Occupational skin disease
focus on contact dermatitis

Occupational skin disease can have considerable impact on one's working life. Early diagnosis is important, as persistence of this skin condition can be associated with a worse prognosis. GPs have a major part to play in the early recognition of this condition.

ROSEMARY L. NIXON
BSc(Hons), MB BS, MPH, FACD, FAFOM

Dr Nixon is Unit Head, Dermatology, Monash Medical Centre, Melbourne, Honorary Senior Lecturer, Monash University Department of Medicine, Melbourne, Vic, and in private practice in East Melbourne. She runs the Occupational Dermatology Clinic at Monash Medical Centre.

Occupational skin disease is a preventable condition. Early recognition and appropriate advice may prevent the condition from becoming chronic and disabling.

In an American study, the key demographic features of people experiencing occupational skin disease were:

- the mean age was 33.4 years
- male gender (two out of three patients were men)
- 89% of cases involved the hands
- 94% of cases were caused by contact dermatitis.[1]

While Australia probably has a higher rate of occupational skin cancer than other countries, this article focuses on the major cause of occupational skin disease – occupational contact dermatitis.

Occupational contact dermatitis: an overview

Exogenous or contact dermatitis is caused by skin contact with an external agent (Figure 1). This may cause a reaction by either an allergic mechanism (allergic contact dermatitis) or a direct effect of the substance on the skin (irritant contact dermatitis). Generally, irritant contact dermatitis accounts for 70 to 80% of all cases of contact dermatitis and allergic contact dermatitis for about 20 to 30%.

Diagnosis

An accurate diagnosis must be made to enable the recognition of allergens and irritants, both at work and home. Patch testing is often necessary (see 'Patch testing' on page 75), and it may also be necessary to test for latex allergy (see the box

IN SUMMARY

- **Occupational skin disease can be disabling. Contact dermatitis accounts for most cases of occupational skin disease. The prognosis of occupational contact dermatitis may worsen if the diagnosis is delayed, thus early diagnosis is important.**
- **Irritant contact dermatitis is more common than, and may coexist with, allergic contact dermatitis. Whereas irritant contact dermatitis is caused by direct skin damage, allergic contact dermatitis is caused by a delayed hypersensitivity reaction.**
- **People with a history of eczema should be advised to avoid occupations that entail wet work, which are associated with a higher risk of irritant contact dermatitis.**
- **Allergic contact dermatitis may be strongly suspected on history and examination, but can only be diagnosed with patch testing, which is traditionally performed by dermatologists. Patch testing establishes delayed hypersensitivity but not immediate hypersensitivity, which is tested for by prick testing.**
- **Latex allergy may complicate contact dermatitis, and this possibility should be assessed with a RAST test in those wearing rubber gloves.**

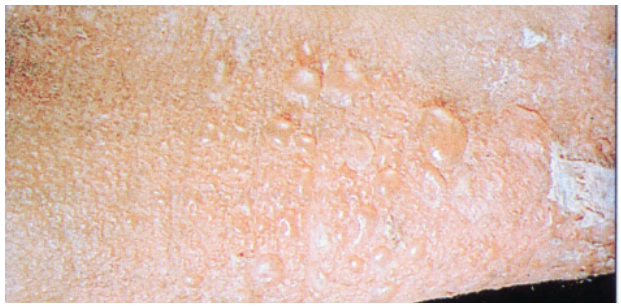

Figure 1. Acute contact dermatitis.

Figure 2. Irritant contact dermatitis from printing ink.

on page 79). The assessment of a patient with suspected occupational skin disease is summarised in the box on page 75.

Clues from the clinical picture

Irritant and allergic contact dermatitis may be clinically indistinguishable from each other. Further, they may coexist.

People usually present with itchy, red, scaly, dry hands. However, a history of more severe changes, such as blistering and swelling, may occur more particularly with allergic contact dermatitis.

Irritant contact dermatitis may start with slight dryness and scaling, followed by fissuring and then signs of inflammation, such as redness. The most commonly affected areas are the:

- web spaces between the fingers
- backs of the hands and fingers
- forearms.

Other skin diseases that may need to be considered when making a differential diagnosis of occupational contact dermatitis are shown in Table 1.

Clues from the history

The patient's history may provide clues to the diagnosis, as indicated below.

Core questions

- Where did the rash start? This is especially important in allergic contact dermatitis as it may help to define the site of skin contact with the allergen, providing a clue to the allergen concerned.
- Has the rash spread? Irritant contact dermatitis is usually confined to the hands, but allergic contact dermatitis often spreads to other areas – either by skin contact or due to a generalised skin reaction to the allergen.
- Does the rash develop immediately or does it take time? Most cases of allergic contact dermatitis occur four to six hours after exposure to the allergen and often at the end of a day's work. However, latex allergy, which is a form of contact urticaria, may present with immediate symptoms of itching and burning on contact with rubber gloves.
- Does the rash improve during weekends or holidays? There is often some improvement in work-related allergic contact dermatitis during weekends, but two to three weeks are usually required for the dermatitis to settle completely.

Other relevant questions

- What other preparations have been used on the skin? This could include over-the-counter products, hand cleaners, barrier creams, sunscreens, cosmetics, perfume, aftershave lotion and hair dyes.
- Is there a past history of any allergies to drugs or substances that have been in contact with the skin, for example, to nickel in jewellery?
- Is the patient atopic? This can be defined crudely as having a history of asthma, hay fever or eczema.
- What does the patient's job entail, exactly, and which agents are in contact with the skin?
- What protective measures, such as gloves, are used?
- Are there any other aggravating circumstances – for example, is the rash related to household work or hobbies?
- What does the patient attribute the rash to? The patient's opinion as to

Table 1. Differential diagnosis of contact dermatitis

- Endogenous hand eczema
- Psoriasis
- Tinea
- Contact urticaria
- Photosensitivity
- Rosacea

Table 2. Causes of irritant contact dermatitis

- Water
- Soap
- Detergents
- Solvents
- Thinners
- Oils
- Cement
- Dust
- Fibreglass
- Friction
- Low humidity
- Sweating
- Grease

cause may warrant further or detailed consideration.

Irritant contact dermatitis

Acute v. chronic

Irritant contact dermatitis may be further classified into acute irritation, which usually arises from contact with a single chemical, or, more commonly, chronic or cumulative irritant contact dermatitis, in which repeated exposure to single or multiple agents damages the skin.

Chemical v. physical

Agents causing irritant contact dermatitis are listed in Table 2. They range from seemingly innocuous substances, such as water, soap and detergents, to recognised skin irritants, such as cleaning agents, solvents, thinners, oils, cement, dusts, fibreglass and alkalis. Physical factors, such as friction, low humidity, heat and sweating, are also irritating to the skin. Figure 2 shows a case of irritant contact dermatitis caused by printing ink.

Susceptibility

People vary in their susceptibility to skin irritants, and, unfortunately, there is no routine predictive test for irritancy. Nevertheless, people with a background of atopy (eczema, asthma and hay fever) may be more susceptible to irritant contact dermatitis, probably because of their tendency to have sensitive skin.

In particular, people with a past history of eczema need to be warned that they are more at risk of developing irritant contact dermatitis if they undertake occupations that involve wet work, such as hairdressing.

Recovery

Complete recovery from irritant contact dermatitis may take a long time. Even when hands look normal after an episode, they may take three to four months to recover fully, and for at least this time they will remain susceptible to further irritation. Patients and employers must be warned of this fact as an early return to previous duties may cause recurrence of the problem.

Allergic contact dermatitis

A type IV reaction

Allergic contact dermatitis results from delayed hypersensitivity – a type IV immunological reaction mediated by primed lymphocytes. Certain chemicals are able to penetrate the skin – usually those with a relatively low molecular weight of 500 to 1000 – and combine with skin proteins to form a hapten that is recognised by immunologically competent Langerhans cells in the epidermis. This process initiates sensitisation and results in the production of specifically primed T-lymphocytes throughout the skin. These lymphocytes release inflammatory mediators when later confronted with the same chemicals. The inflammatory mediators cause the clinical symptoms of allergic contact dermatitis, which may initially consist of blistering, redness and swelling, but later of scaling and peeling.

Sensitisation

Although sensitisation may be triggered by the first contact with a chemical, more often it does not occur for months or years after the first contact. The process of sensitisation takes one to three weeks, but subsequently allergic contact dermatitis will develop within 24 hours of contact with the allergen.

Fortunately, only a small proportion of people exposed to a sensitising chemical will develop allergic contact dermatitis, but there is no way of detecting this group. If the skin barrier is damaged, as occurs with coexistent irritant contact dermatitis, allergic contact dermatitis is more likely to develop. Since sensitisation may be lifelong, it is important to prevent it; thus, with known allergens, protecting the skin barrier is crucial.

Although atopic people develop multiple inhalant allergies, they are not at increased risk of developing allergic contact dermatitis.

Common allergens

Common occupational skin allergens are listed in the box on page 76. Rubber chemicals, chromate, epoxy resins and hairdressing chemicals are the most important occupational allergens.

Patch testing

The diagnosis of allergic contact dermatitis is confirmed by patch testing, where allergy is reproduced in a controlled situation.

Small amounts of chemicals, in concentrations determined by international guidelines, are placed on aluminium discs mounted on hypoallergenic tape and left on the back for two days. Results are read when the discs are removed, at two days, then again at four to seven days. Positive reactions occur as red, lightly palpable spots about the size of a five cent piece. Figure 3 shows a patch test *in situ* and Figure 4 a positive patch test reaction.

Some substances need the addition of ultraviolet light to produce a reaction; these are known as photoallergens.

Both false-positive and false-negative reactions can occur on patch testing.

True Tests are commercially available prepared patch tests that include 24 of the most common allergens. However,

Assessment of a patient with occupational skin disease

- What is the diagnosis: is it dermatitis or something else?
- Is it work related?
- Is it irritant or allergic contact dermatitis?
- Could it be contact urticaria to latex?
- Is patch testing necessary?
- Is it necessary to visit the workplace?

Common occupational skin allergens

Chromate

Chromate is found in cement and is a particular cause of problems in people mixing bagged cement at the work site (Figure A). Other sources include leather (tanning often uses chromate), anticorrosives, paints and exposure during electroplating. Figure B shows a case of allergic contact dermatitis from chromate in an anticorrosive.

Rubber

Allergy to rubber chemicals is most often seen in those wearing rubber gloves to protect their hands (Figure C), especially if the patient already has dermatitis.

Nickel

Nickel is the most common cause of nonoccupational sensitisation in women, caused by the wearing of 'cheap' jewellery. It is also a cause of sensitisation in cashiers, who have contact with it in coins.

Perming solutions and hair dyes

Hairdressers are exposed not only to multiple skin irritants, but also to allergens such as perming solutions and dyes. These can remain on the hair and can cause further exacerbation of dermatitis.

Epoxy resins

Epoxy resins are mixed with hardeners to form a resistant coating that can be applied to various surfaces. Contact with either of these components can cause allergy. Epoxy resins are also used in paints and adhesive formulations such as araldite.

Acrylates and phenol formaldehyde resins

Glues may contain acrylates as well as phenol formaldehyde resins. There is an increasing number of reports from overseas, particularly from Finland, of dentists developing allergies to acrylates used in newer filling materials.

Plants

Plants such as primula and alstroemeria, handled by florists, can cause allergies, as can rhus and grevillea in the general community. Farmers and outdoor workers may develop Compositae dermatitis, which manifests as airborne contact dermatitis on the exposed areas of the face, the 'V' of the neck and the hands, and is caused by exposure to capeweed, dogwood, ragweed and chrysanthemum.

Pine dust and rosin

Pine dust or rosin (colophony) may cause allergic contact dermatitis, as can other wood dusts.

THE ST JOHN'S INSTITUTE OF DERMATOLOGY, LONDON

Figure A. Allergic contact dermatitis from chromate in cement.

Figure B. Allergic contact dermatitis from chromate in an anticorrosive agent.

Figure C. Allergic contact dermatitis from rubber gloves.

Glutaraldehyde, biocides and antioxidants

Glutaraldehyde, used for cold sterilisation and in photography, can cause allergy, as can soluble oils that contain biocides and antioxidants.

Preservatives and fragrances

Patients with dermatitis are apt to use barrier creams and hand creams that may contain preservatives and fragrances capable of causing skin allergies.

these tests will detect only about 70% of cases of allergic contact dermatitis, so the false-negative rate is generally regarded as unacceptably high. They may, however, be useful to exclude a specific suspected allergen, such as chromate, nickel or rubber chemicals.

Patch testing is traditionally performed by dermatologists, and differs from testing performed by allergists, who assess immediate hypersensitivity with the use of prick and radioimmunological allergen-specific tests in the investigation of hay fever, asthma and food allergies.

Patch testing can diagnose only allergic contact dermatitis. However, it is often necessary to exclude the diagnosis of allergic contact dermatitis before making the diagnosis of irritant contact dermatitis.

It is important to establish the relevance of positive patch test reactions. Often, positive reactions will reflect past sensitisation with an allergen and be irrelevant to the current dermatitis. For example, reactions to neomycin often reflect past sensitisation due to the use, some time previously, of the medicament Kenacomb (which contains neomycin, among other actives) and are rarely of current relevance. However, in some situations where the relevance of a positive patch has not been established, it may be necessary to visit the patient's workplace to determine whether there is possible work exposure to an allergen. In one case, a worker positive to rubber chemical denied handling rubber in the workplace. A brief visit established regular handling of car tyres!

Management

Prevention

Administrative measures

Administrative measures that should be considered include:

- pre-employment examination and placement – note that authorities in the field of occupational dermatology do not recommend pre-employment patch testing
- worker education, including information, instruction on protective measures and procedures to follow in case of accidental exposure
- establishment of an appropriate health care referral system to handle problems as they arise.

Environmental measures

Environmental measures that help in the prevention of occupational contact dermatitis include:

- material substitution, in particular, elimination of known allergens
- ventilation
- good housekeeping
- closed systems with segregation of hazardous processes.

Personal measures

Patients should consider the following measures:

- wear protective clothing, especially

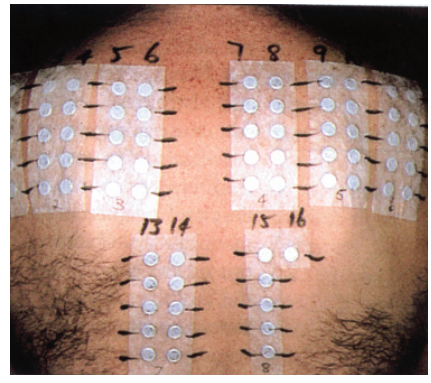

Figure 3. Patch testing *in situ*.

Figure 4. Positive patch test reaction.

Occupational contact dermatitis: the GP's role

The general practitioner has an important role in management in providing advice and, when appropriate, early referral.

Advice

Give patients advice:

- that this condition may be amenable to investigation and control if not cure
- regarding avoidance of further contact with skin irritants such as soap
- on appropriate skin protection, with gloves suitable for the work undertaken – cotton gloves should be worn under rubber gloves to decrease the likelihood of developing a reaction to rubber gloves
- on career choice to young atopic patients with past or present eczema who may be considering a career that involves wet work, such as in hairdressing, food handling, nursing or motor mechanics.

Early referral

Refer early:

- for diagnosis and patch testing where relevant, before the condition becomes chronic
- if workers' compensation is being considered.

appropriate gloves – note that many chemicals penetrate through gloves and advice must be obtained regarding the suitability of a glove or gloves for particular types of work (as examples, nickel and nickel salts penetrate through rubber – but not vinyl – gloves, and cotton gloves should generally be worn under rubber gloves)
- use barrier creams – although they do little to prevent occupational contact dermatitis they may encourage a greater awareness of potential skin hazards at work
- use an after-work moisturising cream – to reduce skin dryness.

Treatment

What can be done?

Treatment is similar to that for endogenous eczema and may include:
- a soap substitute (e.g. emulsifying ointment)
- a moisturising cream (e.g. 10% glycerine and sorbolene cream)
- topical corticosteroid ointments (e.g. methylprednisolone aceponate 0.1% [Advantan], mometasone furoate 0.1% [Elocon, Novasone], 1% hydrocortisone for the face)
- treatment of secondary infection
- treatment with a short course of oral prednisolone in severe cases
- hand PUVA (the combination of psoralens and ultraviolet A light), which can be useful in chronic cases.

Disease impact

Recognition of the psychological impact of the disease on the patient is important. Occupational contact dermatitis can be extremely disabling and have a profound effect on daily living. It can be itchy and painful and is usually visible. Others may assume that it is contagious.

Claiming compensation may be a frustrating experience for the patient, as can be finding a more suitable job. Many people put up with the inconvenience of occupational skin disease rather than apply for workers' compensation.

Role of the GP

Although, and perhaps because, many people affected with occupational contact dermatitis do not bother seeing a doctor because they know they have a 'dermo' from work, their GP has an important role in diagnosis and management. This role of the GP is summarised in the box on page 77.

Prognosis

About 25% of people appear to recover from contact dermatitis, 50% will need periodic treatment, and in the remaining 25% the condition will persist.

Unfortunately, the prognosis of both occupational irritant and allergic contact dermatitis can be poor. There are those who improve rapidly with cessation of contact with the irritant or allergen and those who do not. Some studies have suggested that the longer the duration of allergic contact dermatitis before definitive diagnosis and advice regarding allergen avoidance, the worse the prognosis.[2]

Dr Leon Wall in Perth, identified a group of people whose dermatitis failed to improve significantly despite cessation of work, and suggested a name for this condition – 'persisting postoccupational

Latex allergy

Owing to the possibility of anaphylaxis, for latex allergy, it is preferable to perform a RAST test.

Risk factors for latex allergy include:
- atopy
- pre-existing dermatitis
- use of rubber gloves, particularly if powdered.

Occupational groups at risk include nurses, medical staff, dentists and hairdressers. If people are using rubber gloves then the possibility of latex allergy, as well as allergic contact dermatitis, needs to be assessed.

The use of non-powdered gloves in hospitals and healthcare facilities is essential to decrease the likelihood of latex allergy and to reduce the amount of aerosolised latex protein, which may make the environment unsafe for those already allergic to latex.[6]

Figure A. Latex allergy – which is no different in appearance from other types of allergic contact dermatitis.

Dermatologists and allergists have seen an increasing number of cases of latex allergy with more people using latex gloves, sometimes inappropriately. While latex gloves offer the best protection against body fluids, vinyl gloves are preferred for many other occupations, e.g. food handlers and hairdressers. People who are extremely sensitive to latex may react to minute quantities of the allergen, such as found on food if, inappropriately, food handlers used latex gloves.

dermatitis'.[3] Although dermatologists have long been familiar with this poorly documented condition, some insurers continue to doubt its existence.

Other forms of occupational skin disease

Contact urticaria

Contact urticaria is an immediate hypersensitivity reaction to proteins, particularly those found in natural rubber latex,[4] seafood, meat and vegetables.[5] In those susceptible, contact with these proteins causes immediate itching and reddening; however, this may fade and the rash may evolve into dermatitis which looks quite similar to irritant contact dermatitis or allergic contact dermatitis.

Testing for contact urticaria to foods is carried out by prick testing with these foods. Latex allergy is discussed in the box on page 79.

Psoriasis

Psoriasis is a relatively common skin condition that can occur at sites of trauma and may be produced in some cases by work-related friction or vibration, for example when handling tools.

Paronychia

Paronychia, or nail fold inflammation, is not uncommonly seen in people whose hands are frequently wet. *Candida albicans* may be cultured from skin scrapings from the nail fold but is generally thought to be a secondary factor caused by the presence of moisture.

Infections

Infections may be work related and can include:

- tinea, bacterial infections, viral warts in butchers
- orf, cowpox and milkers' nodule in those handling infected animals.

Phototoxicity

Phototoxicity can be caused by tars.

Stasis eczema

Stasis eczema can be aggravated by prolonged standing.

Acne

Acne can be aggravated by contact with oil or grease, which can also cause folliculitis. Acne may be aggravated in the tropics.

Chloracne

Chloracne is an acneform eruption associated with exposure to polychlorinated biphenyls.

Sweating

Excessive sweating may cause miliaria (prickly heat) or intertrigo.

Itching epidemics

Epidemics of itching have been reported to be caused by mites and bites, low humidity dermatoses and 'psychic possession'.

Skin cancer

Skin cancer may be related to occupation in outdoor workers.

A definite relationship between sun exposure and the development of squamous cell carcinoma. The sun also has a role in the development of basal cell carcinoma and melanoma.

Conclusion

The management of occupational skin disease can be improved by early recognition and diagnosis. Both GPs and specialists have a part to play in the management of this condition. MT

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Further reading

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