
“The Itch That Rashes”: An Update on Atopic Dermatitis

By Catherine McCuaig, MD, FRCPC

Winter is here and with its arrival the centrally heated air indoors worsens skin dryness, leading to a perturbed epidermal barrier and increased incidence of atopic dermatitis (AD).

AD is an inflammatory skin disease primarily in infants and children with a personal or family history of atopy, such as dermatitis, seasonal rhinitis, allergies, or asthma (Figure 1).¹ Disease severity improves with age in most patients. The prevalence in highly developed socioeconomic societies has been increasing from 2% to 15% of children since the 70s.^{1,2} Eczema, the meaning derived from “boiling,” is used by many people interchangeably with dermatitis, however, it should be restricted to acute vesicular dermatitis.

In this article:

1. What are the diagnostic criteria?
2. What factors contribute to AD?
3. What about immunologic abnormalities?
4. How is AD diagnosed?
5. Are there tests for AD?
6. What is differential diagnosis of AD?
7. How do you treat AD?
8. What about topical corticosteroids?
9. What about antibiotics?
10. Is there systematic therapy?

What are the diagnostic criteria?

Atopic dermatitis has been called “the itch that rashes.” Pruritus is primordial and leads to scratching or rubbing, which in turn creates acute excoriations or chronic lichenification. Characteristically, the face and extensor surfaces of the extremities are affected in infancy, whereas the flexures become involved in older children and adults.

What factors contribute to AD?

Genetic, psychosocial, and environmental factors contribute to the expression of atopic disease. Familial associations have been well described, although frequently, atopy is not evident in the parents of immigrant children.³ Single gene disorders, such as hyper IgE localised to chromosome 4 or familial eosinophilia and Netherton's mapping to chromosome 5, along with preliminary genome screens, demonstrate genetic variability.⁴ AD may be transferred by bone marrow transplantation.



Figure 1. Mild AD of the scalp and cheeks in a baby.

There is a general misconception that AD is an allergic reaction. Food allergies are only responsible for a minority of cases, most particularly in children less than two years of age with severe eczema. Eggs, cow's milk, bovine protein, soya, wheat, nuts, shellfish, and fish are the most common allergens. Ideally, food hypersensitivity should be confirmed with double-blind placebo controlled food challenges.¹ Most of these food allergies improve with time. Pseudoallergic reactions, which may include histamine release, arise from foods with acids, vasoactive amines, meats, fish, food colouring, strawberries, cheese, egg white, pineapple, avocado and certain medications. Aeroallergens, including dust mites and pollen, are well-recognised exacerbators of AD.^{1,5,6}

Skin infections lead to exacerbation of AD. *Staphylococcus aureus* secrete superantigens that stimulate T cells and mast cells.⁷ This is particularly common when multiple excoriations and crusts are present (Figure 2). Herpes simplex can also lead to a worsening of AD, and eczema herpeticum must be considered in a patient with a similar presentation (Figure 3). The role of yeast, such as *Malassezia furfur*, is yet to be determined.⁸

Psychosocial factors lead to altered self-image, difficulties in family dynamics and socialisation problems at school. Treatment is a tremendous time and cost drain for the entire family.⁹ Nocturnal pruritus leads to insomnia for the child and parents.¹⁰



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What about immunologic abnormalities?

There is evidence that atopic dermatitis is an immune-mediated disease. Cell-mediated immunity is depressed due to decreased T helper 1 (Th1) activity. Humoral immunity is switched on as seen by elevated IgE levels in more than 80% of patients with AD. There is increased T helper 2 activity which promotes the inflammatory cytokines interleukins 4, 5, and 10, activation of β cells, eosinophils, and mast cells.^{1,2}

How is AD diagnosed?

Diagnostic criteria are outlined in Table 1. AD is primarily a childhood disease. Although it improves with time, skin sensitivity persists and may resurface as occupational dermatitis in adults. AD does not usually manifest until the second or third month of life, presenting in the majority of children before two-years-old.³ Three clinical stages of AD are the infantile stage, the childhood transitional stage and the adult stage. The infantile stage is characterised by involvement of the face, scalp, and extensor surfaces of the extremities. The diaper area is spared. The childhood transi-



Figure 2. Excoriated patches in the antecubital fossae.



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In adolescents and adults, the most common side effects are throat irritation (2%), hoarseness/dysphonia (2%), headache (2%), and candidiasis (2%) which can be reduced by rinsing and gargling with water after inhalation; and palpitations ($\leq 1\%$). In children aged 4 to 11, the only adverse event with an incidence of $>2\%$ was candidiasis.

HPA-axis function and hematological status should be assessed periodically. Height should also be regularly monitored in children and adolescents receiving prolonged treatment with inhaled corticosteroids.

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Atopic Dermatitis

Table 1

Diagnostic Criteria of Atopic Dermatitis

Major Criteria:

1. Pruritus
2. Typical morphology and distribution
3. Chronic or relapsing disease
4. Personal or family history of atopy

Minor Criteria:

1. Widespread xerosis
2. Ichthyosis, palmar hyperlinearity, keratosis pilaris
3. IgE hyperreactivity
4. Infra-auricular fissures
5. Hand and/or foot dermatitis
6. Cheilitis
7. Scalp dermatitis
8. Susceptibility to cutaneous infections: Staph Aureus, Herpes Simplex, Mollusca Contagiosa
9. Pityriasis alba
10. Perifollicular accentuation
11. Nipple dermatitis
12. Dennie Morgan lines
13. Keratoconus
14. Anterior subcapsular cataracts
15. Centropalpebral pallor
16. Sweat intolerance
17. Intolerance to wool
18. Food intolerance
19. White dermographism
20. Dirty neck sign

Adapted from: The U.K. Working Party: Diagnostic Criteria for Atopic Dermatitis: III Independent Hospital. *Br J Dermatol* 1993; 131:406-16.

tional and adult forms are located primarily in the flexures, periorbital and forehead, or scalp. Through all phases xerosis and hand dermatitis are frequent. Early on, patches may be dry erythematous nummular or weeping and bright red (Figures 4 and 5). With time, lichenification, due to chronic rubbing, and excoriations, due to acute scratching, develop. Itch is consistent, but worse at night and leads to insomnia. AD has chronic exacerbations and remissions. Most patients in Canada improve during the summer months although some forms of AD become worse by sweating or aeroallergens. The dry winter months are difficult for most patients with AD.

Are there tests for AD?

There are no specific tests for AD. Total serum IgE levels support the diagnosis of AD, however, they are normal in at least 20% of patients.¹ The leukocyte count may be raised with eosinophilia during an acute crisis, but is highly variable.

T helper 2 lymphocyte activity is increased, promoting activation of interleukins -4, 5, 10, as well as β -cells, eosinophils, and mast cells. When Th1 activity is reduced, it inhibits cell-mediated immunity.

What is the differential diagnosis?

AD must be differentiated from scabies. History should be helpful with sudden new onset and contagion present in the scabies but

not AD. It may be very difficult to differentiate seborrheic dermatitis from AD in infants less than three months of age, although the diaper area involvement is unusual in AD. A child with persistent recalcitrant dermatitis may have an underlying immune deficiency, including hyper IgE syndrome, Wiskott-Aldrich, and agammaglobulinemia. Histiocytosis X usually involves the scalp and flexures with purpura.

Allergic contact dermatitis may present in children and adults. Cutaneous T cell lymphoma, such as patch stage mycosis fungoides are possible when late onset nummular patches are seen.

How do you treat AD?

There is no cure for AD. Skin sensitivity is lifelong. This chronic disease has multiple acute flares which require effective management and prevention.

How can a patient keep their skin hydrated?

Xerosis is a consistent feature of AD (Figure 6). It leads to an impaired epidermal barrier. We recommend short, daily tepid baths followed immediately by skin emollients. Oil

may be added to the bath if the patient prefers, however, the moisturising emollient may preclude the need for a bath oil. Non-irritating soaps or skin cleansers



Figure 3. Eczema herpeticum.



Figure 4. Nummular eczematous patches.

Atopic Dermatitis



Figure 5. Nummular eczematous patches.

may be used to cleanse the skin. If recurrent skin infections are a problem, the use of wet compresses to remove crusts and diminish colonisation by staphylococcal aureus can be added.

Skin moisturisation is accomplished generally by the application of an oil-in-water emollient. This can vary from petrolatum to water-based creams. Petrolatum is the most effective emollient and often best for babies, however, most older children and adults prefer creams.

What about topical corticosteroids?

Topical corticosteroids have been the mainstay of therapy in AD. Ointments (more oil than water) provide an occlusive base, hydrate well, especially with dry lichenized patches, increasing the penetration of the active ingredient. In older patients, creams are more cosmetically acceptable and are more appropriate in crusted, oozing areas. Lotions have even more liquid and are useful for application on the scalp and hair-bearing areas.

The lowest strength corticosteroid necessary should be used. On the face, genital and axillary folds, one should restrict its use to 1% hydrocortisone or if more severe, 0.05% desonide. These can be used elsewhere on the body if the dermatitis is mild.

Mid-strength corticosteroids may be required on the body. Hydrocortisone valerate 0.2%, mometasone furoate 0.1%, prednicarbate 0.1%, and betamethasone valerate 0.05% to 0.1% are amongst the better choices. They should never be used on the face or genitals.

Benefits of topical corticosteroids include their anti-inflammatory effect and reduction in colonisation of staphylococcus aureus. Local side effects develop particularly when corticosteroid use is prolonged or an inappropriately strong corticosteroid is used on the face, folds, or under occlusion. These side effects include atrophy, striae, telangiectasia, purpura, hypertrichosis, increased mollusca contagiosa, tachyphylaxis, and contact dermatitis. Systemic side effects can also be seen, such as



Figure 6. Characteristic xerosis seen in atopic dermatitis.

suppression of the hypothalamic-pituitary axis, Cushing's disease, growth retardation, cataracts, glaucoma, avascular bone necrosis, proximal myopathy, and immunosuppression.

Are there alternative ointments?

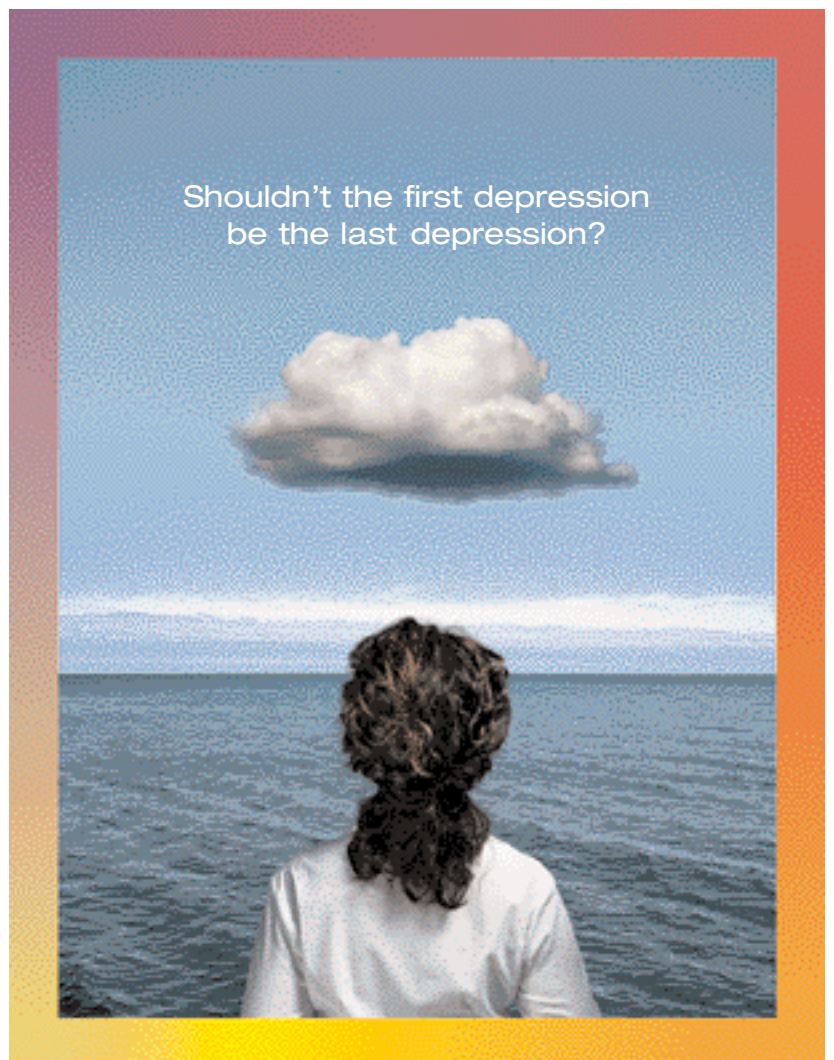
The topical immunomodulators may be used as a new adjunct or alternative to topical corticosteroids. They are also called macrolactams, calcineurin inhibitors or cytokine inhibitors. Tacrolimus is available in an ointment base at 0.03% for children under the age of 15, and 0.1% for adults. Pimecrolimus will soon be approved in Canada.

These agents are anti-inflammatory by blocking the Th2 response and inflammatory cytokines. Studies have demonstrated their long-term efficacy and safety. Flares tend to diminish in intensity, duration, and time between the next flare. Although patients may experience a mild burning sensation with the first applications, pruritus responds rapidly and dramatically to treatment. These agents are particularly effective for dermatitis of the head and neck and side effects of topical corticosteroids are avoided.

Practice Pointer

What about phototherapy?

Narrow Band Ultraviolet B or UVA1 are effective in certain patients.



What about antibiotics?

Antimicrobial therapy may be required for active staphylococcus aureus infections. If limited, topical antibiotics, such as fucidic acid, and mupirocin may be effective. Systemic antibiotics such as cephalexin, cloxacillin, and erythromycin are useful for 10 to 14 days.

Is there systematic therapy?

Antihistamines are used for their sedative effect with hydroxyzine (2 mg/kg per day), diphenhydramine (5 mg/kg per day), and doxepin (10 mg to 75 mg per day) as first-line therapy. Systemic corticosteroids are seldom used because of their toxicity and danger of rebound when withdrawn. Cyclosporin may be administered 3 mg/kg to 5 mg/kg per day for severe cases, with possible remissions lasting several months off therapy. \mathcal{D}_x

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