

# Skin Disorders

Bio 375

Pathophysiology

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# Skin Lesions

- Characteristics of skin lesions are often helpful in making a diagnosis
- Skin lesions may be caused by:
  - Systemic disorders, e.g. liver disease
  - Systemic infections, e.g. chickenpox rash
  - Allergies to ingested food or drugs
  - Localized factors
- Some common skin lesions follow:

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Primary Skin Lesions	Examples
<b>MACULE</b> A flat, circumscribed area that is a change in the color of the skin; less than 1 cm in diameter	Freckles, flat moles (nevi), petechiae, measles, scarlet fever
<b>PAPULE</b> An elevated, firm, circumscribed area less than 1 cm in diameter	Wart (verruca), elevated moles, lichen planus



Macules



Flat warts

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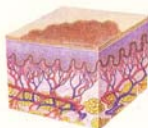

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**PATCH**  
A flat, nonpalpable, irregular-shaped macule more than 1 cm in diameter

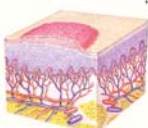

Vitiligo, port-wine stains, mongolian spots, café au lait spot

Vitiligo\*

**PLAQUE**  
Elevated, firm, and rough lesion with flat top surface greater than 1 cm in diameter

Pсориаз, себорейс и актинич кератозис

Plaque\*

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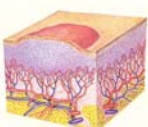

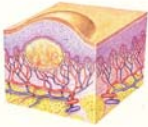

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Primary Skin Lesions	Examples
<p><b>WHEEL</b> Elevated, irregular-shaped area of cutaneous edema; solid, transient; variable diameter</p>	<p>Insect bites, urticaria, allergic reaction</p>   <p>Wheal*</p>
<p><b>NODULE</b> Elevated, firm, circumscribed lesion; deeper in dermis than a papule; 1-2 cm in diameter</p>	<p>Erythema nodosum, lipomas</p>   <p>Hypertrophic nodule*</p>

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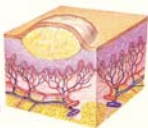

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**TUMOR**  
Elevated, solid lesion; may be clearly demarcated; deeper in dermis; greater than 2 cm in diameter

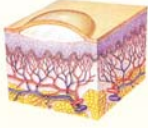

Neoplasms, benign tumor, lipoma, hemangioma

Hemangioma\*

**VESICLE**  
Elevated, circumscribed, superficial, not into dermis; filled with serous fluid; less than 1 cm in diameter

Varicella (chickenpox), herpes zoster (shingles)

Vesicles\*

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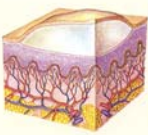

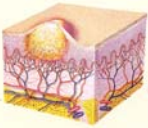

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Primary Skin Lesions	Examples
<b>BULLA</b> Vesicle greater than 1 cm in diameter	Blister, pemphigus vulgaris   Bulla* (Courtesy Dr. KA Riley)
<b>PUSTULE</b> Elevated, superficial lesion; similar to a vesicle but filled with purulent fluid	Impetigo, acne   Acne*

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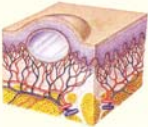

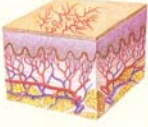

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<b>CYST</b> Elevated, circumscribed, encapsulated lesion; in dermis or subcutaneous layer; filled with liquid or semisolid material	Sebaceous cyst, cystic acne   Sebaceous cyst*
<b>TELANGIECTASIA</b> Fine, irregular red lines produced by capillary dilation	Telangiectasia in rosacea   Telangiectasia*

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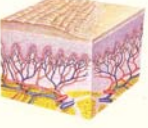

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Primary Skin Lesions	Examples
<b>SCALE</b> Heaped-up, keratinized cells; flaky skin; irregular; thick or thin; dry or oily; variation in size	Flaking of skin with seborrheic dermatitis following scarlet fever, or flaking of skin following a drug reaction; dry skin   Fine scaling*
<b>LICHENIFICATION</b> Rough, thickened epidermis secondary to persistent rubbing, itching, or skin irritation; often involves flexor surface of extremity	Chronic dermatitis   Stasis dermatitis in early stage*

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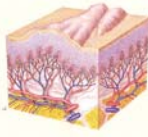

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**KELOID**  
Irregular-shaped, elevated, progressively enlarging scar; grows beyond the boundaries of the wound; caused by excessive collagen formation during healing

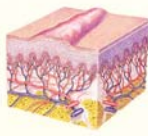

Keloid formation following surgery

Keloid\*

**SCAR**  
Thin to thick fibrous tissue that replaces normal skin following injury or laceration to the dermis

Healed wound or surgical incision

Hypertrophic scar\*

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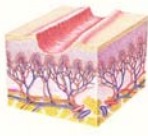

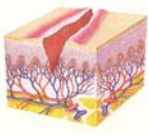

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Primary Skin Lesions	Examples
<b>EXCORIATION</b> Loss of the epidermis; linear, hollowed-out, crusted area	Abrasion or scratch, scabies
	
	
	Scabies*
<b>FISSURE</b> Linear crack or break from the epidermis to the dermis; may be moist or dry	Athlete's foot, cracks at the corner of the mouth
	
	
	Fissures*

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**EROSION**  
Loss of part of the epidermis; depressed, moist, glistening; follows rupture of a vesicle or bulla

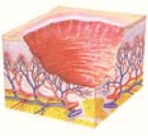

Varicella, variola after rupture

Erosion\*

**ULCER**  
Loss of epidermis and dermis; concave; varies in size

Decubiti, stasis ulcers

Stasis ulcer\*

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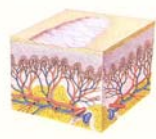

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**Primary Skin Lesions**      **Examples**

**ATROPHY**  
Thinning of the skin surface and loss of skin markings; skin appears translucent and paperlike

Examples: Aged skin, striae

Aged skin\*

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*Table 27-1*

**Description of Some Skin Lesions**

Macule	Small, flat, circumscribed lesion of a different color than the normal skin
Papule	Small, firm, elevated lesion
Nodule	Palpable elevated lesion; varies in size
Pustule	Elevated, erythematous lesion, usually containing purulent exudate
Vesicle	Elevated, thin-walled lesion containing clear fluid (blister)
Plaque	Large, slightly elevated lesion with flat surface, often topped by scale
Crust	Dry, rough surface or dried exudate or blood
Lichenification	Thick, dry, rough surface (leather-like)
Keloid	Raised, irregular, and increasing mass of collagen resulting from excessive scar tissue formation
Fissure	Small, deep, linear crack or tear in skin
Ulcer	Cavity with loss of tissue from the epidermis and dermis, often weeping or bleeding
Erosion	Shallow, moist cavity in epidermis
Comedone	Mass of sebum, keratin, and debris blocking the opening of a hair follicle

An open comedone has a dilated orifice (blackhead) and a closed comedone has a narrow opening (whitehead)

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## Important Characteristics of Skin Lesions

- Location of lesion
- Length of time the lesion has been present
- Any changes occurring over time
- Physical appearance including:
  - Color
  - Elevation
  - Texture
  - Type of exudate
  - Presence of pain or itching
- Itching (pruritus) is associated with allergic responses, chemical irritation due to insect bites or infestations such as scabies (a mite)

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## Inflammatory Disorders

- Contact dermatitis
  - May be caused by exposure to an allergen or direct chemical or mechanical irritation
  - Allergic dermatitis may result from exposure to a multitude of substances:
    - Metals
    - Cosmetics
    - Soaps
    - Chemicals
    - Plants
  - Sensitization to allergen occurs on first exposure (type IV cell mediated hypersensitivity)

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- On subsequent exposures, typically see:
  - Pruritic rash develops at site of exposure within a few hours
  - Area is usually red and edematous and often covered with small vesicles
- Chemical irritation does not involve an immune response but is an inflammatory response caused by exposure to substances like soaps, cleaning materials, acids or insecticides
- Skin is usually red, edematous and may be itchy or painful

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■ Urticaria (Hives)

- Results from type I hypersensitivity (IgE mediated release of histamine) reaction caused by ingested substances:
  - Shellfish
  - Certain fruits like strawberries
  - Drugs like penicillin or aspirin
  - Systemic diseases like intestinal parasites
  - Physical agents like heat or cold
- The release of histamine causes the eruption of hard, itchy, raised red wheals on the skin, often scattered all over the body
- Occasionally, hives develop in the pharyngeal mucosa and may obstruct the airway causing difficulty in breathing

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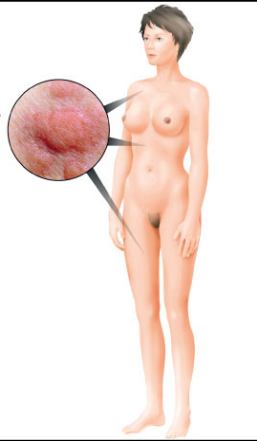
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Hives



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■ Atopic dermatitis (Eczema)

- A common problem in infancy and may persist in adulthood in some persons
  - In infants the itchy lesions are typically moist, red, vesicular and covered with crusts
  - In adults the affected skin is dry and scaling with lichenification; itching is common
- Atopic refers to an inherited tendency toward allergic conditions
- Typically, the family history includes individuals with eczema, allergic rhinitis or hay fever and asthma
- A type I hypersensitivity (increased IgE levels)

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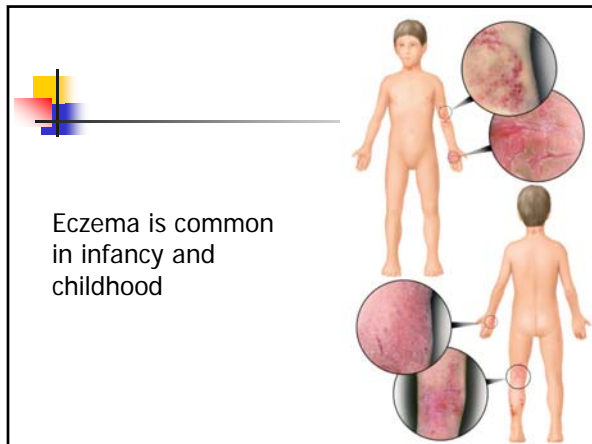
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Eczema is common in infancy and childhood

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OVERVIEW OF THE DIFFERENT TYPES OF ECZEMA				
Type of eczema	Sites	Typical age	History	Other points
Atopic eczema (see page 20)	Flexures, elbows, knees, face and neck	Childhood, sometimes persists into adulthood	May also have asthma or hay fever, or family members with any of the three disorders	Most children improve with age and many get better completely
Irritant contact dermatitis (see page 30)	Especially hands	Adults, usually 30s onwards	May first develop during period of extra work or contact with solvents	Avoidance is critical in care
Discoid eczema (see page 105)	Limbs and trunk	50s to 70s	Scattered coin-sized areas of intensely itchy and slightly crusty eczema	Requires potent therapy
Allergic contact dermatitis (see page 32)	Any site exposed to the relevant substance	Usually adults	A patch of eczema connected in time and site with exposure to a specific substance	When severe, eczema may spread outside the exposed area
Ovarian eczema (see page 103)	Below the knee	50s onwards	May be a history of blood clots, bad varicose veins or leg ulcers	Affected skin may become discoloured and dark
Seborrhoeic eczema (see page 115)	Face, chest and scalp	15-45 years	Seldom itches much, improves in sunshine	May look a bit like psoriasis
Atrophic eczema (see page 105)	Trunk and limbs	50s onwards	Moderate itch, very dry skin which looks like crazy paving	Sometimes a history of vigorous routine washing
Drug eczema (see page 108)	Symmetrical and may be widespread	Adults	Can develop long after the medication has been started and continue after it is stopped	Only after prescribed medication under medical supervision
Lichen simplex (see page 118)	Patch of thickened skin, often shins, forearms or neck	Adults	A limited area of persistent itch which is habitually scratched or rubbed	Will not improve if scratching persists

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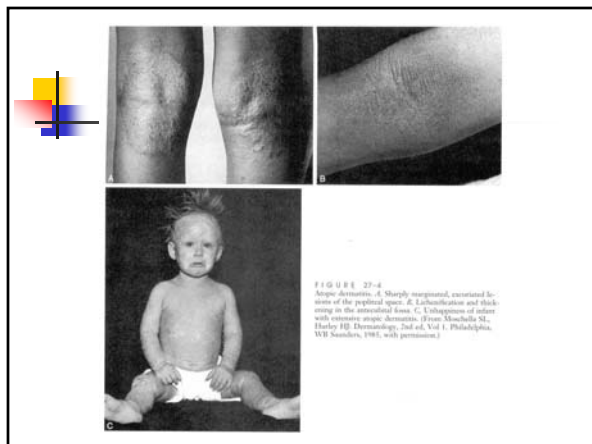


FIGURE 27-4 Atopic dermatitis. A, Sharply marginated, excoriated lesions of the pyralid space. B, Lichenification and thickening in the antecubital fossa. C, Urticarial lesions of infant with contact atopic dermatitis. (From Kinschella SL, Hanley HJ. *Dermatology*, 2nd ed, Vol 1. Philadelphia, WB Saunders, 1981, with permission.)

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- Psoriasis is a chronic inflammatory disorder of unknown origin (shows familial tendency)
  - Onset usually occurs in the teen years
  - Marked by remissions and exacerbations
  - Cases vary in severity
- The rate of cellular proliferation is greatly increased, leading to thickening of the dermis and epidermis
- Epidermal shedding may occur in 3-4 hours rather than the normal several weeks
- The lesion begins with a small red papule that enlarges

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- A silvery plaque forms while the base remains red because of inflammation and vasodilation
- Lesions are commonly found on the face, scalp, elbows and knees



FIGURE 27-5  
A, Psoriasis—acute inflammatory stage. (Courtesy of Dr. M. McKenzie, Toronto.) B, Psoriasis. (From Lookingbill DP, Alarks JG: Principles of Dermatology, 2nd ed. Philadelphia, WB Saunders, 1993, p 138, with permission.)

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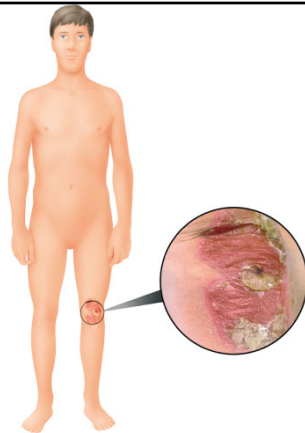
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Psoriasis



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## Skin Infections

- Bacterial infections
  - Common type of skin infection
  - May be primary (due to resident flora)
  - May be secondary (developing in wounds or pruritic lesions)
  - Some are superficial; others form deeper abscesses

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## Cellulitis (Erysipelas)

- Cellulitis is an infection of the dermis and subcutaneous tissue, usually secondary to an injury, furuncle (boil) or ulcer
- Causative agent usually *Staphylococcus aureus* or occasionally beta-hemolytic streptococcus
- Frequently occurs in the lower trunk or legs and the area becomes red, swollen and painful.



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## Furuncles (Boils)

- Furuncle is an infection, usually by *S. aureus*, which begins in a hair follicle and spreads into the surrounding dermis
- Common locations are face, neck and back
- Initially, is firm, red, painful nodule
- Develops into a large, painful mass that frequently drains large amounts of pus

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- Squeezing boils can result in the spread of infection by autoinoculation to other areas of the skin and to cellulitis
- Compression of furuncles in the nasal area may lead to thrombi or infection that spreads to the brain if the infected material reaches the cavernous sinus in the facial bones
- Carbuncles are a collection of furuncles that coalesce to form a large infected mass

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## Furuncles



FIG. 43-17 Furuncle of the forearm. (Courtesy Department of Dermatology, School of Medicine, University of Utah.)



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## Impetigo

- Common infection in infants and children
- *S. aureus* may cause highly contagious infections in neonates
- In older children, infection results primarily from *S. aureus* but may be caused by beta-hemolytic streptococci
- Easily spread by infected hands, eating utensils and towels



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- Lesions commonly occur on the face and begin as small vesicles that rapidly enlarge and rupture to form yellowish-brown crusty masses
- Additional vesicles develop around original site by autoinoculation
- Pruritis is common which adds to spreading
- Prompt treatment helps limit spreading
- Important because some strains of both Streptococci and Staphylococci can cause glomerulonephritis

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## Viral infections

- Herpes Simplex (Cold Sores)
- HSV-1 is the most common cause of cold sores or fever blisters that occur on or around the lips
- HSV-2 (genital herpes) can also cause oral lesions
- The primary infection may be asymptomatic, but the virus remains in a latent stage in the sensory nerve ganglion of the trigeminal nerve
- From here, it can be reactivated causing skin lesions

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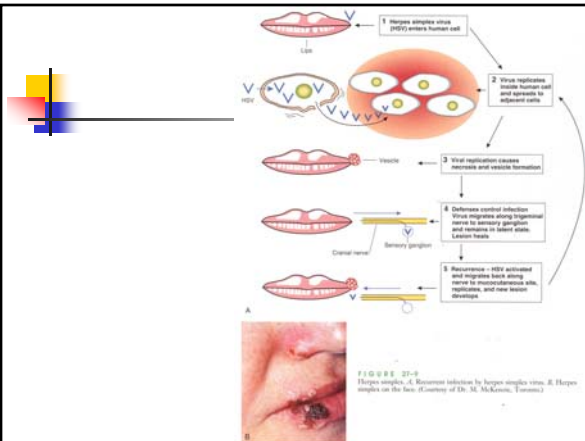
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**FIG. 43-18 Herpes simplex labialis.** Typical presentation with tense vesicles appearing on the lips and extending onto the skin. (From Habif TB: *Clinical dermatology: a color guide to diagnosis and therapy*, ed 3, St Louis, 1996, Mosby.)

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- Recurrence may be triggered by infection such as the common cold, sun exposure or stress.
- Spontaneous healing usually occurs in 2-3 weeks
- The virus is spread by direct contact with the fluid from the lesion
- Viral particles may be present in saliva for several weeks following "healing" and can be spread to others
- A potential complication is spread of the virus to the eyes, causing keratitis

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## Herpes Zoster (Shingles)

- Caused by varicella-zoster virus (VZV) in adults
- It is seen after a primary infection of varicella or chicken pox, which usually occurs in childhood
- Shingles usually affects one cranial nerve or one dermatome on one side of the body
- Pain, paresthesia and a vesicular rash develop unilaterally along a line.
- Lesions persist for several weeks and then clear

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## Verrucae (Warts)

- Warts are caused by the human papillomaviruses (HPVs)
- Many types of these viruses associated with a variety of diseases
- Plantar warts are a common type
  - Frequently develop in children and young adults; are annoying but relatively harmless
  - Occur on soles of feet
  - Tend to persist even with treatment

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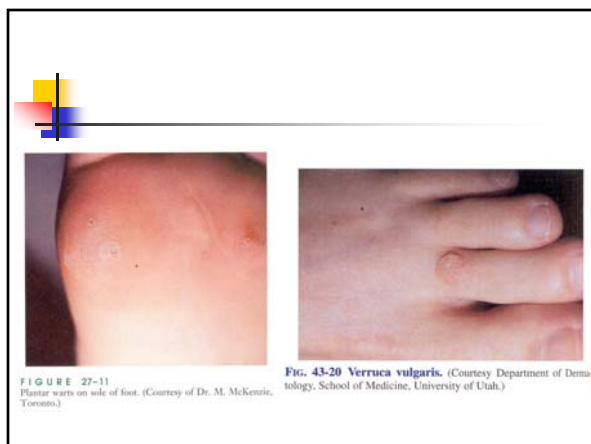
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### ■ Fungal infections (Mycoses)

- Most fungal infections are superficial because the fungal infections live off dead, keratinized cells of the epidermis
- Tinea may cause several types of superficial skin infections depending on the area of the body affected
  - Tinea capitis is an infection of the scalp and is common in school-aged children
  - May be transmitted from cats, dogs or humans



FIGURE 41-4 Tinea of the scalp caused by *Microsporum audouinii*. (Source: G.L. Hall [Ed.], [1996], *Manual of skin diseases* [7th ed.], Philadelphia: Lippincott-Raven)

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Tinea corporis is an infection of the body, particularly the nonhairy parts.

Tinea pedis or athlete's foot involves the feet, particularly the toes

Tinea unguium is an infection of the nails, particularly the toenails

Tinea Cruris is an infection of the groin area and also known as "jock itch".



FIGURE 41-5 Tinea of the body caused by *Microsporum canis*. (Source: G.L. Hall [Ed.], [1996], *Manual of skin diseases* [7th ed.], Philadelphia: Lippincott-Raven)



FIGURE 41-6 Contamination of one of the toenails with tinea unguium. (Source: G.L. Hall [Ed.], [1996], *Manual of skin diseases* [7th ed.], Philadelphia: Lippincott-Raven)



FIGURE 41-7 Tinea of the inguinal area caused by *Trichophyton mentagrophytes*. (Source: G.L. Hall [Ed.], [1996], *Manual of skin diseases* [7th ed.], Philadelphia: Lippincott-Raven)

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## Pediculosis (Lice)

- Three forms in humans
  - *Pediculus humanus corporis* or body louse
  - *Pediculus pubis* or pubic louse
  - *Pediculus humanus capitis* or head louse
- Lice are small, brownish parasites that feed off human blood (human lice are specific to humans)
- Females lay eggs on the hair shaft
- The lice, after hatching, bite the host and suck blood
- Site of each bite forms a macule or papule which is itchy

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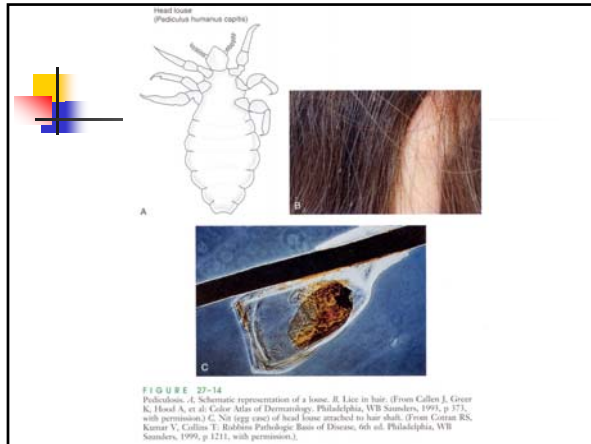
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## Scabies (Mites)

- Scabies is a common infestation with a small mite that lives in the upper surface of the skin.
- Mites passed from person to person
- Rash varies but typically itches
- Often patches of eczema and small pustules around wrists and in the finger webs
- In children under 18 months, pustules sometimes seen on the soles of the feet

Electron micrograph of scabies mite

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## Skin Tumors

- Skin lesions due to sun exposure have been on the increase for some time
- Estimated that 1 in 7 people will develop skin cancer
- In recent years there has been an increased emphasis on more sun exposure
- Incidence higher in those who have experienced severe sunburns, those who spend a lot of time in the sun and light skinned people with little melanin

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## Keratoses

- Keratoses are benign lesions that are associated with aging or skin damage
  - Seborrheic keratoses result from proliferation of basal cells, leading to an oval elevation that may be smooth or rough and is often dark in color; usually found on face or trunk
  - Actinic keratoses occur on skin exposed to UV radiation and commonly arise in fair skinned people; usually pigmented and scaly; may develop into squamous cell carcinoma

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FIGURE 61-35 Large seborrheic keratoses on the hand of an 84-year-old woman. (Sauer G.C., Hall J.C. [1996]. *Manual of skin diseases* [7th ed.], Philadelphia: Lippincott-Raven)



FIGURE 61-36 Multiple actinic keratoses of the face of an 80-year-old man. (Dermik Laboratories, Inc.) (Sauer G.C., Hall J.C. [1996]. *Manual of skin diseases* [7th ed.], Philadelphia: Lippincott-Raven)

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## Warning Signs of Skin Cancer

- A sore that does not heal
- A change in shape, size, color or texture of a lesion, especially an expanding, irregular circumference or shape
- New moles or odd-shaped lesions that develop
- A skin lesion that bleed repeatedly, oozes fluid, or itches

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## Squamous Cell Carcinoma

- Squamous cell carcinoma is a painless, malignant tumor of the epidermis; sun exposure is a major contributing factor
- Lesions are found on the most exposed parts of the skin, such as face and neck
- Smokers have a higher incidence of squamous cell carcinoma in the lower lip and mouth
- Excellent prognosis when lesion is removed within a reasonable time

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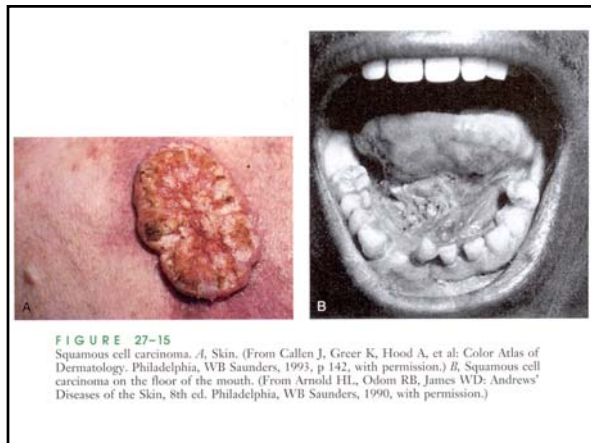
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## Malignant Melanoma

- This is a much more serious form of cancer
- Develops from melanocytes
- This form is increasing in incidence
- Develops from a melanocyte in the basal layer of the epidermis or from a nevis (mole)
- Melanoma's grow quickly, extending down into the underlying tissue and metastasizing quickly to regional lymph nodes
- If not removed early the prognosis is poor

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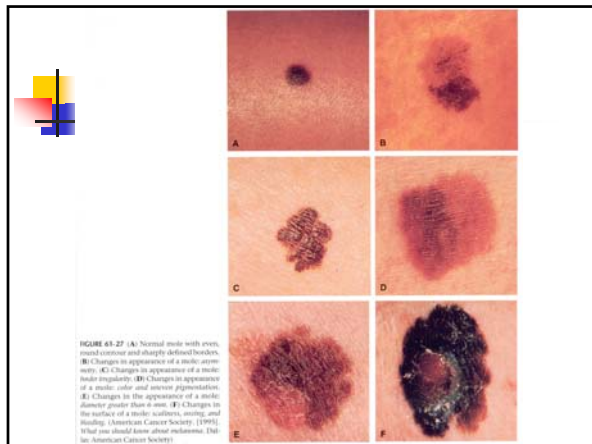
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## Kaposi's Sarcoma

- Most commonly seen in immunosuppressed patients such as those with HIV and AIDS
- Often itchy and painful

**FIG. 43-33 Kaposi sarcoma.** The purple lesion commonly seen on the skin. (Courtesy Department of Dermatology, School of Medicine, University of Utah.)

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