Atopic dermatitis

Atopic dermatitis (**AD**), also known as **atopic eczema**, is a type of inflammation of the skin (dermatitis).[2] It results in itchy, red, swollen, and cracked skin.[2] Clear fluid may come from the affected areas, which often thickens over time.[2] While the condition may occur at any age, it typically starts in childhood with changing severity over the years.[2][3] In children under one year of age much of the body may be affected.[3] As children get older, the back of the knees and front of the elbows are the most common areas affected.[3] In adults the hands and feet are the most commonly affected areas.[3] Scratching worsens symptoms and affected people have an increased risk of skin infections.[2] Many people with atopic dermatitis develop hay fever or asthma.[2]

The cause is unknown but believed to involve genetics, immune system dysfunction, environmental exposures, and difficulties with the permeability of the skin.[2][3] If one identical twin is affected, there is an 85% chance the other also has the condition.[5] Those who live in cities and dry climates are more commonly affected.[2] Exposure to certain chemicals or frequent hand washing makes symptoms worse.[2] While emotional stress may make the symptoms worse, it is not a cause.[2] The disorder is not contagious.[2] The diagnosis is typically based on the signs and symptoms.[3] Other diseases that must be excluded before making a diagnosis include contact dermatitis, psoriasis, and seborrheic dermatitis.[3]

Treatment involves avoiding things that make the condition worse, daily bathing with application of a moisturising cream afterwards, applying steroid creams when flares occur, and medications to help with itchiness.[3] Things that commonly make it worse include wool clothing, soaps, perfumes, chlorine, dust, and cigarette smoke.[2] Phototherapy may be useful in some people.[2] Steroid pills or creams based on calcineurin inhibitors may occasionally be used if other measures are not effective.[2][6] Antibiotics

Atopic dermatitis	
Other names	Atopic eczema, infantile eczema, prurigo Besnier, allergic eczema, neurodermatitis[1]
 Atopic dermatitis of the inside crease of the elbow.	
Specialty	Dermatology
Symptoms	Itchy, red, swollen, cracked skin[2]
Complications	Skin infections, hay fever, asthma[2]
Usual onset	Childhood[2][3]
Causes	Unknown[2][3]
Risk factors	Family history, living in a city, dry climate[2]
Diagnostic method	Based on symptoms after ruling out other possible causes[2][3]
Differential diagnosis	Contact dermatitis, psoriasis, seborrheic dermatitis[3]
Treatment	Avoiding things that worsen the condition, daily bathing followed by moisturising cream, steroid creams for flares[3]
Frequency	~20% at some time[2][4]

(either by mouth or topically) may be needed if a bacterial infection develops.[3] Dietary changes are only needed if food allergies are suspected.[2]

Atopic dermatitis affects about 20% of people at some point in their lives.[2][4] It is more common in younger children.[3] Males and females are equally affected.[2] Many people outgrow the condition.[3] Atopic dermatitis is sometimes called eczema, a term that also refers to a larger group of skin conditions.[2] Other names include "infantile eczema", "flexural eczema", "prurigo Besnier", "allergic eczema", and "neurodermatitis".[1]

Contents

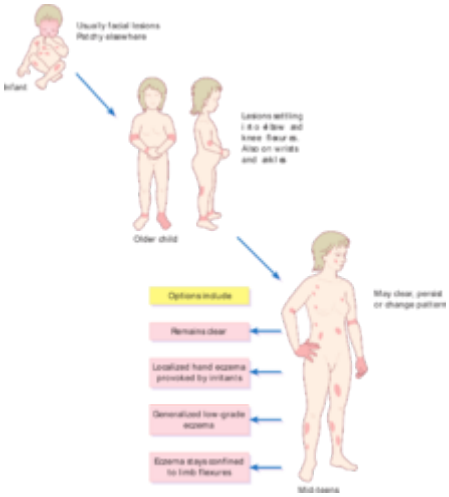
Signs and symptoms

People with AD often have dry and scaly skin that spans the entire body, except perhaps the diaper area, and intensely itchy red, splotchy, raised lesions to form in the bends of the arms or legs, face, and neck.[7][8][9][10][11]

AD commonly affects the eyelids where signs such as Dennie-Morgan infraorbital fold, infra-auricular fissure, and periorbital pigmentation can be seen.[12] Post-inflammatory hyperpigmentation on the neck gives the classic 'dirty neck' appearance. Lichenification, excoriation and erosion or crusting on the trunk may indicate secondary infection. Flexural distribution with ill-defined edges with or without hyperlinearity on the wrist, finger knuckles, ankle, feet and hand are also commonly seen.[13]

Causes

The cause of AD is not known, although there is some evidence of genetic, environmental, and immunologic factors.[14]



Pattern of atopic eczema varies with age

Genetics

Many people with AD have a family history of atopy. Atopy is an immediate-onset allergic reaction (type 1 hypersensitivity reaction) that manifests as asthma, food allergies, AD or hay fever.[7][8]

About 30% of people with atopic dermatitis have mutations in the gene for the production of filaggrin (*FLG*), which increase the risk for early onset of atopic dermatitis and developing asthma.[15][16]

Hygiene hypothesis

According to the hygiene hypothesis, early childhood exposure to certain microorganisms (such as gut flora and helminth parasites) protects against allergic diseases by contributing to the development of the immune system.[17] This exposure is limited in a modern "sanitary" environment, and the incorrectly-developed immune system is prone to develop allergies to harmless substances. There is some support for this hypothesis with respect to AD.[18] Those exposed to dogs while growing up have a lower risk of atopic dermatitis.[19] There is also support from epidemiological studies for a protective role for helminths against AD.[20] Likewise children with poor hygiene are at a lower risk for developing AD, as are children who drink unpasteurised milk.[20]

Allergens

In a small percentage of cases, atopic dermatitis is caused by sensitization to foods.[21] Also, exposure to allergens, either from food or the environment, can exacerbate existing atopic dermatitis.[22] Exposure to dust mites, for example, is believed to contribute to one's risk of developing AD.[23] A diet high in fruits seems to have a protective effect against AD, whereas the opposite seems true for fast foods.[20] Atopic dermatitis sometimes appears associated with celiac disease and non-celiac gluten sensitivity, and the improvement with a gluten-free diet indicates that gluten is a causative agent in these cases.[24][25]

Role of *Staphylococcus aureus*

Colonization of the skin by the bacterium *S. aureus* is extremely prevalent in those with atopic dermatitis.[26] Studies have found that abnormalities in the skin barrier of persons with AD are exploited by *S. aureus* to trigger cytokine expression, thus aggravating the condition.[27]

Hard water

Atopic dermatitis in children may be linked to the level of calcium carbonate or "hardness" of household water, when used to drink.[28] So far these findings have been supported in children from the United Kingdom, Spain, and Japan.[28]

Pathophysiology

The pathophysiology may involve a mixture of type I and type IV-like hypersensitivity reactions.[29]

Diagnosis

Atopic dermatitis is typically diagnosed clinically, meaning it is diagnosed based on signs and symptoms alone, without special testing.[30] Several different forms of criteria developed for research have also been validated to aid in diagnosis.[31] Of these, the UK Diagnostic Criteria, based on the work of Hanifin and Rajka, has been the most widely validated.[31][32]

UK diagnostic criteria[32]

People must have itchy skin, or evidence of rubbing or scratching, plus three or more of the following:
Skin creases are involved: flexural dermatitis of fronts of ankles, antecubital fossae, popliteal fossae, skin around eyes, or neck, (or cheeks for children under 10)
History of asthma or allergic rhinitis (or family history of these conditions if patient is a child ≤4 years old)
Symptoms began before age 2 (can only be applied to patients ≥4 years old)
History of dry skin (within the past year)
Dermatitis is visible on flexural surfaces (patients ≥age 4) or on the cheeks, forehead, and extensor surfaces (patients<age 4)

Treatments

There is no known cure for AD, although treatments may reduce the severity and frequency of flares.[7]

Lifestyle

Applying moisturisers may prevent the skin from drying out and decrease the need for other medications.[33] Affected persons often report that improvement of skin hydration parallels with improvement in AD symptoms.[7]

Health professionals often recommend that persons with AD bathe regularly in lukewarm baths, especially in salt water, to moisten their skin.[8][34] Avoiding woollen clothing is usually good for those with AD. Likewise silk, silver-coated clothing may help.[34] Dilute bleach baths have also been reported effective at managing AD.[34]

Diet

The role of vitamin D on atopic dermatitis is not clear, but there is some evidence that vitamin D supplementation may improve its symptoms.[35][36]

Studies have investigated the role of long chain polyunsaturated fatty acids (LCPUFA) supplementation and LCPUFA status in the prevention and treatment of atopic diseases, but the results are controversial. It remains unclear if the nutritional intake of n-3 fatty acids has a clear preventive or therapeutic role, or if n-6 fatty acids consumption promotes atopic diseases.[37]

Several probiotics seem to have a positive effect with a roughly 20% reduction in the rate of atopic dermatitis.[38][39] The best evidence is for multiple strains of bacteria.[40]

In people with celiac disease or non-celiac gluten sensitivity, a gluten free diet improves their symptoms and prevents the occurrence of new outbreaks.[24][25]

Medication

Topical corticosteroids, such as hydrocortisone, have proven effective in managing AD.[7][8] If topical corticosteroids and moisturisers fail, short-term treatment with topical calcineurin inhibitors like tacrolimus or pimecrolimus may be tried, although their use is controversial as some studies indicate that they increase the risk of developing skin cancer or lymphoma.[7][41] A 2007 meta-analysis showed that topical pimecrolimus is not as effective than corticosteroids and tacrolimus.[42] However a 2015 meta-analysis indicated that topical tacrolimus and picrolemus are more effective than low dose topical corticosteroids, and found no evidence for increased risk of malignancy or skin atrophy.[43]

Other medications used for AD include systemic immunosuppressants such as ciclosporin, methotrexate, interferon gamma-1b, mycophenolate mofetil and azathioprine.[7][44] Antidepressants and naltrexone may be used to control pruritus (itchiness).[45] In 2016, crisaborole was approved as a topical treatment for mild-to-moderate eczema.[46][47] In 2017, the biologic agent dupilumab was approved to treat moderate-to-severe eczema.[48] Leukotriene inhibitors such as monteleukast are of unclear benefit as of 2018.[49]

There is tentative evidence that allergy immunotherapy is effective in atopic dermatitis, but the quality of the evidence is low.[50] This treatment consists of a series of injections or drops under the tongue of a solution containing the allergen.[50]

Antibiotics, either by mouth or applied topically, is commonly used to target overgrowth of *Staphylococcus aureus* in the skin of people with atopic dermatitis. However, a 2008 meta-analysis found no clear evidence of benefit.[51]

Light

A more novel form of treatment involves exposure to broad or narrow-band ultraviolet (UV) light. UV radiation exposure has been found to have a localized immunomodulatory effect on affected tissues and may be used to decrease the severity and frequency of flares.[52][53] In particular, the usage of UVA1 is more effective in treating acute flares, whereas narrow-band UVB is more effective in long-term management scenarios.[54] However, UV radiation has also been implicated in various types of skin cancer, and thus UV treatment is not without risk.[55]

Alternative medicine

While there are several Chinese herbal medicines intended for treating atopic eczema, there is no conclusive evidence that these treatments, taken by mouth or applied topically, reduce the severity of eczema in children or adults.[56]

Epidemiology

Since the beginning of the twentieth century, many mucosal inflammatory disorders have become more common; atopic eczema (AE) is a classic example of such a disease. It now affects 15–30% of children and 2–10% of adults in developed countries and in the United States has nearly tripled in the past thirty

to forty years.[8][57] Over 15 million American adults and children have atopic dermatitis.[58]

Research

Evidence suggests that IL-4 is central in the pathogenesis of AD.[59] Therefore, there is a rationale for targeting IL-4 with anti-IL-4 inhibitors.[60] People with atopic dermatitis are more likely to have *Staphylococcus aureus* living on them.[61] The role this plays in pathogenesis is yet to be determined. Medications in Phase III trials as treatments include tralokinumab[62] and abrocitinib.[63]

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External links

- NIH Handout on Health: Atopic Dermatitis (http://www.niams.nih.gov/Health_Info/Atopic_Dermatitis/default.asp)
- DermAtlas *9 (http://dermatlas.med.jhmi.edu/derm/result.cfm?Diagnosis=9)*

Classification	**ICD-10**: L20 (http://apps.who.int/classifications/icd10/browse/2016/en#/L20) · **ICD-9-CM**: 691.8 (http://www.icd9data.com/getICD9Code.ashx?icd9=691.8) · **OMIM**: 603165 (https://omim.org/entry/603165) · **MeSH**: D003876 (https://www.nlm.nih.gov/cgi/mesh/2015/MB_cgi?field=uid&term=D003876) · **DiseasesDB**: 4113 (http://www.diseasesdatabase.com/ddb4113.htm)
External resources	**MedlinePlus**: 000853 (https://www.nlm.nih.gov/medlineplus/ency/article/000853.htm) ·

eMedicine: emerg/130 (https://emedicine.medscape.com/emerg/130-overview) derm/38 (http://www.emedicine.com/derm/topic38.htm#) ped/2567 (http://www.emedicine.com/ped/topic2567.htm#) oph/479 (http://www.emedicine.com/oph/topic479.htm#)
