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Not All Round Rashes Are Ringworm: A Differential Diagnosis of Annular and Nummular Lesions

Like you, I've had little training in dermatology; most of what I know was learned on the job and through continuing education. With round rashes, my differential was limited to tinea, if it had been there for a while, or urticaria and erythema multiforme, if it had just started. This article interested me because it broadened my awareness about this type of rash. I trust it will do the same for you.

—J. Stephan Stapczynski, MD, Editor

Introduction

Although rashes are not usually an emergency, it is common for emergency physicians to see patients come in with a rash. Sometimes the rash is new onset, and sometimes it has been present for a while and refractory to treatment. Among the common presentations seen on a day-to-day basis are annular lesions. The term annular is derived from the Latin word "annulus," meaning ring shaped.[1] These lesions have a characteristic appearance, described as round to oval-shaped patches or plaques with central clearing. In contrast, the term nummular, derived from the Latin word "nummulus," meaning coin shaped, is used to describe sharply marginated, round to disc-shaped lesions without central clearing. In adults, the most common etiology of annular lesions is tinea, a superficial fungal infection of keratinized tissue. While tinea may be readily identifiable, a wide variety of clinical entities mimic these infections, leading to confusion and, often, misdiagnosis.

Key morphological characteristics of annular lesions can improve diagnostic accuracy, leading to correct initial treatment. (*See Table 1.*) This review also may be helpful especially in cases of suspected tinea that are refractory to treatment.

The Superficial Mycoses

Superficial mycotic infections are those limited to keratinized environments such as the skin, hair, and nails. Notoriously, these infections are caused by dermatophytes, a collective term that describes three genera — *Microsporum*, *Trichophyton*, and *Epidermophyton*. In naming dermatophyte infections, the term "tinea" is used, followed by the Latin name for the anatomical area infected.[2] Subtypes include tinea corporis (body), cruris (groin), capitis (scalp), faciei (face), barbae (beard), unguium (nail), and manuum (hand).

Tinea infections are caused by close contact with infected persons, animals, or, occasionally, soil, and are spread to multiple body areas via autoinoculation

EXECUTIVE SUMMARY

- Annular skin lesions are round with central clearing, whereas nummular lesions are round with discrete margins without central clearing.
- Tinea corporis produces well-demarcated, erythematous, dry, and scaly lesions with raised red borders and central clearing.
- Localized granuloma annulare produces annular lesions with smooth, non-scaly contours.
- Pityriasis rosea produces diffuse eruption on the trunk and proximal extremities with oval-shaped, scaly plaques.
- Urticaria produces wheals and well-defined, erythematous superficial swelling of the dermis. As a general rule, the individual lesions last less than 24 hours.
- Psoriasis is suggested when lesions occur on the extensor surfaces of the limbs, umbilical region, and sacrum.
- Nummular eczema is common during the winter months, with crusting, hyperpigmented, coin-shaped plaques on the lower legs, dorsal hands, and extensor surface of the arms.
- In erythema multiforme, the characteristic target lesions remain fixed for multiple days, as opposed to the transient lesions of urticaria.

when an infected region is scratched.[1] Most infections occur in young adults and affect men more often than women.[3] Warm environments, poor hygiene, contact sports, prolonged use of potent topical corticosteroids, and diseases that cause defects in the skin barrier facilitate these infections.[4] Additionally, practices such as sharing towels, clothing, and toiletries, commonly seen in young athletes, are other important risk factors.

Tinea can be diagnosed confidently when characteristic lesions described below are observed. When available, the diagnosis can be confirmed by observing branching hyphae under the microscope using a potassium hydroxide (KOH) preparation. Tinea corporis and tinea cruris, the most common subtypes of dermatophytosis, are discussed briefly in this report.

Tinea Corporis

Tinea corporis is a superficial dermatophyte infection of the body, not involving the scalp, face, hands, feet, or groin.[4] Classically, tinea corporis is characterized by an asymmetric, well-demarcated, erythematous, dry, and scaly patch with a raised, red advancing border.[2,4] Centrally, lesions clear, forming an annular pattern.[4] Individual eruptions vary in size, enlarge over time, and often are associated with mild to moderate pruritus, although smaller lesions may be asymptomatic.[4]

Tinea Cruris

Tinea cruris, or "jock itch," is dermatophytosis of the groin. Lesions are similar to those of tinea corporis, characterized by an asymmetric, well-defined, mildly erythematous patch with associated scale. The advancing border is raised and may contain vesicles, pustules, or papules.[4] Typically, infection begins unilaterally and extends to the medial thighs, perineum, and anus, sparing the scrotum.[5] Tinea cruris commonly is found in conjunction with tinea pedis and/or tinea unguium, as the fungus is spread from the infected foot to the groin when clothing is pulled to the waist.[2]

Treatment of Tinea

For localized tinea corporis or cruris, pedis, and faciei, topical antifungals, such as imidazoles (clotrimazole, miconazole, ketoconazole, econazole, oxiconazole, sulconazole) or allylamines (naftifine, terbinafine), should be used once to twice daily for two to six weeks, including two weeks following clearance.[2,6] Nystatin, commonly used to treat *Candida* infections, should not be used to treat tinea.[3]

Other Etiologies of Annular Lesions

Granuloma Annulare

Granuloma annulare (GA) is a relatively common, self-limiting disorder of the dermis that affects women twice as often as men.[7] The eruption has a predilection for young adults and children, with most cases presenting before the third decade of life.[1,7] Although the etiology remains unknown, GA is controversially associated with diabetes mellitus and hyperlipidemia.[8] Several clinical variants of GA exist; however, localized disease primarily affects the dorsal surfaces of the fingers, hands, elbows, feet, and ankles.[1,7] Lesions are characterized by asymptomatic, erythematous to violaceus colored papules or plaques with a thin, smooth border.[9] Lesions develop slowly, spread peripherally, and involute centrally, conferring an annular appearance.[9] An isolated (< 5 cm) lesion on the hand or arm represents most cases.[7]

Granuloma annulare can be diagnosed clinically by its unique distribution and morphology. Asymptomatic lesions with smooth, non-scaly contours are differentiated easily from the pruritic, scaly, and rough lesions of tinea. Biopsy with histopathologic correlation can be used to confirm or establish the diagnosis when not clinically obvious.[7]

Reassurance and observation is appropriate, as GA is benign and self-limiting. If left alone, one half of cases will resolve within two years.[8] If treatment is preferred, high-potency topical corticosteroids or intralesional triamcinolone can be used.[8,9] Although most cases heal without residual skin findings, recurrence is common regardless of treatment.[9]

Pityriasis Rosea

Pityriasis rosea is a common eruption primarily seen in adolescents and young adults.[10] The etiology remains unknown, but given its seasonal variation, occurring mostly in the spring and fall, a viral cause is suspected.[11] The eruption is aptly named — pityriasis, meaning scaly, and rosea, meaning pink. About half of cases will begin with a "herald patch," a 2 to 4 cm lesion that occurs mainly on the trunk or neck.[11] The herald patch is a pink to brown oval-shaped patch

Table 1. Summary of Diseases, Clinical Features, and Treatment

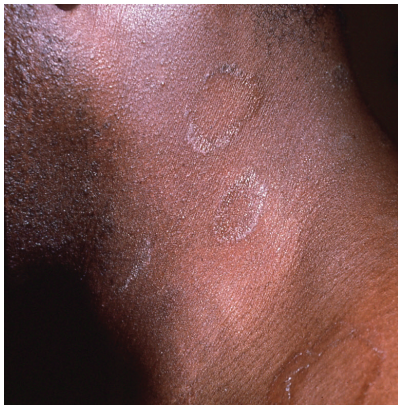
Diagnosis	Clinical Features	Treatment
Tinea corporis/cruris	Asymmetric, well-demarcated, erythematous lesion with or without central clearing. Often associated with a scaly, palpable edge. KOH microscopy positive.	Topical or systemic antifungal agents
Granuloma annulare	Non-scaly, erythematous to violaceus colored papules or plaques with a thin, smooth border. Favors the dorsal aspects of the extremities.	Topical, intralesional, or oral corticosteroids
Pityriasis rosea	Can begin with a herald patch, followed by a diffuse eruption involving the trunk and proximal extremities. Lesions are oval-shaped, scaly, skin- to salmon-colored papules or plaques. Described as a "Christmas-tree distribution" when on the back.	Oral corticosteroids if significant pruritus is present
Erythema annulare centrifugum	Erythematous annular or polycyclic plaques with a trailing scale inside an erythematous border. Favors the trunk and proximal extremities.	Topical corticosteroid creams
Erythema chronicum migrans	Large, evolving erythematous plaque without scale. May have a characteristic "bull's-eye" appearance.	Doxycycline (adults)/amoxicillin (pregnant women and children)
Urticaria	Well-circumscribed, non-scaly edematous papules or plaques with blanched centers, surrounded by a red flare.	First- or second-generation antihistamines
Lichen planus	Small, violaceous, polygonal-shaped papules and plaques with a diffuse network of white streaking.	Topical or intralesional corticosteroids; oral corticosteroids if severe
Cutaneous larva migrans	Erythematous, serpiginous tracts associated with intense pruritus.	Ivermectin (adults)/albendazole (children)
Porokeratosis of Mibelli	Annular, skin- to brown-colored plaque with a raised, ridge-like border.	Topical 5-fluorouracil with or without topical retinoids; cryosurgery
Psoriasis	Well-circumscribed, erythematous dry plaques with silvery scale.	Topical corticosteroids
Nummular eczema	Well-demarcated, erythematous or hyperpigmented scaly or crusty coin-shaped plaques.	Topical corticosteroids
Subacute cutaneous lupus erythematosus	Red to pink plaques with raised borders and central clearing. Occurs following sun exposure. Favors the face, upper trunk, and backs of arms.	Sun protection
Sarcoidosis	Multiple firm, red to purple to brown colored papules, nodules, or plaques. Favor the face, neck, and areas of trauma. Can have annular lesions.	Intralesional triamcinolone. Oral corticosteroids for systemic disease
Seborrheic dermatitis	Sharply demarcated red to pink to brown patches or thin plaques with greasy scale.	Topical ketoconazole cream or shampoo
Erythema multiforme	Edematous plaques with three distinct zones.	Valacyclovir daily
Hansen's disease	Tuberculoid — erythematous plaques with raised, sharply defined borders and atrophic center. Characteristically anesthetic. Lepromatous — numerous, poorly defined, hypopigmented macules that are symmetrically distributed.	Dapsone and rifampin Dapsone, rifampin, and clofazimine

or plaque with slightly raised margins and collarette scale at the periphery.[10,12] One to two weeks following the herald patch, numerous, fine scaling papules and patches arise on the trunk and proximal extremities, sparing the face, palms, and soles.[10] Subsequent lesions are smaller, oval-shaped, and salmon-colored, although they may be hyperpigmented in darker skinned individuals.[10,12] (*See Figure 1.*) Lesions are mildly pruritic and oriented along cleavage lines.[12] When stretched, scale hangs, resulting in the pathognomonic "hanging curtain sign." Multiple lesions may coalesce, forming a diffuse rash that, when present on the back, exhibits a "Christmas tree" pattern along Langer's lines, the natural folds of the body. A small subset of patients will experience a prodrome of headache, fever, and generalized malaise days to weeks prior to the initial outbreak.[13]

When the rash is localized to the trunk, axillae, or groin, it commonly is mistaken for tinea. Tinea rarely is as widespread, and its lesions generally exude more significant central clearing.[12] A negative KOH preparation can be used to exclude tinea.

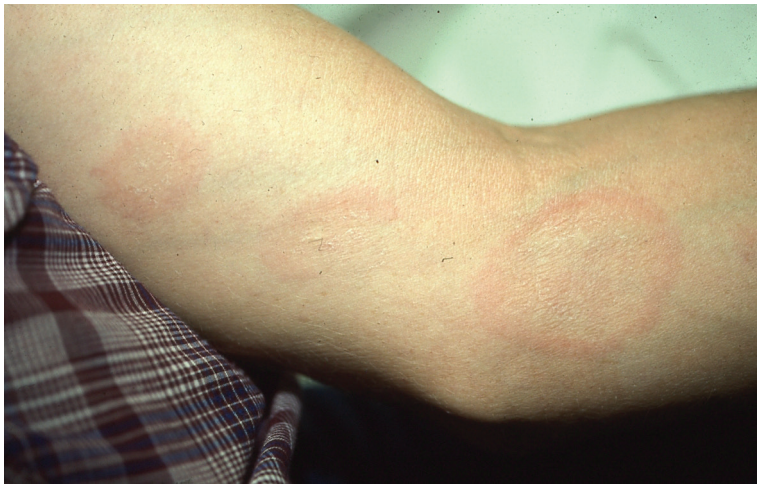
The classic presentation often is alarming to patients, prompting medical evaluation. However, treatment generally is not required, as the eruption spontaneously remits in three to eight weeks.[12] If patients experience intense pruritus, second-generation antihistamines,

Figure 1. Multiple, Oval-shaped Lesions of Pityriasis Rosea



Source: Karl Kellawan, MD

Figure 2. Erythema Annulare Centrifugum With Faint Trailing White Scale Inside the Erythematous Border



Source: Karl Kellawan, MD

topical corticosteroids, a short course of systemic corticosteroids, or narrowband ultraviolet B (UVB) phototherapy can provide symptomatic relief.[10]

Erythema Annulare Centrifugum

Erythema annulare centrifugum (EAC) belongs to a group of disorders characterized by raised, erythematous lesions that form annular, polycyclic, or arcuate arrangements.[14] Although the etiology is unclear and most patients do not have an identifiable trigger, an association with leukemias and lymphomas has been reported.[15] The eruption is seen in both men and women and peaks in the fifth decade of life.[16] Lesions begin as firm, pink papules that expand slowly over weeks, clear centrally, and progress to annular, erythematous, minimally elevated lesions that remain relatively asymptomatic beyond mild pruritis.[14,16] Just inside the erythematous border is a trailing white scale that represents desquamation at the inner margin, characteristic of EAC. (*See Figure 2.*) Lesions have a predilection for the trunk and proximal extremities, sparing the hands, feet, face, and mucosa.[14] When pressed, lesions should blanch.

Diagnosis relies on clinical presentation. Centrally, lesions lack the associated crusts or vesicles commonly seen with tinea. Annular psoriasis may present similarly, but these lesions have diffuse, thick scaling throughout as opposed to the fine, trailing scale around the margin in EAC.

EAC often has a waxing and waning course that persists for about nine months.[1,14] Most cases will subside spontaneously without treatment, leaving no residual scar. While rare, a basic cancer workup is warranted to rule out a paraneoplastic cause. If pruritus is present or treatment is desired, corticosteroids often are effective, but topical applications are preferred, as recurrence upon discontinuation of systemic agents is common.[14,16]

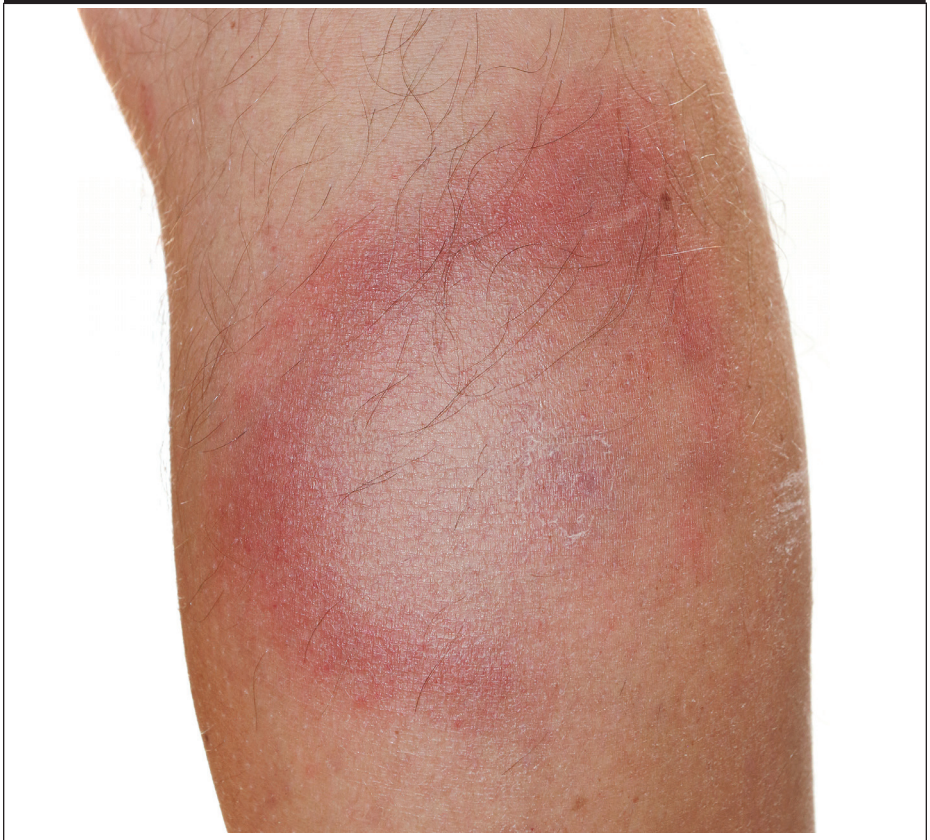
Erythema Chronicum Migrans

Erythema chronicum migrans (ECM) is the cutaneous manifestation of Lyme disease. In the United States, *Borrelia* spirochetes are transmitted to humans by an infected *Ixodes* tick. For most patients, ECM at the site of the tick bite is the first sign of infection.[17] However, only about half of patients presenting with ECM will recall a recent bite or exposure to ticks. As with most tick bites, an erythematous, small, round papule will appear at the site of the bite, and within days, the surrounding erythema will migrate peripherally, forming a large, erythematous plaque.[17] The expanding border will be warm and slightly raised without an associated scale, while centrally, a ring may clear, resulting in an annular or pathognomonic bull's-eye appearance.[18,19] (*See Figure 3.*) Primary lesions can reach 15 cm in diameter and commonly are found on the trunk, axilla, groin, and popliteal fossa.[17,18] Days to weeks following the primary eruption, a subset of patients will develop secondary lesions that are smaller and less pronounced than the primary lesion. Generally, these secondary lesions will not have the targetoid appearance of the primary lesion and will spare the palms and soles.[19] The cutaneous manifestations are self-limiting and, if untreated, will fade within six weeks.[17]

While the skin manifestations are mostly asymptomatic, accompanying symptoms of Lyme disease are common. Early in the disease course, a mild flu-like illness consisting of general malaise, fever, headache, nausea, vomiting, arthralgias, myalgias, and photophobia can occur.[19] If untreated, the disease can progress over the course of weeks to months, resulting in significant complications such as chronic arthritis, facial nerve palsy, and varying degrees of atrioventricular block.[19]

Early recognition and accurate diagnosis can prevent progression of disease and subsequent lifelong rheumatologic, neurologic, and cardiac complications. In a case of suspected Lyme disease, cutaneous findings are the most sensitive sign of early infection.[18] Tick bites

Figure 3. Classic Bull's-eye Rash of Erythema Chronicum Migrans on the Lower Extremity



Source: Getty Images

not associated with infection will begin to regress within a few days, while ECM will persist and progress. A detailed travel history, recent bites, or outdoor exposures should raise clinical suspicion. Lab findings may include an elevated erythrocyte sedimentation rate, elevated liver function tests, and mild anemia.[18] Serologic evidence of infection is most sensitive between weeks three and six and commonly involves detection of anti-*Borrelia* antibodies using enzyme-linked immunosorbent assay (ELISA), followed by a Western blot for confirmation.[17]

Adults should be treated with a 21-day course of doxycycline.[18] Amoxicillin, cefuroxime, and penicillin can be used in pregnant women and children younger than 8 years of age.[18] If significant rheumatologic, neurologic, or cardiac complications are present, more aggressive regimens consisting of intravenous antibiotics should be used.[18]

Urticaria

Often referred to as hives, urticaria is an extremely common skin eruption that occurs in up to 20% of the population.[20] Most cases are benign and resolve spontaneously. Rarely, patients experience a chronic course lasting longer than six weeks or progress to anaphylaxis.[21] In acute cases, a trigger such as infection or allergic reaction may be identified. Chronic urticaria almost always occurs in adults and often does not have an obvious trigger.[20] The eruption is composed of wheals, well-defined superficial swellings of the dermis that are characterized by raised, erythematous papules or plaques surrounded by a red flare.[21] (*See Figure 4.*) Shape varies, but lesions often are round and blanch centrally, conferring an annular appearance.[14] Lesions range from a few millimeters to more than 10 cm in size and are accompanied by intense itching, stinging, or burning. The hallmark finding in urticaria is its transient course. As a general rule, individual wheals do not last longer than 24 hours.[20] Urticaria may be accompanied by deeper, ill-defined swellings of the dermis and subcutaneous tissue, termed angioedema.[21]

Urticaria can be classified as allergic, physical, or idiopathic. Allergic urticaria can be IgE-mediated, occurring in response to foods (milk, eggs, wheat, shellfish, nuts), inhalants (pollen, dander), medications (penicillin), or complement-mediated in the case of serum sickness. Physical urticarias include dermatographic urticaria, occurring where skin has been stroked; cholinergic urticaria, occurring in response to fever and hot baths; cold urticaria, occurring on distal extremities upon rewarming; pressure urticaria, often occurring on the feet and buttocks hours after pressure has been applied; solar urticaria, occurring after exposure to light; and exercise-induced urticaria, which presents with large lesions five to 30 minutes into exercise.[14]

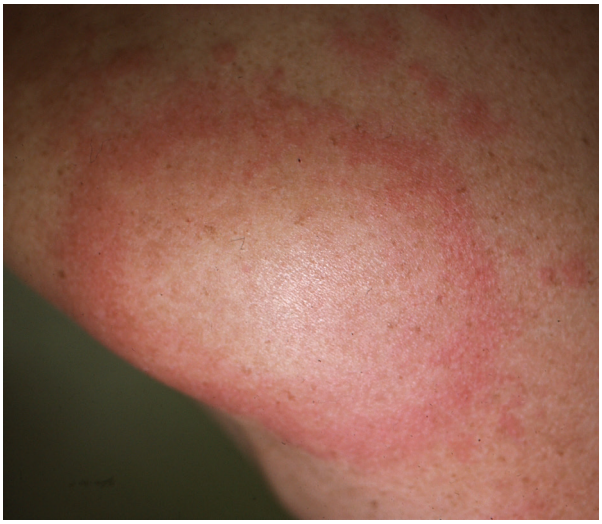
Urticaria is a clinical diagnosis based on history and physical exam. Laboratory tests rarely are indicated and generally are not recommended. Difficulty arises when patients present asymptomatically after an eruption, limiting the exam. As mentioned earlier, individual lesions should not last longer than 24 hours, although an attack may last much longer.[21] If lesions persist beyond 24 hours, other causes must be considered and a biopsy may be warranted.[22] If food is a suspected trigger, a food diary may be helpful. If a physical cause is suspected, provocative testing can uncover the offending stimuli.[14]

Treatment for acute urticaria involves avoidance of identifiable triggers and use of first- or second-generation antihistamines.[14,21] If the patient fails to respond, a three-week tapered course of systemic corticosteroids is effective with a lower risk of recurrence than shorter courses.[14]

Lichen Planus

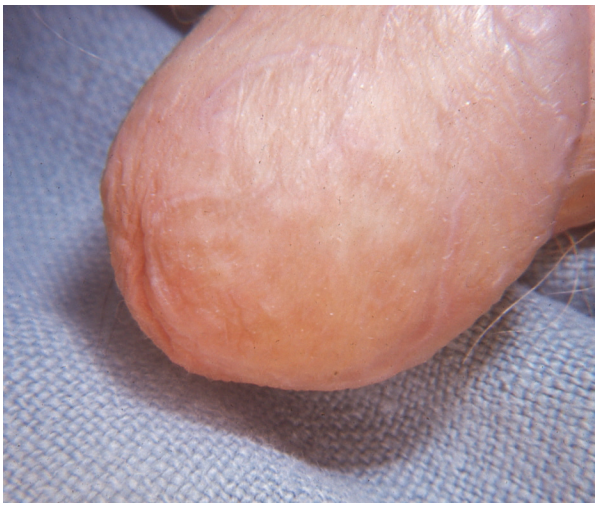
Lichen planus (LP) is an idiopathic, inflammatory disease of the skin and mucus membranes that primarily affects middle-aged adults.[23] Mediated by T-lymphocytes, the reaction can be triggered by medications, vaccinations, or viral infections, especially hepatitis C.[24]

Figure 4. Edematous Plaque With Red Flare Characteristic of Urticaria



Source: Karl Kellawan, MD

Figure 5. Annular Lichen Planus of the Glans Penis



Source: Karl Kellawan, MD

The eruption begins as small, pinpoint papules that expand into plaques that are classically shiny, violaceous, and polygonal-shaped.[25] Wickham striae, a diffuse network of white streaking, can be seen embedded throughout the surface.[23] Lesions commonly are found on the dorsal hands, flexor wrists, forearms, shins, vulva, and glans penis, but also can be seen in the mouth.[23] When lesions are present on the body, patients may be asymptomatic or complain of intense pruritus. Oral lesions typically are painful, especially when ulcerated.

Annular LP is a subtype of LP present in 10% of cases and seen scattered among typical lesions described above. Lesions are characterized by asymptomatic, small, annular papules or plaques with raised borders, typically purple to white in color.[24,25] (*See Figure 5.*) Centrally, lesions may be hyperpigmented or skin-colored.[24] LP may mimic tinea, granuloma annulare, or porokeratosis of Mibelli (discussed later). Tinea is classically more erythematous and scaly than LP, while lesions of GA are less numerous and have smooth borders.

Cutaneous LP often is self-limiting; most cases resolve spontaneously within one year.[24] For cutaneous disease, topical corticosteroids under occlusion can be used.[24,25] When lesions are symptomatic or when oral lesions are present, intralesional triamcinolone is helpful.[25] Widespread disease can be treated with systemic corticosteroids, although relapse may occur when the dose is tapered.[25]

Cutaneous Larva Migrans

Cutaneous larva migrans is a serpiginous eruption caused by animal hookworm larvae as they migrate through the epidermis.[26] In the United States, this disease is most common in warm, southeastern states.[27] Percutaneous infection often occurs in those who walk barefoot and children who play in sandboxes. Most cases occur on the feet, hands, and buttocks where larvae can penetrate the skin easily.[28] Shortly after infection, patients experience intense pruritus localized to the area of inoculation. Within days, erythematous papules followed by characteristic thin, red, torturous tracts begin to appear.[26] (*See Figure 6.*) Many isolated tracts may be present, each representing the course of an individual larva. Eventually, tracts can coalesce to form annular or ring-shaped lesions. Tracts migrate up to several centimeters a day and may disappear then reappear throughout their course.[27] Systemic manifestations are not seen, as larvae are unable to invade deeper tissues.[27]

Diagnosis is based on clinical findings and supported by a recent history of potential exposure. The eruption can be differentiated from tinea by its lack of scale and distinctive migrating course.

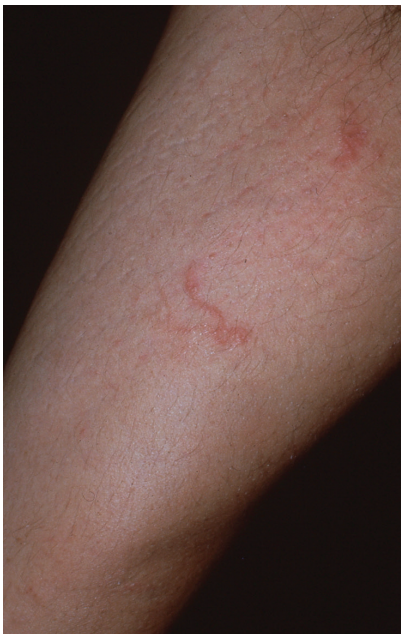
The cutaneous infestation is self-limiting in that humans are "dead-end" hosts. Most eruptions spontaneously resolve in two to eight weeks.[28] Treatment with anthelmintics can shorten the course of the disease. Early, localized lesions can be treated with topical thiabendazole. Widespread disease is treated with oral albendazole or invermectin.[27]

Porokeratosis of Mibelli

Porokeratosis of Mibelli is a rare, genetically inherited disorder of epidermal keratinization that arises during childhood or adolescence.[29] Lesions begin as small, skin- to brown-colored papules that enlarge over the course of years, forming plaques with raised, ridge-like borders and atrophic, hyper- or hypopigmented centers.[30] (*See Figure 7.*) Lesions are asymptomatic, measuring up to several centimeters in diameter and having a predilection for the hands, fingers, feet, and ankles.[31] When multiple lesions are present, they are almost always unilateral and localized.[30]

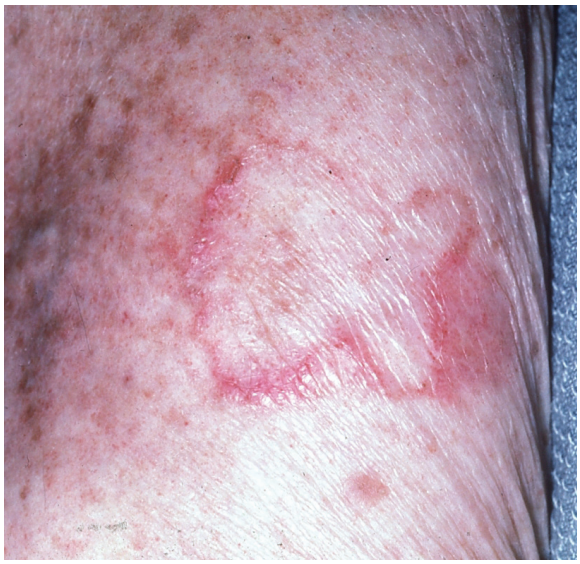
Focusing on the furrowed rim formed by the prominent border and

Figure 6. Serpiginous Tracts of Cutaneous Larva Migrans on the Proximal Lower Extremity



Source: Karl Kellawan, MD

Figure 7. Enlarging Plaque With Raised Border of Porokeratosis of Mibelli



Source: Karl Kellawan, MD

depressed center is key in differentiating the lesion from other annular lesions like tinea. The large, ridge-like border can be accentuated with the application of colored dye, such as crystal violet or povidone-iodine, followed by removal with alcohol.[31] In addition, questioning may reveal a family history of similar lesions. Definitive diagnosis can be made with biopsy and histopathological examination showing a cornoid lamella.[29]

Treatment consists of topical 5-fluorouracil alone or in combination with topical retinoids.[30,31] Other possible approaches include cryotherapy with liquid nitrogen.[29]

Psoriasis

Psoriasis is one of the most common skin conditions encountered by primary care physicians. The immune-mediated, hyperproliferative disorder affects approximately 2% of the U.S. population with equal frequency in men and women.[32] Psoriasis can begin at any age, although the majority of cases occur in patients younger than 40 years of age.[33]

Many different types of psoriasis exist. The most common type, chronic plaque psoriasis, accounts for approximately 90% of cases.[34] In this variant, lesions present as well-circumscribed, erythematous, dry plaques covered by a silvery scale. During an eruption, lesions begin small then extend peripherally, becoming more erythematous over time.[32] As lesions mature, desquamation occurs, leaving a collarette of scale at the margin, which often is accompanied by intense pruritis and burning.[32,33]

Although characteristic plaques predominate, variations in morphology are not uncommon. Lesions may appear annular when they develop rapidly, forming the active outer margin first, leaving relatively normal skin at the center.[34] As plaques regress, margins persist while the center heals, again resulting in annular-shaped lesions.[35] (*See Figure 8.*) A rare form of psoriasis, termed annular pustular psoriasis, also is considered when annular lesions are present. In this variant, lesions are characterized by well-demarcated, erythematous plaques with an active border composed of pustules.

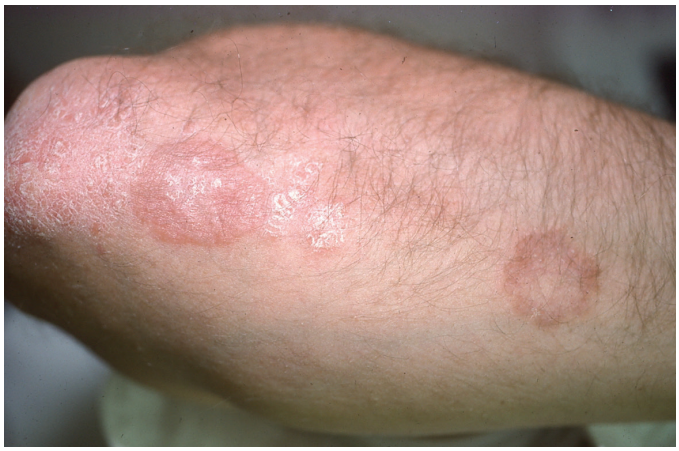
In many cases, the diagnosis may not be obvious, even for the experienced clinician. Family history may be helpful in revealing relatives with the disease. The location is suggestive when plaques are confined to the extensor surfaces of limbs, umbilical region, and sacrum.[33] Physically removing scale can produce pinpoint bleeding, referred to as the "Auspitz sign," characteristic of psoriasis.[32] Extracutaneous manifestations including nail changes and asymmetric, oligoarthritis of the hands and feet commonly are seen in conjunction with cutaneous findings.[34]

The chronic nature of the disease often leads to complex treatment regimens requiring combination therapy to achieve control. Therefore, referral to a dermatologist is appropriate. For small, localized lesions, potent topical corticosteroids and vitamin D derivatives in creams, lotions, or ointments can be used.[32] When plaques persist, intralesional injections of triamcinolone can be tried.[32] Another commonly used, cost-effective modality is phototherapy.[32] When the disease is severe or widespread, biologic and oral immunosuppressive agents are options.

Nummular Eczema

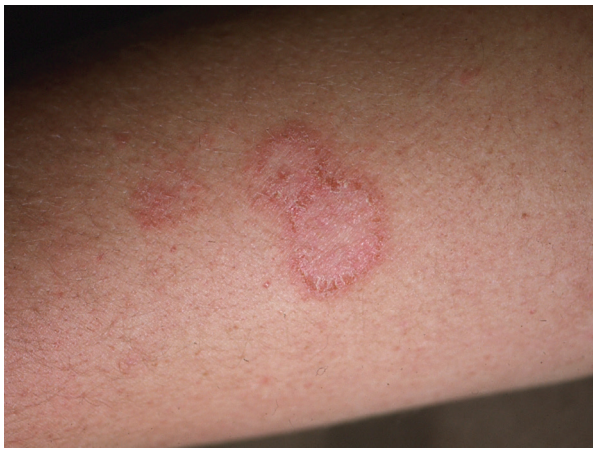
Nummular eczema (NE) is a relatively common, inflammatory

Figure 8. Healing Lesions of Chronic Plaque Psoriasis



Source: Karl Kellawan, MD

Figure 9. Nummular Eczema of the Lower Extremity



Source: Karl Kellawan, MD

dermatitis that occurs in the form of coin-shaped lesions.[36] The pathogenesis remains poorly understood, but often it is seen in atopic individuals. Clinically, NE follows a chronic course characterized by well-demarcated, erythematous, or hyperpigmented coin-shaped plaques with diffuse crust.[37] (*See Figure 9.*) Acutely, lesions may ooze and have associated vesicles.[38] Most will lack central clearing, although in some cases, plaques can expand and clear centrally, conferring an annular appearance.[1] Lesions are especially common during winter months when skin is dry and primarily present on the lower legs, dorsal hands, and extensor surface of the arms.[39] Excoriations often are prominent because of intense pruritus.[36]

Nummular eczema should be differentiated from tinea corporis and psoriasis. Tinea corporis is associated with a fine scale and commonly affects the trunk, unlike NE, which has a thick crust and occurs almost exclusively on the extremities. Lesions of psoriasis often are larger and associated with a more silvery scale compared to NE.[40] In addition, nail changes and arthritis would not be seen in conjunction with NE.

Treatment consists of potent topical corticosteroids supplemented by daily soaking and greasing with occlusive ointments.[36,40] In refractory cases, phototherapy can be used.[36]

Subacute Cutaneous Lupus Erythematosus

Systemic lupus erythematosus can have dramatic skin involvement that comes in three variants — acute, subacute, and discoid. Acute cutaneous lupus erythematosus refers to the notorious malar rash that is almost always associated with systemic disease.[41] Subacute cutaneous lupus erythematosus (SCLE) describes a photosensitive eruption that commonly forms annular lesions, but is associated with systemic disease only occasionally. Lesions of discoid lupus erythematosus vary greatly; however, they rarely are annular.

SCLE is characterized by the rapid appearance of small or large, erythematous to pink-colored plaques with raised borders, central clearing, and an easily detached scale.[41,42] The eruption is extremely photosensitive and, thus, most commonly will present on the face, upper trunk, and the backs of the arms.[41]

In differentiating SCLE from other annular lesions, a history of sun exposure in correlation with the appropriate distribution supports the diagnosis. Patients often are Caucasian women aged 15 to 40 years.[42]

Because of the transient nature of the eruption, treatment is centered around sun protection.[42] If medical therapy is preferred, topical corticosteroids or antimalarial agents, such as hydroxychloroquine, can be used.[41]

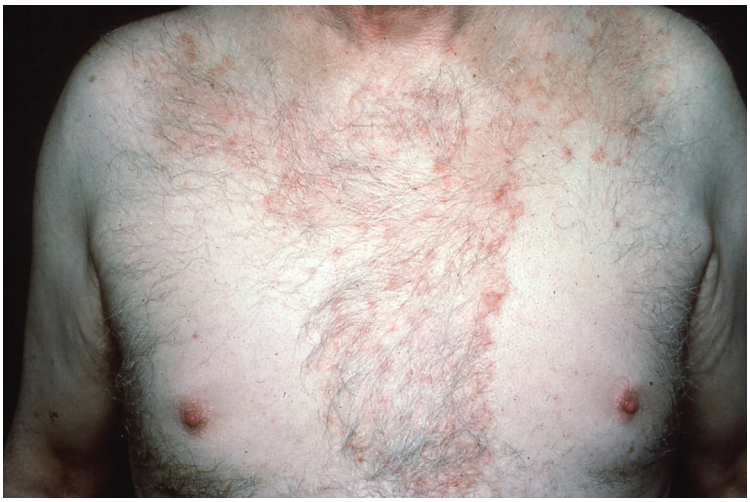
Sarcoidosis

Sarcoidosis is an idiopathic systemic disease characterized by non-caseating granulomas in multiple organ systems — mainly the lungs, but also the skin, lymph nodes, eyes, and salivary glands.[7,9] The disease is more common in women and typically begins between the ages of 20 and 40 years.[9] Interestingly, in the United States, there is marked racial variation, with sarcoidosis affecting African Americans more often than Caucasians.[9]

Skin involvement is seen in up to one-third of those affected and may be the first and/or only clinical sign of disease.[7,9] Lesion morphology varies, presenting as multiple round papules, patches, or plaques that favor the face, neck, and areas of prior injury such as tattoos and scars.[7] Color ranges from red to purple to brown.[7] Annular configurations may be present when multiple papules coalesce or when plaques clear centrally.[7] Applying pressure to the firm lesions causes blanching, sometimes revealing a yellow-brown (apple-jelly) color.[7] Lesions are almost always asymptomatic, although rarely may itch.[9]

Diagnosis may be straightforward in a patient with a known history of sarcoidosis; however, with no prior history, a biopsy of the lesion will reveal non-caseating epithelioid granulomas.[7] In newly diagnosed cases, a chest X-ray is warranted and, if abnormal, patients should be referred for pulmonary evaluation.[9]

Figure 10. Sharply Demarcated, Scaly Patch of Seborrheic Dermatitis Affecting the Presternal Area



Source: Karl Kellawan, MD

Treating the underlying systemic disease often clears cutaneous lesions.[9] Limited cutaneous eruptions can be treated with intralesional triamcinolone.[9] Systemic corticosteroids are effective but generally are reserved for active pulmonary, ocular, cardiac, and central nervous system involvement or when skin disease is widespread.[9]

Seborrheic Dermatitis

Seborrheic dermatitis is a common, chronic dermatosis present in up to 5% of the population.[32] The pathogenesis has been linked to the overproduction of sebum and *Malassezia* yeasts. Therefore, eruptions occur in regions in which sebaceous glands are most active, such as the scalp, face, eyebrows, ears, and presternal area (*see Figure 10*), as well as large body folds such as the axillae and groin.[36] Lesions are more common in men and are characterized by gradual onset of sharply demarcated patches or thin plaques that vary in color from red to orange to yellow. Flaky, visibly greasy, white to yellow scaling overlies affected areas.[36] Most cases are pruritic, and symptoms generally intensify with sweat.[32,36]

Seborrheic dermatitis may closely resemble tinea or psoriasis, especially in the groin. Distribution is helpful in distinguishing seborrheic dermatitis from tinea. When seborrheic dermatitis is present on the face, lesions are remarkably symmetric, mostly affecting the forehead, eyebrows, and retroauricular areas.[36] When present in large folds, seborrheic dermatitis tends to be centered along the crease, whereas tinea is less often as symmetric.[36] In addition, patches and plaques of seborrheic dermatitis typically are more numerous and appear greasier than lesions of tinea. Plaques of psoriasis are associated with a heavier scale that, unlike seborrheic dermatitis, bleeds when removed.[32]

Treatment consists of imidazoles, mainly ketoconazole, as a shampoo when present on the scalp or cream when present on the face and body.[36] Topical steroids work quickly and are effective but should be limited because of the risk of steroid rosacea.[32] Once cleared, daily maintenance therapy is important to prevent relapse.

Erythema Multiforme

Erythema multiforme (EM) is an acute and often recurrent eruption that commonly affects young adults.[14] The reaction pattern represents an immune-mediated response to a variety of antigenic agents, most notably herpes simplex. Other triggers include drugs (penicillin, phenytoin, allopurinol, sulfonamides, barbiturates) and *Mycoplasma* infections.[14] Erythema multiforme can be separated into EM minor and EM major, the more severe form with mucosal involvement. The minor variant is not associated with systemic symptoms, but EM major is accompanied by symptoms such as fevers and arthralgias.[14]

EM minor is characterized by distinctive "target-shaped" or "iris-shaped" lesions.[14] Lesions evolve over several days, beginning as round, sharply demarcated erythematous macules that progress to raised, edematous papules.[4] Mature lesions have three distinct zones — a dull red center, a pale outlining ring, and an encircling macular erythema.[14] (*See Figure 11.*) Occasionally, atypical target lesions that are round, edematous, and composed of only two distinct zones are present.[43] Lesions may sting, burn, and even blister at the center.[43] Sites of predilection include the palms, dorsal hands, elbows, backs of the arms, knees, shins, dorsal feet, and soles.[14,43]

EM major occurs primarily as a drug reaction. The eruption presents with the same target-shaped lesions seen in EM minor but is accompanied by systemic symptoms and mucosal involvement.[14] Erosions and even ulcerations may involve the oral, genital, and ocular mucosa.[14,43]

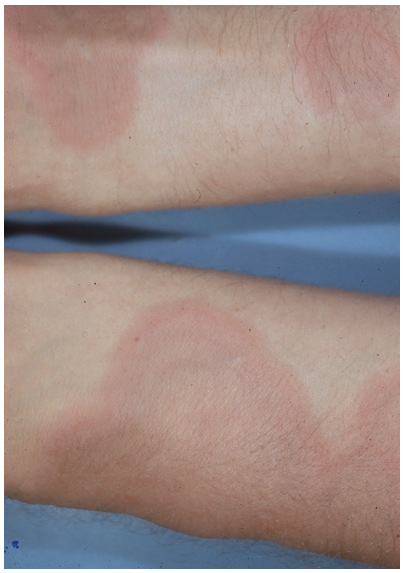
EM often is confused with large urticarial lesions. To diagnose EM, several lesions must evolve into the classic, target-shaped ones described above.[43] In addition, EM lesions remain fixed for multiple days, whereas individual urticarial lesions last less than 24 hours.

EM is self-limiting and usually resolves within weeks without complications.[14] For limited cutaneous disease, symptomatic treatment with oral antihistamines or low-potency topical corticosteroids is sufficient.[43] In recurrent cases precipitated by herpes simplex virus eruptions, chronic suppressive antiviral therapy with valacyclovir is effective.[14] When oral lesions are present, topical corticosteroid gels and "swish and spit" rinses containing a mixture of lidocaine, diphenhydramine, and kaolin are helpful.[14] In severely ill patients, systemic corticosteroids should be considered.[43]

Hansen's Disease

Hansen's disease, also known as leprosy, is a rare, chronic granulomatous

Figure 11. Target-shaped Lesions of Erythema Multiforme Affecting the Forearms Bilaterally



Source: Karl Kellawan, MD

disease caused by *Mycobacterium leprae*.[44] Although mostly a disease of the developing world, cases in the United States occur in those who have resided in foreign countries or those living in southeastern states with exposure to armadillos, a natural host.[1,45] In almost all new cases, a history of close contact with an untreated, infected individual is obtainable.[45] Once a patient is infected, the disease has an insidious onset and an incubation period that ranges from three to 20 years.[1] Hansen's disease primarily presents in two forms, tuberculoid leprosy and lepromatous leprosy.[45] In both forms, cooler areas of the body such as the skin, peripheral nerves, upper respiratory tract, and eyes are affected.[1,45] Warmer areas such as the axilla, groin, and scalp usually are spared. Often, peripheral nerves are affected first, resulting in paresthesias and numbness of the infected area; however, symptoms may be mild and go undiagnosed until cutaneous lesions appear.[45]

The tuberculoid form represents a strong cell-mediated immune response.[45] Patients present with localized disease, consisting of fewer than five asymmetrically distributed lesions characterized by large plaques with a raised, sharply defined border and an atrophic, depressed center.[45] Typically, the borders are erythematous to purple in color while the centers often are hypopigmented. Lesions may be dry, scaly, and hairless, but most importantly, anesthetic.[44,45] The superficial nerves supplying the area may be enlarged, tender, and palpable.[1,45]

The lepromatous form represents a poor cell-mediated immune response.[45] Patients present with generalized disease, consisting of numerous, symmetrically distributed lesions characterized by small, poorly defined hypopigmented macules without associated anesthesia.[45] Eventually, nodules and raised plaques of the face (leonine facies), ears, elbows, hands, and knees may appear.[45] Nerve involvement can occur, but will present as a symmetric stocking-glove pattern neuropathy.[45]

Diagnosis of Hansen's disease is made by identifying the infectious acid-fast bacilli in skin or nerve lesions with biopsy.[45] In the United States, tuberculoid leprosy is treated with a combination of dapsone and rifampin for 12 months.[45] Lepromatous leprosy is treated with a combination of dapsone, rifampin, and clofazimine for two years.[45]

Summary

Annular skin lesions are among the most common dermatologic presentations. Although tinea is often to blame, many other entities mimic these infections. Establishing a broad differential and focusing on key morphological characteristics will improve accuracy of diagnosis, limit unnecessary treatment, and lead to faster resolution of disease.

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CME/CE Questions

1. Which of the following is best characterized by having a trailing white scale just inside an outer, erythematous border?
   a. Tina corporis/cruris
   b. Granuloma annulare
   c. Annular lichen planus
   d. Erythema annulare centrifugum
2. A herald patch preceding a diffuse eruption is seen commonly with which of the following?
   a. Pityriasis rosea
   b. Subacute cutaneous lupus erythematosus
   c. Nummular dermatitis
   d. Hansen's disease
3. Which of the following is *not* caused by an infectious agent?
   a. Tinea corporis/cruris
   b. Porokeratosis of Mibelli
   c. Erythema chronicum migrans
   d. Cutaneous larva migrans
4. Which of the following is *not* commonly associated with systemic symptoms?
   a. Lichen planus
   b. Psoriasis
   c. Subacute cutaneous lupus erythematosus
   d. Sarcoidosis
5. Applying a colored dye followed by removal with alcohol will accentuate the border of which of the following?
   a. Erythema annulare centrifugum
   b. Lichen planus
   c. Porokeratosis of Mibelli
   d. Seborrheic dermatitis
6. Urticaria can be differentiated from other annular lesions by which of the following characteristics?
   a. Erythematous papules or plaques with fine scale
   b. An annular plaque with a raised, ridge-like border
   c. Erythematous macules or patches that favor the lower extremities
   d. A transient course with individual lesions lasting less than 24 hours

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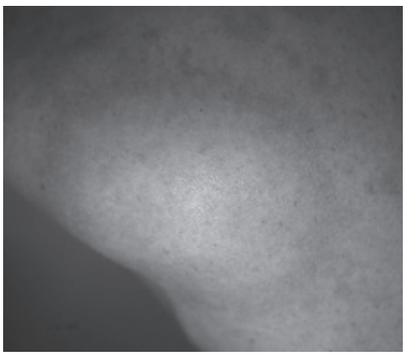
Not All Round Rashes Are Ringworm: A Differential Diagnosis of Annular and Nummular Lesions

Summary of Diseases, Clinical Features, and Treatment

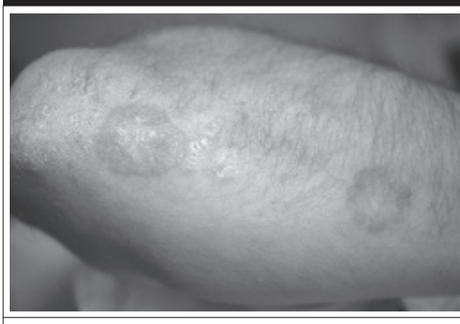
Diagnosis	Clinical Features	Treatment
Tinea corporis/cruris	Asymmetric, well-demarcated, erythematous lesion with or without central clearing. Often associated with a scaly, palpable edge. KOH microscopy positive.	Topical or systemic antifungal agents
Granuloma annulare	Non-scaly, erythematous to violaceus colored papules or plaques with a thin, smooth border. Favors the dorsal aspects of the extremities.	Topical, intralesional, or oral corticosteroids
Pityriasis rosea	Can begin with a herald patch, followed by a diffuse eruption involving the trunk and proximal extremities. Lesions are oval-shaped, scaly, skin- to salmon-colored papules or plaques. Described as a "Christmas-tree distribution" when on the back.	Oral corticosteroids if significant pruritus is present
Erythema annulare centrifugum	Erythematous annular or polycyclic plaques with a trailing scale inside an erythematous border. Favors the trunk and proximal extremities.	Topical corticosteroid creams
Erythema chronicum migrans	Large, evolving erythematous plaque without scale. May have a characteristic "bull's-eye" appearance.	Doxycycline (adults)/amoxicillin (pregnant women and children)
Urticaria	Well-circumscribed, non-scaly edematous papules or plaques with blanched centers, surrounded by a red flare.	First- or second-generation antihistamines
Lichen planus	Small, violaceous, polygonal-shaped papules and plaques with a diffuse network of white streaking.	Topical or intralesional corticosteroids; oral corticosteroids if severe
Cutaneous larva migrans	Erythematous, serpiginous tracts associated with intense pruritus.	Ivermectin (adults)/albendazole (children)
Porokeratosis of Mibelli	Annular, skin- to brown-colored plaque with a raised, ridge-like border.	Topical 5-fluorouracil with or without topical retinoids; cryosurgery
Psoriasis	Well-circumscribed, erythematous dry plaques with silvery scale.	Topical corticosteroids
Nummular eczema	Well-demarcated, erythematous or hyperpigmented scaly or crusty coin-shaped plaques.	Topical corticosteroids
Subacute cutaneous lupus erythematosus	Red to pink plaques with raised borders and central clearing. Occurs following sun exposure. Favors the face, upper trunk, and backs of arms.	Sun protection
Sarcoidosis	Multiple firm, red to purple to brown colored papules, nodules, or plaques. Favor the face, neck, and areas of trauma. Can have annular lesions.	Intralesional triamcinolone. Oral corticosteroids for systemic disease
Seborrheic dermatitis	Sharply demarcated red to pink to brown patches or thin plaques with greasy scale.	Topical ketoconazole cream or shampoo
Erythema multiforme	Edematous plaques with three distinct zones.	Valacyclovir daily
Hansen's disease	Tuberculoid — erythematous plaques with raised, sharply defined borders and atrophic center. Characteristically anesthetic. Lepromatous — numerous, poorly defined, hypopigmented macules that are symmetrically distributed.	Dapsone and rifampin Dapsone, rifampin, and clofazimine

Edematous Plaque With Red Flare Characteristic of Urticaria



Source: Karl Kellawan, MD

Healing Lesions of Chronic Plaque Psoriasis



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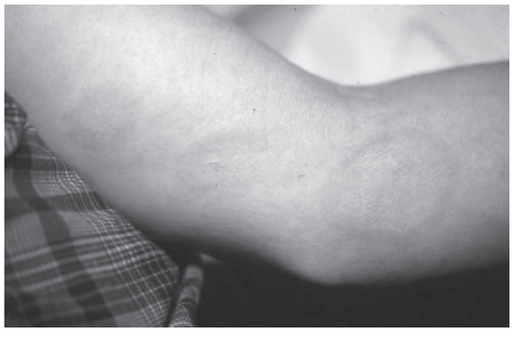
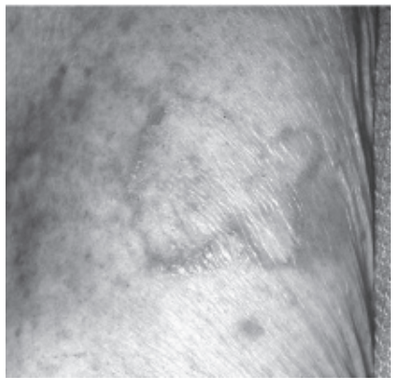
Erythema Annulare Centrifugum With Faint Trailing White Scale Inside the Erythematous Border



Source: Karl Kellawan, MD

Enlarging Plaque With Raised Border of Porokeratosis of Mibelli

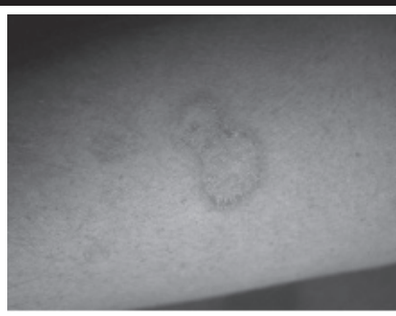


Source: Karl Kellawan, MD

Target-shaped Lesions of Erythema Multiforme Affecting the Forearms Bilaterally

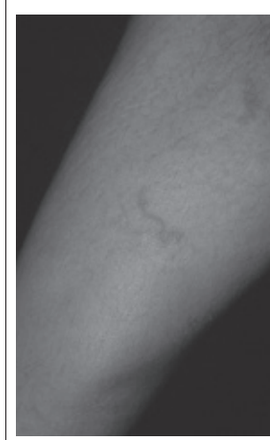
Source: Karl Kellawan, MD

Nummular Eczema of the Lower Extremity



Source: Karl Kellawan, MD

Serpiginous Tracts of Cutaneous Larva Migrans on the Proximal Lower Extremity



Source: Karl Kellawan, MD

Supplement to *Emergency Medicine Reports*, November 1, 2018: "Not All Round Rashes Are Ringworm: A Differential Diagnosis of Annular and Nummular Lesions." Authors: Karl Kellawan, MD, Forefront Dermatology, Centerville, OH; and Wyatt Andrasik, BS, MD Candidate, Wright State University Boonshoft School of Medicine, Dayton, OH.