particularly in the past five years. Further references were identified from searching the bibliography of articles. We also incorporated recommendations from guidelines published by the European Society of Contact Dermatitis, the American College of Allergy, Asthma and Immunology, and the British Association of Dermatologists.

equipment, for example proper glove selection.⁶⁻⁸ Hobbies associated with contact dermatitis include gardening, carpentry, metalwork, photography, swimming, and painting.

Clinical features of contact dermatitis in the acute phase include pruritus, erythema, dryness, and scaling, but vesicles and bullae can develop. With chronic disease, lichenification and fissuring can occur.⁶⁻¹³ A recent study by the Danish Contact Dermatitis Group showed that the morphology of the lesions is often unreliable in predicting whether the cause is allergic, irritant, or endogenous.²⁶

Contact dermatitis is classically localised to the site of contact, but patchy or diffuse eruptions can also arise.⁸⁻¹⁰ The areas most prone to contact dermatitis include the hands, face, eyelids, neck, scalp, axillae, lower extremities, feet, and anogenital areas (figs 2-6).⁸ Photodistributed and airborne contact dermatitis both affect exposed sites. Photodistributed contact dermatitis involves areas on the skin with maximal amount of exposure to sunlight and are therefore involved in eruptions because of photosensitivity. Clues to a sunlight trigger, include sparing of specific areas, such as under the chin, nose and behind the ears.⁶ Airborne contact dermatitis denotes a unique type of contact dermatitis originating from dust, sprays, pollens or volatile chemicals by airborne fumes or particles without handling this allergen.

When should investigations be performed?

Anyone with suspicion of contact dermatitis should be referred to a dermatologist to consider patch testing. Patch tests are the gold standard for diagnosing allergic contact dermatitis.²⁷ Irritant contact dermatitis is usually a diagnosis of exclusion, when patch tests for allergic contact dermatitis are negative. The patch test procedure is illustrated in box 1 and figure 7.

Irritant contact dermatitis is usually confined to the site of contact with the irritant. For example, contact with mild irritants such as soap or detergent may, over time, cause dryness, itching, and cracking of the hands due to repetitive washing.

The dimethylglyoxime test (nickel spot test) is a highly specific (reported to be 97.5%) and rapid test that can be performed in clinic to detect nickel released from metal objects.³⁰

Patch testing should be considered for

- Suspected cases of allergic contact dermatitis where the diagnosis is not clinically obvious. This may include dermatitis of sudden onset, particularly if there is no history of eczema in an adult.

- Dermatitis with an unusual distribution, including that taking a very localised form (such as face and neck, eyelid, hand and foot).
- Dermatitis related to occupational exposure.
- Other types of severe chronic dermatitis (eczema) not improving with treatment that may be triggered by unsuspected contact allergens. For example, hand-and-foot, stasis, atopic, or seborrheic dermatitis or discoid (nummular) eczema.

Asymptomatic patients are not patch tested unless they may be exposed to allergens of past relevance. For instance, referrals for patch testing to metals are becoming increasingly common in secondary care before joint replacement surgery to avoid any problems with implanted metal prostheses. Patch tests are not routinely performed for investigation of food allergies.

How useful are patch tests?

A large multicentre prospective observational study showed that patch testing leads to improved quality of life as it allows early diagnosis of aetiology through identification of relevant allergens and enables treatment to be initiated before the disease becomes chronic.³¹ Studies have demonstrated the importance of patch tests in children,³²⁻³³ and they are particularly helpful when the clinical presentation is suggestive of allergic contact dermatitis.³⁴ Although they vary according to the allergen tested, data from analysis of common baseline series suggest a sensitivity of 0.77 and specificity of 0.71 for patch tests.³⁵

Patch tests do not tell us what exposures caused the induction of contact allergy or what types of exposure may be tolerated.³⁶ Potential complications include triggering a flare of atopic dermatitis, rarely inducing intense reactions that can cause scarring, and occasionally inducing new allergen sensitivities.²⁷⁻³⁷ Isolated reports of type 1 hypersensitivity reactions, including anaphylaxis, have also been reported. Therefore, patch tests should be performed in an environment with access to resuscitation facilities, and a thorough history must be taken before testing to decide whether patch tests are appropriate.³⁸

What does a positive patch test mean?

Not all positive reactions will be of clinical relevance. Some may be clinically irrelevant cross reactions.¹⁴⁻³⁷ The North American Contact Dermatitis Group, studying 4238 patients who were patch tested in 2011-12, reported that 63.8% had at least one positive reaction but only 48% were ultimately diagnosed with allergic contact dermatitis.³⁹ Patient history is crucial to understanding the clinical relevance of positive patch

Box 1: Patch tests

- How patch tests are performed: a series of chemical allergens are applied to the patient's skin at standardised concentrations under occlusion
- A standard patch test series is used, with the aim of testing individuals to the most common allergens encountered in the environment
- The British standard series consists of 41 common allergens
- Additional series can be tested, such as hairdresser or cosmetic series, in light of the patient's medical history. Patients' own products can also be tested, but they may need to be diluted appropriately
- Patch testing involves three visits to the hospital in one week: patches are applied on day 0, removed on day 2 with the first reading taken, and a final reading taken on day 4²⁸
- Occasionally, an additional reading at day 7 can be useful in yielding late reactions to certain substances²⁹
- Readings are graded by the intensity of the reactions under the applied patch tests¹⁰
- Antihistamines can be continued throughout patch testing, but use of topical steroids and exposure to ultraviolet light is discouraged in the days before patch testing

test reactions and making a diagnosis of allergic contact dermatitis.^{6 27} Researching the composition of products to which the patient has been exposed is another strategy to establish relevance.¹³

Interpreting patch test results is complex. The British Association of Dermatologists' guidelines advise that a positive patch test reaction is of clinical relevance if the patient has been exposed to the allergen during the current episode of dermatitis and symptoms improve when exposure ceases.¹⁴ Other possible explanations for positive results are

- Past relevance—if a past episode of dermatitis occurred from exposure to the allergen, such as allergic contact dermatitis to an earring due to nickel allergy
- Relevance not known—not clear if exposure is current or old
- Cross reaction—the positive test is due to cross reaction with another allergen.

False positive reactions can result from the use of irritants or allergic substances at potentially irritating higher concentrations or patch testing on skin with active eczema. False negative reactions can arise if the allergen concentrations for testing are too low, prior ultraviolet light exposure has occurred, the patient is receiving immunosuppressive therapy, or methodological errors have arisen, such as failure to perform delayed readings or insufficient occlusion.⁸ If a reaction is negative, but the history is strongly suggestive of an allergic cause, then repeat patch testing or serial dilution patch testing may be helpful in clarifying the nature of the reaction.²⁷

In some cases, exposure to a contact allergen may explain the dermatitis clearly. In reality, the cause of dermatitis is often multifactorial.

How is contact dermatitis managed?

Self management

The definitive treatment of contact dermatitis is the identification and avoidance of the underlying cause.⁶⁻⁸ Advise patients to avoid exposure to allergens and irritants at home and in the workplace. Personal protective equipment such as gloves and masks can minimise future allergen exposure.^{6 40} Contact dermatitis can lead to redeployment or loss of occupation in some cases.¹ Patients are encouraged to explain their diagnosis to their employer and seek advice from the occupational health department at their workplace.

Provide patients with written information on all identified allergens, including the allergen name, its synonyms, common uses, and examples of the types of products that may contain it.^{6 13} Advise patients to check the ingredient lists of all their skin care products before application and when purchasing new

products. The ingredients for a product are usually labelled on the product itself, or on the packaging or pull-out product information insert.

Advise patients that if they wish to test a new skin care product before using it at home, they can perform a repeat open application test.⁴¹ Advise them to apply a small amount of product to the volar aspect of the forearm twice a day for 1-2 weeks. If any eczematous reaction occurs they should avoid the product.

Topical treatment

Table 2^{||} lists the main types of topical treatments for contact dermatitis.

Regular emollients are recommended to enhance the barrier function of the skin.^{42 43} A huge range of emollients are available commercially. The evidence base is too weak to give recommendations on which emollients to use, but patient preference is an essential factor to consider. Lipid-rich emollients can hasten healing after experimental damage to the skin⁴⁴ and may be advocated, particularly for night time use. Use of soap substitutes are also advised to minimise irritation.¹⁴ A recent Cochrane review, including four randomised controlled trials of barrier creams versus no intervention in the workplace, showed fewer new cases of occupational irritant contact dermatitis arising with barrier creams.⁴⁵ Statistical significance was not achieved, but this probably reflects the fact that larger well designed clinical trials are needed.

The efficacy of topical corticosteroids for treating allergic contact dermatitis is well documented. The evidence is less clear for irritant contact dermatitis.⁴⁶ According to consensus guidelines on the management of chronic hand eczema (a common manifestation of contact dermatitis), the topical treatment of choice, after emollients and soap substitutes, is a topical steroid.^{47 48} Topical steroids are effective in the short term, but they inhibit repair of the stratum corneum and induce skin atrophy, which may interfere with recovery in the long term.

Anecdotal evidence suggests that intermittent treatment with topical corticosteroids or alternating a topical corticosteroid with a topical calcineurin inhibitor may reduce adverse effects, but data on the long term safety of this approach is lacking.⁴⁸ The optimum duration of topical corticosteroid therapy is not known, but from clinical experience we would recommend an initial treatment period of four to six weeks with a potent topical steroid, with subsequent review. Evidence shows that long term intermittent use of mometasone furoate is safe and effective in treatment of hand eczema for up to 36 weeks.⁴⁹ Evidence has also shown that the risk of recurrence of chronic hand eczema

is reduced by use of a very potent steroid (clobetasol propionate) compared with a moderately potent topical corticosteroid.⁵⁰

For all cases of moderate to severe dermatitis, the strength and the period of use of topical steroids should be adjusted according to the severity of the condition, as advised by the dermatologist.

Topical calcineurin inhibitors are currently licensed for second line treatment of atopic dermatitis when topical steroids have failed or if there is a serious risk of adverse effects from topical steroid use, including irreversible skin atrophy.⁵¹ These principles are also applied to treatment of contact dermatitis, although the use of topical calcineurin inhibitors is off-label.

Topical calcineurin inhibitors should be particularly considered for sites prone to steroid induced atrophy with prolonged use, such as the face and neck.⁵² Adverse events such as itching and burning are common with calcineurin inhibitors, but they are often transient. The efficacy of topical 0.1% tacrolimus was found to be similar to mometasone furoate 0.1% ointment in a randomised comparative study of patients with allergic contact dermatitis of the hands.⁵³

Systemic treatment

Occasionally patients may require systemic treatment. If systemic treatment is required, the patient should be under the care of a dermatologist. Systemic corticosteroids may be required for short periods during the acute phase of a severe contact dermatitis.⁶ Psoralen combined with ultraviolet A light (PUVA) treatment, narrow band ultraviolet B treatment, or systemic treatment with immunomodulators (such as methotrexate, ciclosporin, or azathioprine) may be second line options for patients with chronic dermatitis unresponsive to conventional topical therapy.^{47 48} Alitretinoin is licensed for treating severe chronic hand eczema.⁵⁴ Although immunomodulators are used to treat chronic skin diseases, each has its own associated adverse effects.

What is the prognosis?

Prognosis depends on the patient's ability to avoid the allergen or irritant. A recent study with a follow-up of 7-14 years showed that 40% of patients with occupational hand eczema had not experienced dermatitis in the past year. Risk factors for the continuation of dermatitis were a long duration of hand eczema before diagnosis, respiratory atopy, skin atopy, and continuation in the same job.⁵⁵ Discuss with patients the possibility that contact dermatitis may persist and require long term management, even after initial treatment and workplace modifications.⁸

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Ongoing research studies in the area

EPIDERM

The Health and Occupation Research Network (THOR) includes the ongoing EPIDERM scheme in which dermatology consultants report cases of occupational skin disease.¹⁸ This project has provided invaluable data on the incidence of occupational skin disease, and on causative agents.

Future research ideas

- Establishing the prevalence of contact dermatitis in the general population in the UK
- Exploring the relevance of weakly positive patch test reactions
- Studying the effects of environmental factors, such as climate, on past test reactions
- Studying the influence of immunosuppressants on results of patch tests
- Large, well conducted, randomised controlled trials of treatment and prevention of contact dermatitis, including the use of different types of barrier creams

Continuing medical education resources

- British Society for Cutaneous Allergy—www.cutaneousallergy.org
Information on common irritants and allergens
- British Association of Dermatologists—www.bad.org.uk
Information on signs and symptoms, investigation, and treatment options for contact dermatitis
- European Society of Contact Dermatitis—www.escd.org
Information on signs and symptoms, investigation, and treatment options for contact dermatitis

Information for patients

- National Eczema Society—www.eczema.org
Dedicated charity and patient support group, aims to provide practical advice on managing eczema and to raise awareness of the needs of people with eczema
- Allergy UK—www.allergyuk.org
National charity providing support, advice, and information for those with allergies and intolerances
- Eczema Outreach Scotland. www.eczemaoutreachscotland.org.uk
Charity supporting children and young people with eczema and their families in Scotland
- Patch test information leaflet—www.bad.org.uk/shared/get-file.ashx?id=113&itemtype=document
Patient information leaflet explaining patch testing, from the British Association of Dermatologists
- DermNet New Zealand Trust—www.dermnetnz.org
Provides written information for patients and health professionals, in an easy-to-understand format, on a huge variety of dermatological conditions.

Education into practice

Do you routinely give patients with contact allergy information on how to avoid allergens?

A patient's perspective

I noticed a few marks on my jaw line, and both eyes had become red, sore, and itchy. I went to my doctors three times over four months before I was referred. Prior to this, I was given steroid cream by one doctor and was told I had eczema by another doctor.

I first saw a lady doctor at the hospital in July 2015 and was again prescribed another steroid cream, but at a high dose. This helps straight away but does not clear the problem.

I saw the consultant in November 2015, and a patch test was completed. The results indicated I was allergic to a preservative from toiletries and make-up. I was given information about products that do not have the preservative. I could feel the difference from the first time I started to use the new products, and within weeks my eyes were back to normal and the red marks had disappeared.

I now check on products that I use to ensure the preservative is not in.

Physician's perspective

This patient was allergic to methylisothiazolinone (MI) found in many of her personal products such as shampoo and cosmetics. MI is a preservative against bacterial contamination. It is widely used in cosmetics and household products, such as moist wipes, shampoos, cleansers, and liquid laundry products. Allergy to MI is extremely common. The European Scientific Committee on Consumer Safety reviewed the literature and in July 2015 banned the use of MI in Europe in all new leave-on products and lowered the concentration for rinse-off products. I have encouraged this patient to check the label of ingredients and try an alternative product which does not contain MI. Having observed this advice, the patient has seen her symptoms resolve.

How patients were involved in the creation of this article

A patient reviewed the article and made suggestions for amendments. Patients provided clinical images for this article, and one provided a brief description of her experiences.

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Tables

Table 1 | Clinical features of atopic dermatitis, irritant contact dermatitis, and allergic contact dermatitis

	Atopic dermatitis	Irritant contact dermatitis	Allergic contact dermatitis
Incidence	Common: affects 2-10% of adults and 15-20% of schoolchildren	Can occur in virtually anyone. Comprises 80% of contact dermatitis.	Occurs only in sensitised people. Comprises 20% of contact dermatitis
Age at onset	Usually begins in infancy	Any age, but commoner in adults	Any age, but commoner in adults
Personal or family history of atopy	Present	Often present	May or may not be present
Symptoms	Dry, scaly, pruritic	Itching, stinging, smarting	Itching, stinging, smarting
Clinical distribution	Facial, extensors in infancy Flexural in childhood and adolescence Flexural or facial in adults	Localised to site of contact (hands and face are commonly affected)	Mainly confined to site of contact, but can spread distally
Pathophysiology	Due to complex interplay of genetic, environmental, immunological, and skin barrier defects Primarily a Th2 cell-associated, cytokine-mediated disease	Non-immunologic reaction Caused by direct damage to the skin by chemicals or physical agents	Immunologic reaction Type IV, T cell-mediated delayed hypersensitivity reaction to an external allergen
Onset after exposure	—	Minutes to hours No previous exposure required	8-96 hours, typically within 48 hours Previous exposure required
Course	Chronic course with flares and remissions	Withdrawal of irritant leads to quick healing	May persist despite withdrawal of allergen
Patch tests	Can often be positive, but must be interpreted in light of history	Patch testing negative	Patch tests are positive

Table 2| Topical treatments for contact dermatitis

Topical therapy	How it works	How is it applied	Side effects
Emollients	Restores skin barrier function, prevents painful cracking	Apply frequently during the day and before bedtime Can apply a lighter moisturiser during the day and a more lipid-rich, fragrance-free, greasy emollient at night Should be applied liberally all over affected areas	Can cause acne or folliculitis Some emollients can cause irritant reactions
Topical corticosteroids	Anti-inflammatory and immunosuppressive	Once or twice daily to affected sites for 4-6 weeks initially, then re-assess. If better, gradually reduce frequency, but may need twice a week maintenance therapy if severe.	Skin atrophy, tachyphylaxis, systemic absorption causing adrenal suppression (very rare), induction of allergic contact dermatitis to steroid
Topical calcineurin inhibitors	Immuno-modulator	Once or twice daily to affected sites for 4-6 weeks initially, then review	Mild to moderate burning or stinging erythema, concerns about long term risk of cutaneous carcinogenesis (advocate sun protection) Avoid in active skin infection
Other: potassium permanganate soaks	Oxidising agent with disinfectant, deodorising, and astringent properties	Used for weeping or infected eczema Dissolve 400 mg tablet (Permitab) in 4 L of water to make 1:10 000 solution. Soak affected areas for 10-15 minutes. Use once or twice daily until lesions dry up (usually 2-5 days) Use concomitantly with topical steroids and emollients	Redness, irritation, caustic burns Stains clothing, fabrics, and ceramic basins

Figures



Fig 1 Irritant contact dermatitis of the hands often starts with scaling and erythema in the finger web spaces



Fig 2 Allergic contact dermatitis to acrylates in artificial nails, causing classic fingertip dermatitis



Fig 3 Pulpitis due to acrylates characterised by scaling, erythema, and fissuring



Fig 4 Acute allergic contact dermatitis to hair dye resulting in a papulo-vesicular eruption with weeping and crusting of the scalp, neck, and ears



Fig 5 Hair dye allergy can clinically manifest as an acute symmetrical eczematous eruption on the ears (same patient as fig 4↓)



Fig 6 Positive patch test reactions to p-phenylenediamine (PPD), confirming contact dermatitis to hair dye as seen in figs 4 and 5 (hair dye used by patient contained PPD)



Fig 7 Patch testing to the British standard, cosmetic, and bakery series of allergens. IQ chambers are used, which contain standardised allergens in units of 10, on a hypoallergenic adhesive tape