

# Not every annular rash is tinea:

## Recognising erythema annulare centrifugum

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### CASE

A girl of Asian descent aged 12 years, who was accompanied by a parent, presented with a 1-week history of a pink-red ring-shaped lesion on her left forehead (Figure 1A). She had been using topical Hydrozole (1% hydrocortisone and 1% clotrimazole) obtained elsewhere, with limited effect. On examination, a solitary erythematous annular lesion with mild scaling and central sparing was observed. A week later, the lesion had slightly increased in diameter while retaining its central clearing (Figure 1B). The patient reported mild pruritus but no systemic symptoms. There were no other

cutaneous lesions and no personal or family history of skin disorders. She was not on any regular medications.

### QUESTION 1

Based on the clinical information, what are the likely differential diagnoses?

### QUESTION 2

What is the most likely diagnosis in this scenario?

### ANSWER 1

Several conditions can present as annular (ring-shaped) lesions. In this case, the most relevant differential diagnoses for an annular, erythematous lesion with central clearing include:<sup>1-4</sup>

- tinea corporis/faciei (dermatophyte infection)
- erythema annulare centrifugum (EAC)
- nummular (discoid) eczema
- granuloma annulare
- psoriasis (annular variant)
- subacute cutaneous lupus erythematosus.

Table 1 outlines the characteristics of these conditions, with comparison.<sup>1-4</sup>

Other differential diagnoses for annular lesions that are less likely in this case/context include:<sup>1-5</sup>

- erythema marginatum (associated with rheumatic fever; rare on the face)
- erythema multiforme (typically affecting the palms and trunk with multiple targetoid lesions)
- erythema migrans (early stage of Lyme disease, following a tick bite)



**Figure 1A.** Annular erythema at 1 week from onset; **B.** Expanding annular erythema at 2 weeks from onset; **C.** Development of a new ring within an existing ring at 3 weeks from onset.

- pityriasis rosea's herald patch/plaque (oval/annular variant form; typically present on the trunk with multiple surrounding maculopapular eruptions and usually preceded by viral infection)
- annular lichen planus (violaceous, flat-topped papules in annular pattern; rare in children)
- cutaneous sarcoidosis (annular variant; rare in children)
- erythema gyratum repens and necrolytic migratory erythema (usually associated with underlying neoplasms)
- mycosis fungoides (ring form; rare in children).

**ANSWER 2**

The most likely diagnosis in this case is EAC, which is characterised by annular or polycyclic (various shapes of rings) plaques with trailing scales and central clearing. Unlike tinea infection, EAC does not respond to antifungal therapy. The ring might expand slowly, at a rate of 2–3 mm per day, and might exhibit a polycyclic pattern, potentially reaching a diameter of up to 8–10 cm.<sup>4,5</sup> It can manifest either as asymptomatic or mildly pruritic. Scaling might be absent in the early

stage or after topical application. Although the buttocks, thighs and trunk are common sites, lesions can appear on any part of the body except the palms and soles.<sup>5</sup>

**QUESTION 3**

What causes EAC, and how is it diagnosed?

**ANSWER 3**

The exact cause of EAC remains unclear, though it is considered to be a hypersensitivity reaction to various triggers. Most cases are idiopathic, but EAC may be associated with infections (fungal, bacterial or viral), medications, autoimmune diseases, pregnancy or, rarely, neoplasms.<sup>3,6</sup> Interestingly, fungal infections may be associated in up to 48% of EAC cases, but this does not necessarily imply a primary fungal aetiology.<sup>1</sup> Diagnosis of EAC can be made clinically on the basis of the characteristic annular, arciform or polycyclic erythematous lesions with trailing scale and central clearing, as well as a limited response to antifungal treatment.<sup>7</sup> In uncertain cases, a confirmatory biopsy can be employed, typically showing a dense perivascular lymphocytic infiltrate ('coat-sleeve'

appearance) with possible spongiosis, parakeratosis and hyperkeratosis.<sup>8</sup>

**CASE CONTINUED**

As a result of diagnostic uncertainty, an initial non-invasive skin scraping for fungal staining was performed with negative results. Histological analysis of the biopsy revealed a perivascular lymphocytic infiltrate with spongiosis and parakeratosis, without fungal hyphae, in keeping with EAC (Figure 2).

**QUESTION 4**

What is the epidemiology of EAC?

**QUESTION 5**

How is EAC managed?

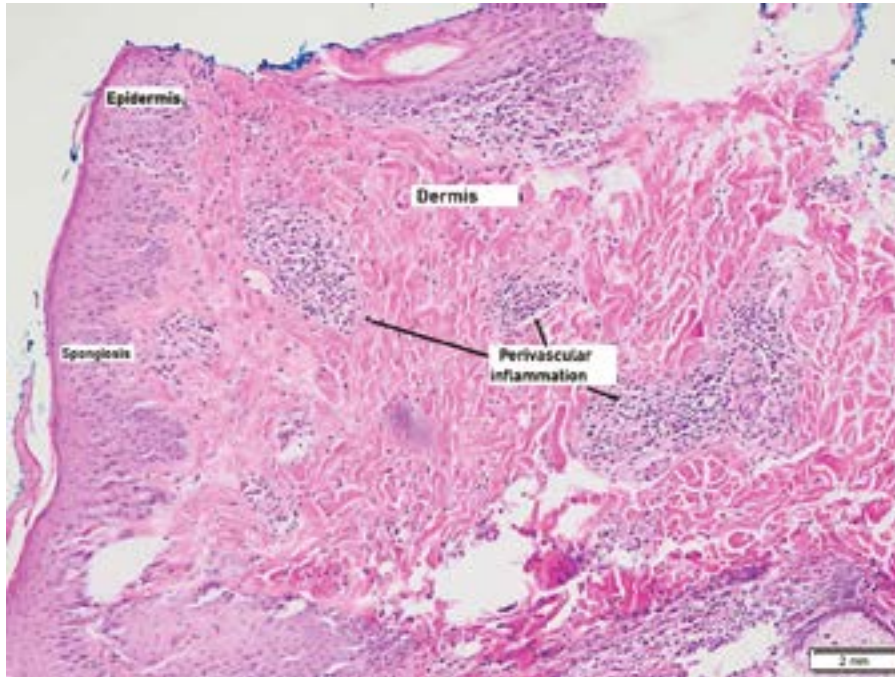
**ANSWER 4**

EAC is an uncommon, sporadically encountered dermatosis with limited epidemiological data. It has no racial predilection. It can affect individuals of all ages, ranging from 9 to 74 years, with a mean age of 40 years and a slight female preponderance (41% male:59% female; 4:6).<sup>6</sup>

**Table 1. Comparison of common differential diagnoses for annular erythematous lesions**

Diagnosis	Clinical morphology	Aetiopathogenesis	Demography	Histopathology
Tinea (dermatophyte infection)	Annular plaques with peripheral scaling border (outer rim) and central clearing	Dermatophyte fungi ( <i>Trichophyton</i> )	All ages, but common in children	Fungal hyphae/elements in stratum corneum
Erythema annulare centrifugum	From small papule to expanding annular ring with trailing scale of inner rim with central clearing	Hypersensitivity reaction but most often idiopathic or secondary to infections or drugs	Any age, F>M (6:4)	Perivascular lymphocytic infiltrate ('coat-sleeve' pattern)
Nummular eczema	Round/coin-shaped, scaly, eczematous plaques	Complex with atopy, skin barrier dysfunction and genetic predisposition	All ages	Spongiosis, acanthosis, superficial perivascular infiltrate
Granuloma annulare	Smooth, non-scaly, flesh-coloured or pink-red annular plaque, typically on limbs or trunk	Unknown, possibly immune mediated	All ages, but more common in age <30 years	Palisading granulomas with necrobiotic collagen
Psoriasis (annular)	Well-demarcated, erythematous, silvery scaly plaques	Immune mediated and genetic predisposition	All ages	Regular acanthosis, parakeratosis, neutrophils in stratum corneum
Subacute cutaneous lupus erythematosus	Annular/polycyclic erythematous plaques, especially on photosensitive areas	Autoimmune with sun exposure; may be associated with SLE and other autoimmune diseases	Young to middle-aged adults, F>M	Interface dermatitis, perivascular lymphocytic infiltrate, mucin deposition

F, female; M, male; SLE, systemic lupus erythematosus.



**Figure 2.** Histopathology of erythema annulare centrifugum (magnification  $\times 20$ ) showing perivascular infiltrate/inflammation; epidermal spongiosis will be more obvious in a higher-zoom image.



**Figure 3A.** Near-complete resolution of erythema annulare centrifugum at 5 weeks; **B.** Follow-up at 1 year with no recurrence, following complete resolution.

### ANSWER 5

There is no standardised protocol for managing EAC given its unclear aetiology and limited evidence. However, treatment approaches can include both general management and specific treatment.

#### General management

- Reassure the patient that the condition is benign and self-limited, typically resolving within weeks to months, although in rare cases it might persist for years.<sup>1,9</sup>
- Identify and manage potential triggers or associated conditions, such as irritants, infections or medication-related factors.

#### Specific treatment

- In symptomatic cases, moderate-to-potent topical corticosteroids (TCSs) might help reduce inflammation and pruritus.
- For moderate-to-severe or persistent cases, monotherapy or combination therapy with TCSs and oral antihistamines or macrolide antibiotics (eg erythromycin, azithromycin) has been reported as useful.<sup>5,6</sup> Antihistamines can alleviate itching, whereas erythromycin provides an anti-inflammatory effect. A review found that complete resolution was often noted with oral antibiotics (90.5%, 19/21 cases).<sup>6</sup> Erythromycin at a dosage of 1000 mg/day for 2 weeks in adults was described as a safe and effective treatment in a small study ( $n = 8$ ).<sup>10</sup> Additionally, off-label use of other oral medications such as doxycycline, fluconazole and metronidazole has been explored, with variable outcomes.<sup>1,2,6</sup>
- In severe, refractory cases, systemic corticosteroids may be considered; however, recurrence is common after discontinuation.<sup>5,10</sup> Recurrence may appear at the same or different body locations.

#### CASE CONTINUED

In this patient, 2 weeks duration of a potent TCS (betamethasone dipropionate 0.1% ointment twice daily) and oral erythromycin 250 mg twice daily were prescribed. Interestingly, at 3 weeks from onset, the patient had another annular ring development, inside the expanding previous ring, which is also consistent with EAC (Figure 1C). Complete resolution occurred

after 6 weeks (Figure 3A). There was no recurrence at 6- and 12-month follow-ups (Figure 3B).

## Discussion

EAC can pose a diagnostic challenge because of its resemblance to several other annular dermatoses, such as tinea corporis, nummular eczema, psoriasis or granuloma annulare. Although tinea corporis is the closest mimic, a negative fungal test or lack of response to antifungal therapy should prompt a re-evaluation for other annular lesions. Histological confirmation via skin biopsy is important when clinical uncertainty remains. Treatment is generally conservative, with most cases resolving spontaneously or with topical or systemic therapy. Recurrences can occur; however, the long-term prognosis is generally good. Awareness of EAC can help prevent misdiagnosis and unnecessary interventions.

## Key points

- When an annular lesion with central sparing is not primarily caused by a tinea infection, consider other annular dermatoses including EAC, which typically expands centrifugally (outward).
- Histopathology analysis is important when a clinical diagnosis is uncertain.
- Management is often conservative, with options of monotherapy or combined TCSS and oral therapy.

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