ABC of allergies

Allergy and the skin. II—Contact and atopic eczema

P S Friedmann

Allergic contact eczema

Eczema is characterised by erythema, pruritus, vesiculation, and, in more chronic forms, scaly desquamation. Contact eczema may be due to chemically induced irritation or allergic sensitisation. Allergic contact eczema is a cell mediated (delayed type) hypersensitivity reaction to environmental chemical "sensitisers." Hence, it occurs at body sites that make physical contact with the eliciting sensitiser. The term dermatitis is often used for eczema caused by exogenous agents.

Prevalence and aetiology

In the working population of Western countries, contact eczema (both irritant and allergic) accounts for 85-90% of all occupational skin disease. Hand eczema has been estimated to affect 2-6.5% of all populations in Western countries.

The development of allergic reactions to exogenous substances seems to be the result of the intrinsic "sensitising potency" of the compound and various host factors that determine susceptibility. Small molecular chemicals vary in their potential to induce allergic sensitivity: primula can sensitise most people, nickel sensitises 10-20% of women, while many other agents sensitise a smaller minority. The sensitising potency of a chemical is thought to be related to its chemical reactivity and ability to bind to proteins, which act as "carriers," facilitating the presentation of the substance to the immune system. Host susceptibility is related to as yet uncharacterised genetic factors, which include variation in metabolic pathways that handle exogenous chemicals.

Mechanisms

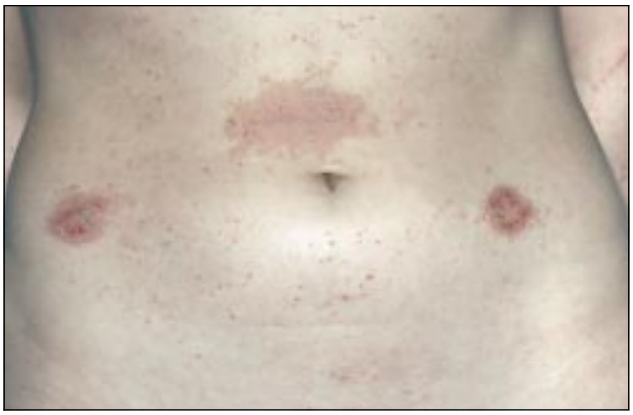
When skin sensitisers penetrate the epidermis, they are taken up by Langerhans' cells—bone marrow-derived members of the macrophage family that function as "professional antigen presenting cells." The Langerhans' cells leave the epidermis and migrate to the regional lymph nodes, where they enter the paracortical areas, the home of naive T lymphocytes. Probably while en route to the lymph node, the Langerhans' cells process the sensitiser so it is physically associated with the HLA-DR molecules on the cell surface. In the node, the Langerhans' cells "present" the sensitiser to T lymphocytes of the immune system. If T cells with the appropriate specific receptor recognise the complex of sensitiser and HLA-DR, they proliferate to establish "immunological memory." The memory T cells that mediate allergic contact eczema are of the Th1 subtype, characterised by the production of interleukin 2 and interferon gamma. The induction of sensitisation and establishment of immunological memory takes 8-14 days. Should re-exposure to the sensitiser occur, Langerhans' cells carry it down into the dermis, where they present it to memory T cells travelling through the tissues. These are activated to release cytokines (including interferon gamma) that attract other cells and activate vascular responses, resulting in the characteristic inflammation of contact eczema.

Differential diagnosis

Allergic contact eczema must be distinguished from irritant contact eczema. Clinically the two may be indistinguishable, but irritant eczema usually occurs on the hands. It is the result of

Distribution of allergic contact eczema

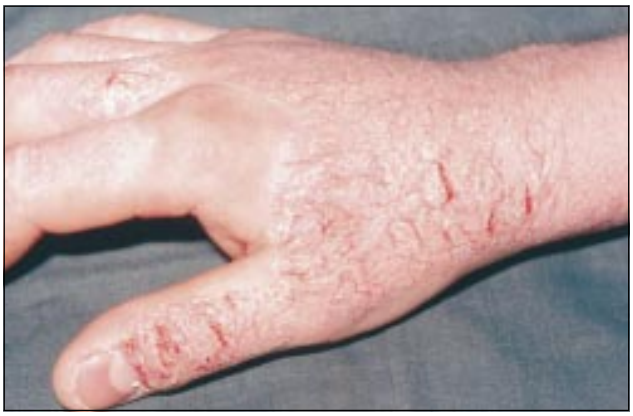
- Nickel sensitivity involves ears, skin under buckles, and often the hands; accidental spread from hands can involve the face
- Hair products (for example, dyes, perms, and setting agents) often affect the face, neck, and ears
- Clothing dyes in socks and shoe leather often affect the feet
- Ingredients in drugs used around leg ulcers often induce a dermatitis of the leg



Allergic contact eczema due to nickel in studs and buttons on jeans

Clinical presentation

- After re-exposure to a sensitiser, at sites of skin contact with the offending agent, an itchy erythematous rash starts to develop within 6-12 hours
- The reaction progresses and reaches a peak between 48 and 72 hours after contact
- Sensitivity may range from weak to strong
- Strongly sensitised people may need very little contact to evoke an acute, weeping eczematous reaction
- Nickel in keys, money, or clothing studs can be eluted by minimal perspiration through several layers of clothes



Irritant contact eczema (dermatitis) of the hand

repeated "insult" to the skin with caustic, irritant, or detergent substances. Photoallergic eczema occurs on light exposed areas—face, nape of neck, and backs of hands. It is usually a response to photosensitisation by ingested drugs such as thiazide diuretics or quinine.

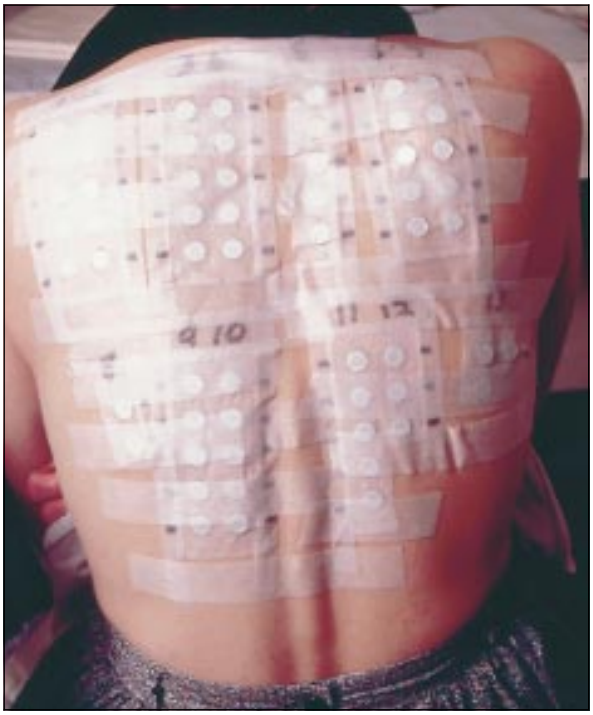
Management

The causal agent should be identified by epicutaneous patch tests. Contact allergy can be induced by a huge range of substances encountered daily. Sometimes the history of flare ups after contact with something is sufficient to permit reasonably confident identification. Often a short list of possible culprits can be arrived at. Definitive proof of causal significance, however, requires patch testing. This is normally performed in dermatology clinics with the requisite expertise and range of test materials.

The patient should then be advised to avoid the causal agent.

Treatment will vary:

- Acute weeping eczema should be "dried" by soaking with potassium permanganate (1/10 000) daily for four to five days;
- Anti-inflammatory steroids of category 3 or 4 (category 1 is the weakest, 4 the strongest—see *British National Formulary*) during the acute phase;
- Systemic steroids may be required for severe cases;
- For irritant hand eczema, avoiding contact with soaps, detergents, and solvents, together with generous use of greasy emollients, is vital.



Patch testing for diagnosing causal sensitiser in allergic contact eczema

Atopic eczema

Definition

The atopic state is a genetically determined capacity to make IgE class antibodies to antigens that enter the body via mucosal surfaces. This is associated with allergies of the immediate type and the clinical syndromes of rhinitis asthma or atopic eczema, alone or in combination.

Prevalence

For unclear reasons the prevalence of atopic diseases, including eczema, has risen steadily over the past 30 years. There are many estimates of the prevalence of atopic eczema in children in different countries. For children aged up to 12 years these range from 12-26%.

With increasing age the prevalence falls: 65% of atopic eczema presents before the age of 6 months, and 80% in the first year of life.

Aetiology

In atopic individuals, responses to common allergens result in the generation of helper T lymphocytes of the so called Th2-type in preference to those of Th1-type.

Th2 cells produce mainly interleukins 4 and 5, which regulate IgE production, mast cells, and eosinophils. Th1 cells produce mainly interleukin 2 and interferon gamma. Although several potentially important genes are receiving attention, they seem more connected with the formation of IgE than with the clinical syndrome.

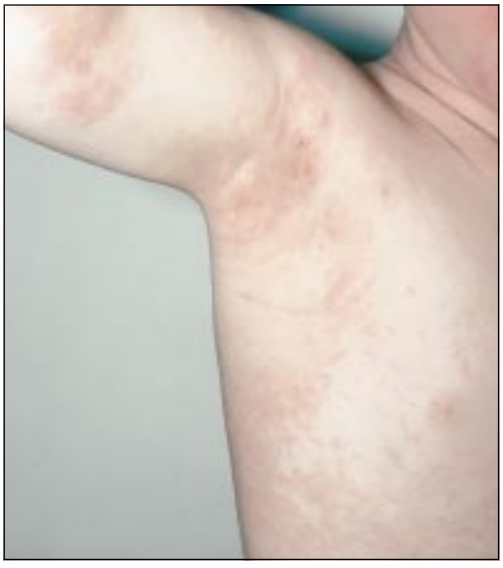
It is completely unknown what determines whether the clinical manifestations in any individual will involve the lungs, nose, or skin.

Clinical presentation

Atopic eczema most commonly begins in infancy. The rash of erythematous areas comprises tiny papules, sometimes with an

Pathogenesis

- Eczema is triggered or exacerbated by interactions between a genetic predisposition and environmental factors
- These include environmental allergens (house dust mites, animal furs, and pollens), microbes (such as staphylococci), environmental pollutants, and climatic and emotional factors
- Skin challenge with allergens elicits both immediate and delayed responses
- The evidence suggests that atopic eczema is an allergic reaction mediated by T lymphocytes of both Th1-types and Th2-types
- Although IgE may participate during antigen presentation and by mediation of immediate-type hypersensitivity responses, the eczema is probably not related to histamine or mast cell products

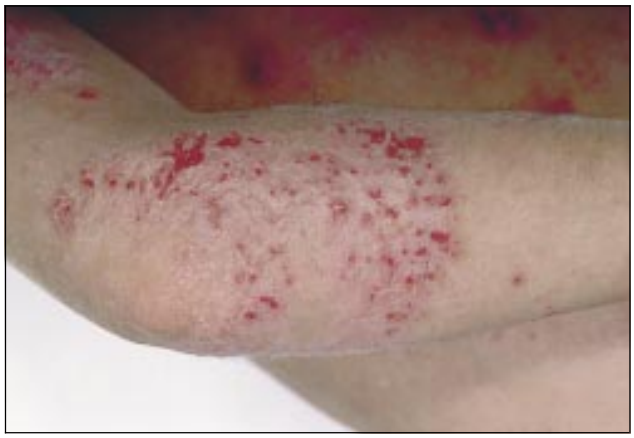


Typical atopic eczema in child

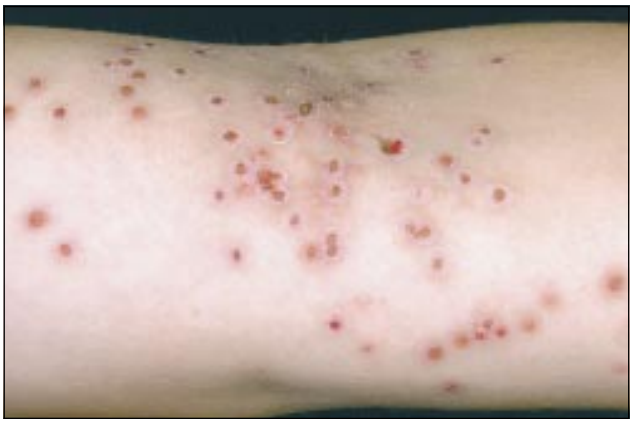
urticaria-like component. They may join to form confluent red sheets. In infants atopic eczema commonly affects the whole body including the head and face. On the limbs predominantly extensor surfaces are affected.

Once the baby begins to crawl, the eczema tends to localise to extensor surfaces of the hands, wrists, knees, and ankles. These changes in distribution are probably related to changes in exposure or contact with exogenous triggers, including friction from dusty floor surfaces. Once the toddling and upright stage is reached, the eczema moves to flexural sites such as popliteal and antecubital fossae. The severity may range from mild (usually of limited extent) to severe, with extensive, angry inflammation on most of the body.

Acute exacerbations may be weepy and crusted—this usually signifies superinfection with staphylococci. Chronic excoriated lesions are often thickened and lichenified



Discoid pattern of atopic eczema



Eczema herpeticum (ulcers are of similar shape and size)

The key physical sign of eczema herpeticum is blisters, pustules, or erosions of a rather uniform size and appearance

Complications

Immune resistance to several microbial pathogens is reduced in individuals with atopic eczema. Thus both viral warts and molluscum contagiosum can be numerous and slow to clear. Eczema herpeticum is infection with herpes simplex viruses, which may be extensive and aggressive.

Management

Drug treatment

The basis of direct treatment is to suppress the symptoms and control or prevent complications.

Atopic eczema is readily irritated by soaps, so their avoidance and use of emollients as soap substitutes is important.

Anti-inflammatory topical steroids are the mainstay of treatment. In children, when the eczema is very active, stronger steroids such as betamethasone valerate (1/4 strength) may be required. Normally, clobetasone or mometasone may be adequate for treating areas other than the face; 1% hydrocortisone is the main steroid for the face. In adults undiluted category 3 steroids may be required for flare ups. Dilutions and weaker steroids are used for regular maintenance.

Acute flares are often induced by staphylococcal superinfection. Systemic antibiotics (flucloxacillin or erythromycin) should be used. If chronic or repeated infective episodes occur, use of a topical steroid and antibiotic, or antiseptic mixtures, can help.

Although antihistamines are often used to relieve itch, histamine is not the main, responsible mediator. Hence antihistamines are not very effective, and usually the older sedative types—such as trimeprazine, hydroxyzine, and chlorpheniramine—seem more effective than the modern non-sedative varieties.

Treatment of atopic eczema

- Emollients as soap substitutes
- Oils, creams, and ointments
- Topical steroids to suppress inflammation
- Antibiotics
- Antihistamines—sedative varieties
- Bandages—"wet dressings" or impregnated bandages

Use of topical steroids for treating atopic eczema

	Adults	Children
When severe	Category 3 to body; category 2 to face	Diluted category 3 to body; category 2 to face
Routine	Category 2 or diluted category 3 to body; category 1 or 2 to face	Category 1 or 2 to body; category 1 (hydrocortisone) to face

Bandages and dressings

In infants and children the "wet bandage" technique can provide great symptomatic relief. A double layer of medium grade tubular cotton bandage (Tubifast, Seton) is applied over a layer of emollient or sometimes over a weak topical steroid. The inner layer of bandage is moistened with warm water. The dressing can be applied to limbs and even the trunk. For very lichenified or excoriated eczema, various bandages impregnated with antiseptics (Ichthopaste, Smith and Nephew, or Quinaband, Seton) or zinc oxide (Viscopaste, Smith and Nephew) can be used to occlude the area; a weak steroid and antiseptic mixture is usually applied underneath.

Second line treatment

Systemic corticosteroids should be used very seldom. Atopic eczema virtually always flares rapidly on dose reduction. Ultraviolet light (UVB) and photochemotherapy with a psoralen and long wavelength ultraviolet irradiation (UVA; PUVA) may be used in older children and adults.

Third line treatment

When second line treatment fails or is not suitable, various further treatment options are available (see box).

Allergen avoidance

The role of allergen avoidance should be considered for all patients with atopic eczema. Avoidance or elimination of house dust mite allergens can be beneficial for many people with confirmed mite sensitivity who have severe atopic eczema. The main study to show this looked at children aged over 6 years and adults. The most important measures are encasing the mattress in a dust proof bag, and washing the duvets and pillows every three months; washes should be hotter than 55°C to kill mites and denature antigens. Removal of fitted carpets in the bedroom should be recommended. Reducing upholstered furnishings and regular use of a modern cylinder or upright vacuum cleaner fitted with an adequate filter seem sensible precautions.

Foods are often suspected as being provoking factors in babies, but reliable identification of relevant foods is difficult and often impossible. Hence regimens avoiding dairy or other suspected foods are often disappointing, and if no clear benefit is obtained they should not be maintained for longer than four weeks. In small children such diets are difficult to implement, and the help of a dietician is necessary.

The photograph showing dermatitis of the hand is reproduced with the permission of Gower Medical Publishing. The data in the graph are adapted from Tan et al (*Lancet* 1996;347:15-8).

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The ABC of allergies is edited by Stephen Durham, honorary consultant physician in respiratory medicine at the Royal Brompton Hospital, London. It will be published as a book later in the year.

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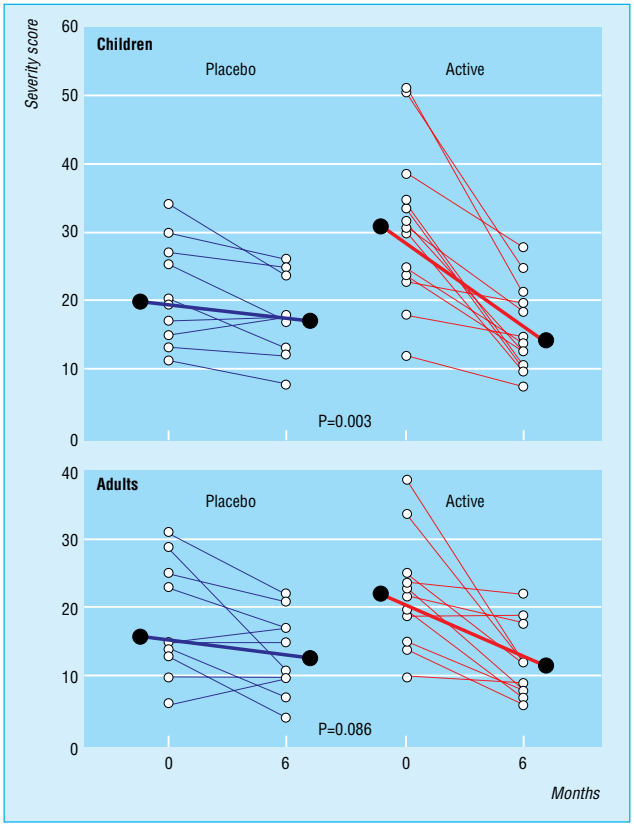
Third line treatment of atopic eczema

- Cyclosporin A can be highly beneficial in severe atopic eczema
- Great care must be taken in monitoring renal function, and treatment courses should be restricted to 8-12 weeks
- In adults with severe and chronic atopic eczema, azathioprine may be used for longer term maintenance
- Haematological and hepatic function must be monitored carefully



Effect of avoiding house dust mite allergens on severity of atopic aczema. Individual scores before and after 6 months' avoidance are connected by fine lines. Solid lines represent median scores for each group

Further reading

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