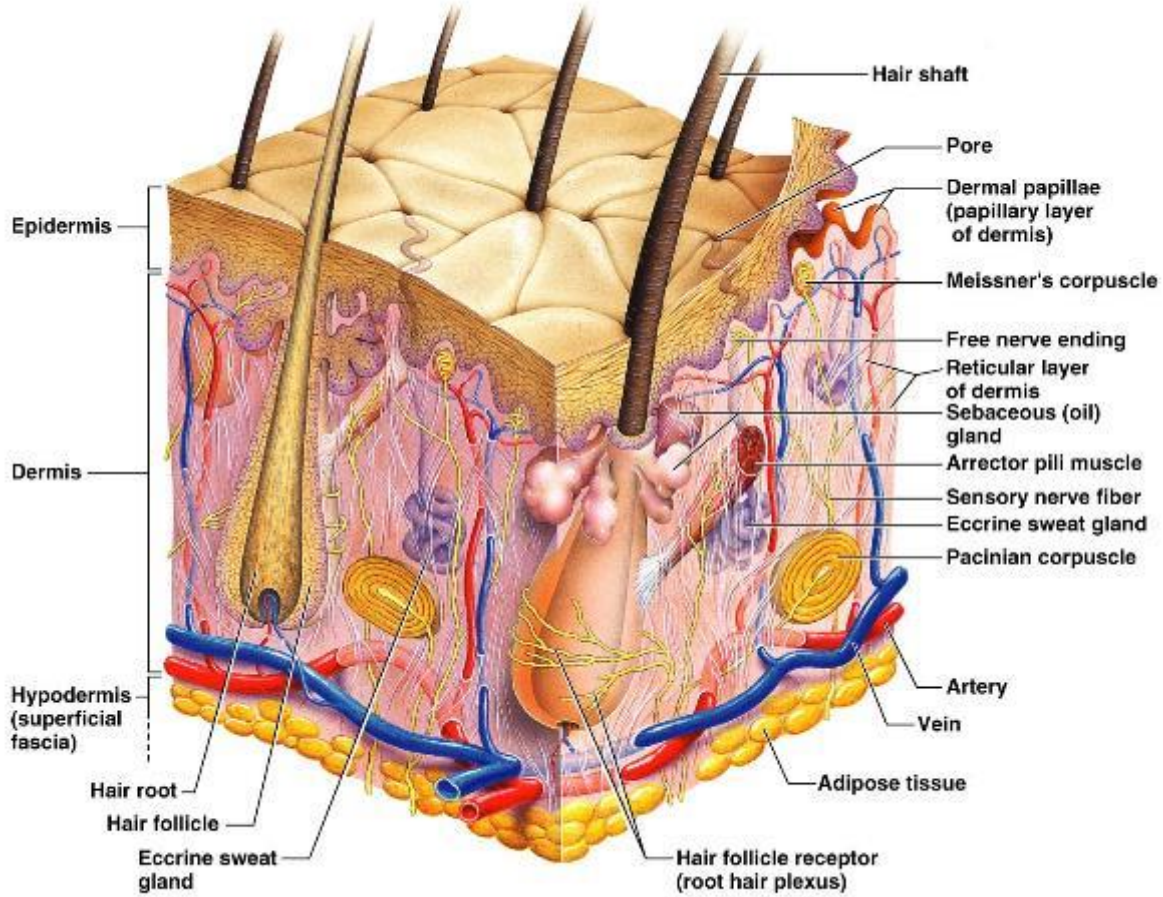
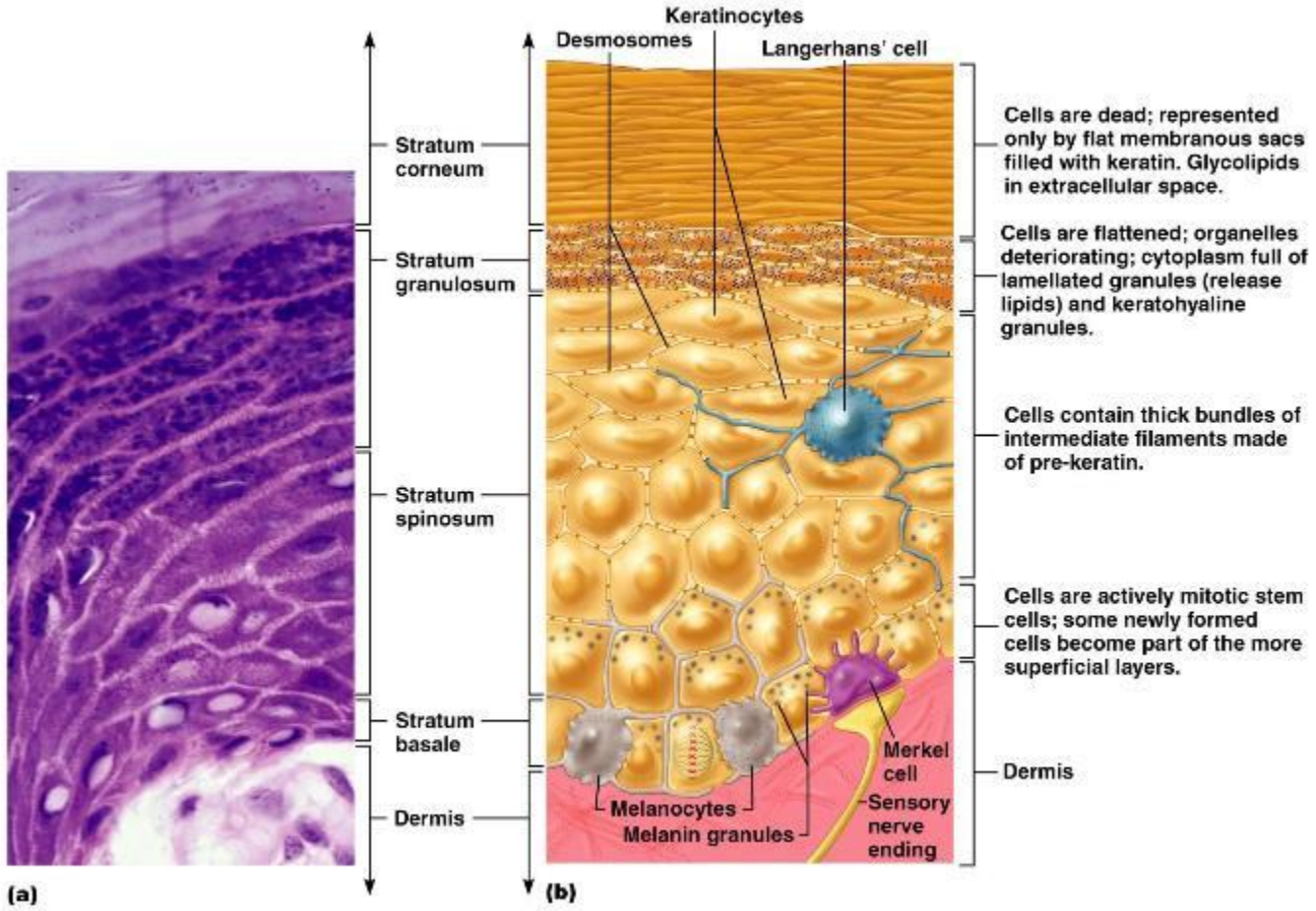
Lecture 5A:
Age-Related Changes in the Skin
Evaluation of the Skin
Infectious Skin Disorders

Integumentary Anatomy



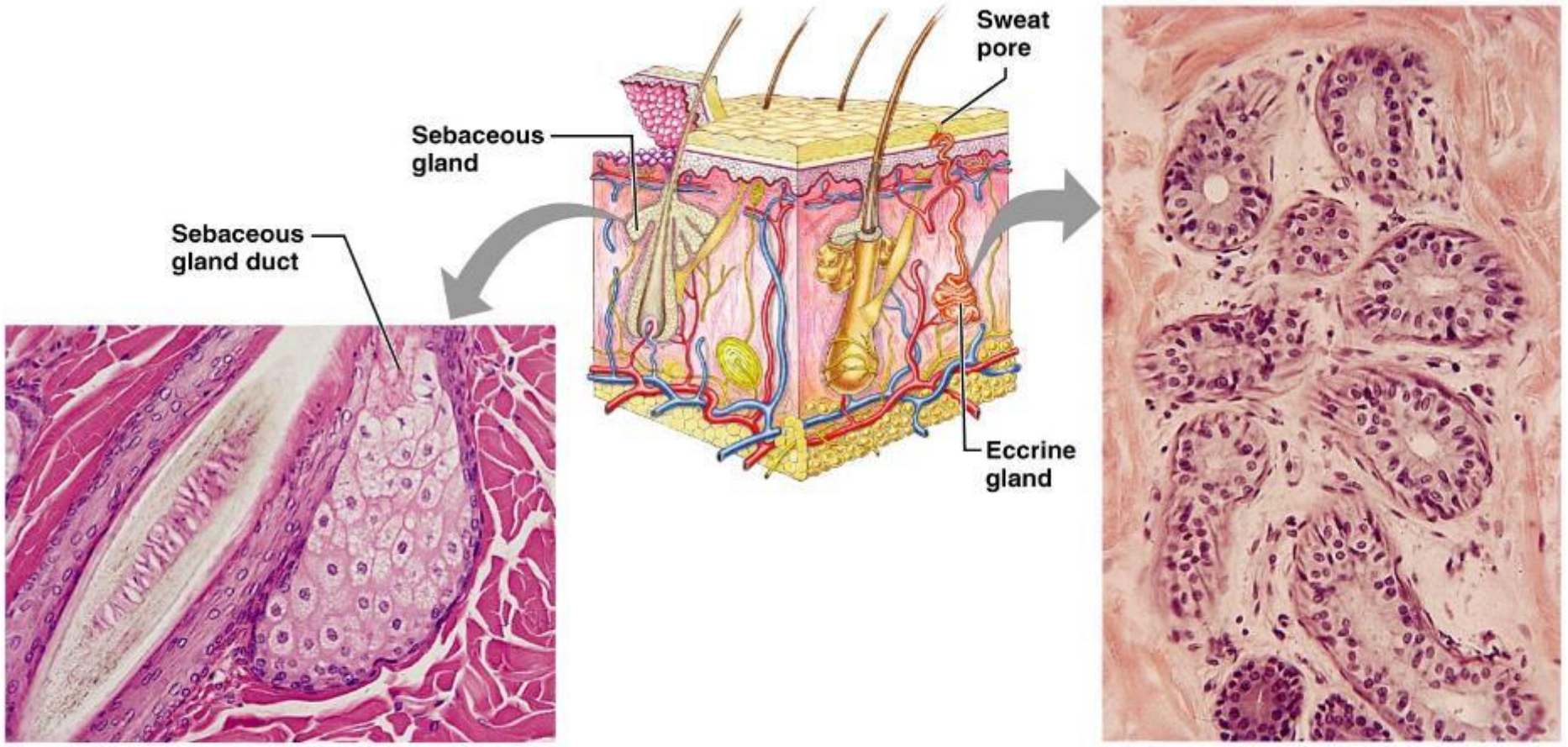
Integumentary Anatomy

Epidermal Layers



Integumentary Anatomy

Epidermal Derivatives: Sebaceous Glands & Sweat Glands



Age-Related Changes in the Skin

- **Infants and Young Children**
  - Skin is smooth and elastic. Cell division occurs often, so healing is rapid.
  - Fewer eccrine sweat glands than young to middle aged adults, so there is more reliance on blood shunting to regulate body temperature.
- **Adolescents**
  - Hormones stimulate the development and level of secretion by sebaceous glands and sweat glands during puberty.
  - Overactive sebaceous glands are associated with acne.
  - Apocrine sweat glands first appear during puberty. Apocrine sweat contains organic compounds and supports the growth of bacteria creating body odor and the need for deodorant.

Age-Related Changes in the Skin

- **Elderly Skin, Epidermis**
  - The number of cell layers remains the same, but the thickness of the epidermis declines and is more variable. Cells are less functional, so the epidermis is less able to serve as a barrier against chemicals and dehydration.
  - Mitotic activity decreases, and, in Caucasians, the number of melanocytes decreases.
- **Elderly Skin, Dermis**
  - The thickness of the dermis and the amount of fat it contains both decrease.
  - The amount of collagen and elastin fibers decreases. Elastin fibers become cross-linked and calcified (elastosis). This leads to wrinkling and a loss of resilience. These changes are more pronounced in sun-exposed areas.
  - The number of nerve fibers and blood vessels decreases, and vessel walls become fragile.

Age-Related Changes in the Skin

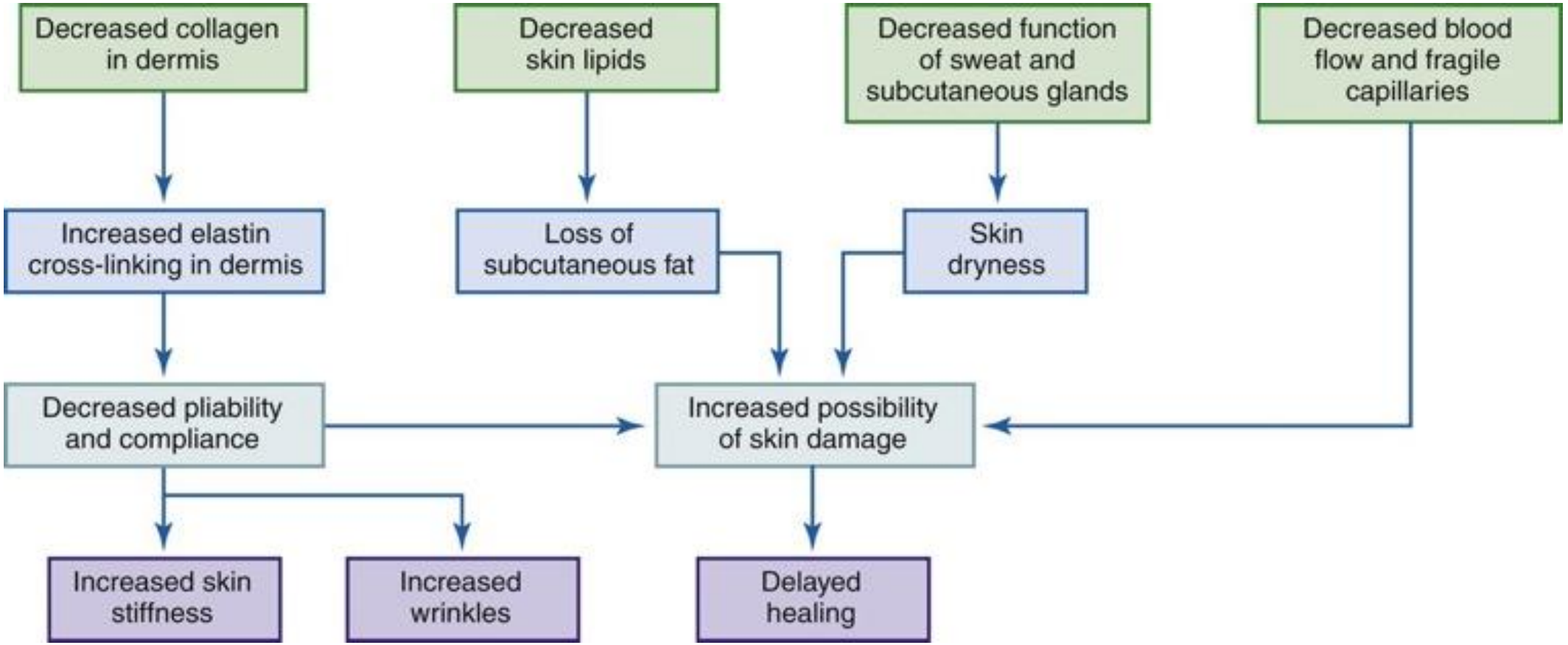
- **Elderly Skin, Subcutaneous Tissue**
  - Subcutaneous fat decreases especially in the arms and legs.
  - Vascularity decreases, so drugs administered subcutaneously are absorbed more slowly.
- **Elderly Skin, Hair**
  - Hair follicle melanocytes produce less melanin, so the hair becomes gray in color beginning at the temples of the head. Graying is less pronounced in other body regions.
  - The number of hairs decreases except on the face. Unopposed adrenal androgens produce coarse facial hair in about 50% of women. Hairs of the eyebrows, nose and ears become longer and coarser in men.
  - Frontal recession of the hair line occurs in 80% of women and 100% of men. Men may experience baldness, a genetic trait.
- **Elderly Skin, Nails**
  - Diminished blood flow causes nails to become dull, brittle, hard and thick. Longitudinal striations may lead to nail splitting.

Age-Related Changes in the Skin

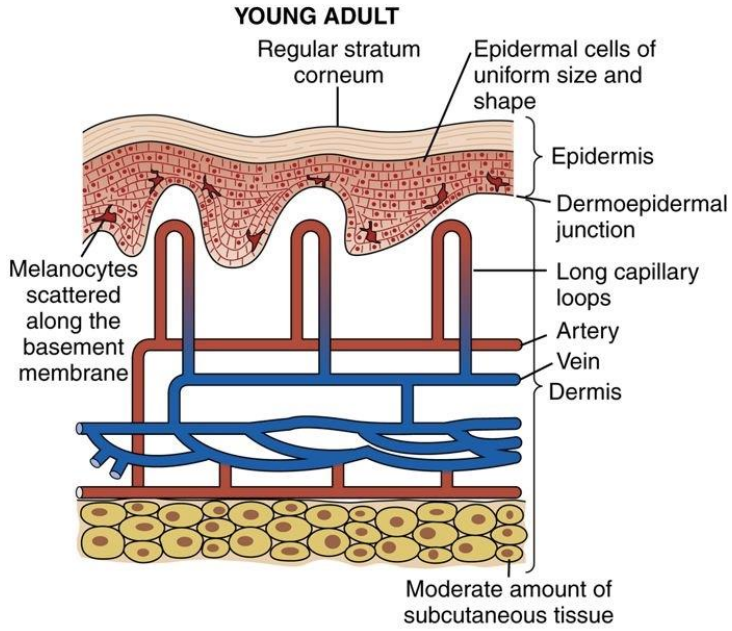
- **Elderly Skin, Glands**
  - Sebaceous glands and eccrine sweat glands decrease in number. Aprocrine sweat glands do not.
  - Sebaceous glands show little atrophy, but their function decreases, especially in women after menopause.
  - Eccrine sweat glands decrease in both size and function. The thermal threshold for sweating increases.
  - Apocrine glands don’t atrophy, but their function decreases.

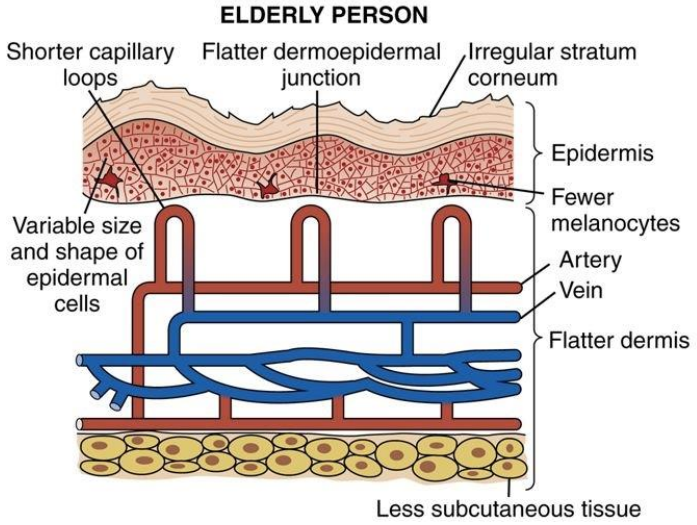
Age-Related Changes in the Skin

Characteristics of Elderly Skin



Age-Related Changes in the Skin





Evaluation Of The Integumentary System

- **Evaluation Must Include a Careful History.**
  - Family history
  - Personal history
  - Geographic origin and present abode
  - Seasonal occurrence
  - Occupation
  - Leisure activities
  - Accompanying diseases
  - Previous treatment
  - Character of lesions

Evaluation Of The Integumentary System

Evaluation Includes a Description of Lesions.

- **Primary Lesions** (lesions in their original state)
  - **Nonpalpable (flat):**
    - Macule: up to 1 cm; freckle
    - Patch: more than 1 cm; café au lait spots
  - **Palpable (raised), Solid:**
    - Papule: less than 5 mm; mole
    - Nodule: 5 mm–2 cm;
    - Tumor: larger than 2 cm
    - Plaque: well-circumscribed; slightly elevated; psoriasis
    - Wheal: caused by acute edema; mosquito bite
  - **Palpable, Fluid-filled:**
    - Vesicle: up to 5 mm; early Herpes simplex
    - Bulla: more than 5 mm; pemphigus
    - Pustule: well-circumscribed, pus-filled; acne

Evaluation Of The Integumentary System

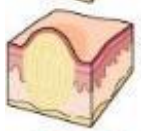
NONPALPABLE

PRIMARY LESIONS (Original Appearance)

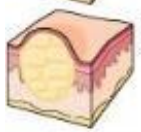
Macule: A spot, circumscribed, up to 1 cm; not palpable; not elevated above or depressed below surrounding skin surface; hypopigmented, hyperpigmented, or erythematous. **Example:** Freckles. Referred to as **patch** if greater than 1 cm. **Examples:** CafŽ au lait spots, mongolian spots.

PALPABLE, SOLID

Papule: A bump, palpable and circumscribed, elevated and less than 5 mm in diameter; may be pigmented, erythematous, or flesh-toned. **Example:** Elevated nevus (mole).



Nodule: A lesion similar to a papule, with a diameter of 5 mm to 2 cm; may have a significant palpable dermal component. **Examples:** Fibroma, xanthoma, intradermal nevi.

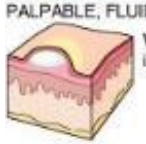


Tumor: Any mass lesion; generally larger than a nodule; may be either malignant or benign. **Example:** Lipoma.

Plaque: Usually well-circumscribed lesion with large surface area and slight elevation. **Examples:** Psoriasis, lichen planus.

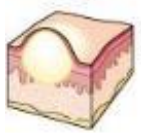
Wheal: An elevation in the skin, with a smooth surface, sloping borders, and (usually) light pink color; caused by acute areas of edema in the skin; may appear, disappear, or change form abruptly within minutes or hours; size ranges from 3 mm to 20 cm. **Example:** Mosquito bite.

PALPABLE, FLUID-FILLED



Vesicle: A small blister (up to 5 mm in diameter); fluid collection may be subcorneal, intraepidermal, or subepidermal. **Example:** Herpes simplex (early stages).

Bulla: A blister larger than 5 mm; fluid may be located at various levels. **Examples:** Pemphigus, pemphigoid.



Pustule: An elevated, well-circumscribed lesion containing purulent exudate. **Example:** Acne vulgaris.

Evaluation Of The Integumentary System

- **Secondary Lesions** (lesions modified by progression or by external agents such as scratching)
  - **Erosion**-an area of partial loss of epidermis
  - Ulceration-an area of loss of the full epidermis; leads to scarring
  - **Fissure**-a split through all epidermal layers
  - Atrophy-thinning of the skin
  - **Excoriation**-an area of loss of outer skin layers due to scratching
  - **Crust**-collection of serous exudates and debris overlying an area of damaged or absent outer skin layers
  - Scale-an area of flaking stratum corneum
  - **Lichenification**-an area of epidermal thickening and roughening with visible furrows
  - **Scar**-an area of fibrous tissue that forms to replace lost epidermal and dermal tissue
  - **Keloid**-significantly elevated scar tissue

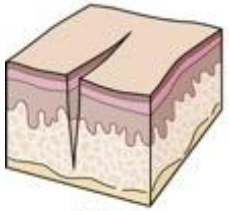
Evaluation Of The Integumentary System

SECONDARY LESIONS (Modification of Original Appearance)

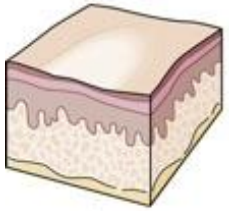
DAMAGED OR DIMINISHED SKIN SURFACE

Erosion: Loss of epidermis that does not extend into dermis. **Example:** Ruptured chickenpox vesicle.

Ulcer: Loss of skin through the epidermis; healing results in scar formation. **Example:** Stasis ulcer.



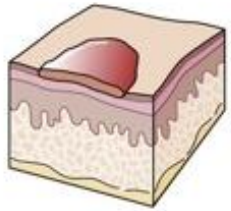
Fissure: A split in all epidermal layers of skin. **Example:** Athlete's foot.



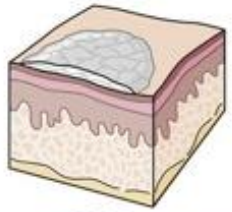
Atrophy: Diminution of epidermal surface; skin looks thinner and more translucent than normal; atrophy of the dermal layers may result in wasting or depression of the skin surface. **Example:** Arterial insufficiency.

Excoriation: Loss of outer skin layers from scratching or rubbing. **Example:** Scratched insect bite.

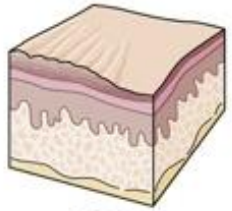
AUGMENTED OR INCREASED SKIN SURFACE



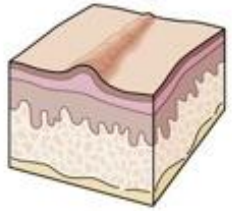
Crust: A collection of serous exudate and debris on the surface of damaged or absent outer skin layers. **Example:** Impetigo.



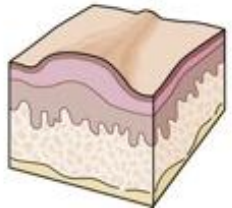
Scale: A compact portion of desquamating stratum corneum; may vary in size, thickness, and consistency. **Examples:** Psoriasis scale (compact and thick), pityriasis rosea scale (thin and small).



Lichenification: Epidermal thickening and roughening of the skin with increased visibility of skin surface furrows. **Example:** Chronic atopic dermatitis.



Scar: A collection of fibrous tissue that forms to replace lost epidermal and dermal tissue. **Examples:** Surgical scar, acne scar.



Keloid: Augmentation of scar tissue, creating a significant elevation on the skin surface after healing. **Examples:** Postsurgical scar, postacne scar.

Evaluation Of The Integumentary System

- **Lesion Descriptors**
  - **Color**
  - **Number**
    - Solitary
    - Few
    - Profuse
  - **Distribution pattern:**
    - Symmetric vs Asymmetric
  - **Surface Area Location Affected:**
    - Sun-exposed
    - Intertriginous (warm moist areas)
    - Acral (distal extremities, ears, nose)
    - Genital
    - Flexor (anterior upper limb) or extensor (posterior lower limb) areas
  - **Relationship among lesions:**
    - Confluent (blend together)
    - Clustered

Infectious Skin Disorders

- **Viral**
  - Verrucae (HPV)
  - Rubella vs Rubeola
  - Herpes Simplex Virus (HSV)
  - Chicken Pox vs Shingles (Herpes Zoster)
  - Roseola

  NOTE: Viral infections that cause skin lesions are contagious!
- **Fungal**
  - Dermatophytes
  - *Candida albicans*
- **Bacterial**
  - Impetigo
  - Acne vulgaris

Infectious Skin Disorders: Viral Infections

Verrucae (Warts)

- Warts are benign epidermal papillomas (tumors) caused by human papilloma virus (HPV). Strains that cause warts are not the same strains that are associated with cervical cancer.
- They most often occur on the hands and feet, but may occur in other areas too.
- 95% of warts will resolve untreated in 5 years, but they may multiply.
- Treatments: removal by laser, liquid nitrogen, acids, plasters

Plantar Warts

Infectious Skin Disorders: Viral Infections

Herpes Simplex Virus Type 1 and Type 2

- HSV type 1 infections occur mostly above the waist, cold sores, for example.
- HSV type 2 infections occur in the genital region.
- Lesions begin with burning or itching, vesicles and erythema follow with progression to pustules, ulcers, and crusts before healing in 10-14 days.
- HSV persists in latent form in ganglia (sites where neuron cell bodies are clustered). Recurrence may be triggered by stress, sunlight, menses, or injury.
- Treatments: Benadryl, xylocaine, and aspirin for pain; antivirals (acyclovir) to shorten outbreak period.

Infectious Skin Disorders: Viral Infections

Herpes Simplex Virus Type 1

Infectious Skin Disorders: Viral Infections

Herpes Simplex Virus Type 2

From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, p 92

From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, p 92

Infectious Skin Disorders: Viral Infections

Varicella-Zoster Virus (Herpes Simplex Type 3)

- **Herpes zoster (shingles)** is an acute localized inflammatory disease due to the reactivation of a latent varicella-zoster virus that has been present in the dorsal ganglion of a spinal nerve since childhood infection (**chicken pox**).
- There as of 2017 there is a new shingles vaccine that is very effective.
- Vesicles erupt for 3 to 5 days in **dermatomes** served by sensory neurons of a single or small group of spinal nerves usually on the trunk and face. Lesions are deeper and more confluent than chicken pox.
- Severe pain and paresthesias are common.
- The vesicles dry, form crusts, and fall off usually within 2 to 3 weeks.
- **Postherpetic neuralgia** is an important complication that occurs in 10% of shingles sufferers. Pain remains long after the after rash is gone.
- Eye involvement can cause blindness.
- Treatment is **acyclovir.** Topicals and pain medications are also useful.

Infectious Skin Disorders: Viral Infections

Varicella Zoster Virus

Chicken Pox

Shingles

Infectious Skin Disorders: Viral Infections

- **Rubella (German Measles aka Three Day Measles)**
  - One of the TORCH infections capable of causing congenital defects (cataracts, deafness, heart anomalies) if it occurs in the mother early in pregnancy.
  - May cause miscarriage.
  - Prevented by the MMR (Measles, Mumps, Rubella) vaccine.
  - Produces a pruritic maculopapular light red rash that begins on the face and moves downward. The face clears as the rash moves inferiorly.
  - Infection provides life time immunity.
- **Rubeola (Measles aka Red Measles or Hard Measles)**
  - Produces a flat (macular), red or brownish red confluent rash that begins on the face and moves downward. It is accompanied by relatively high fever.
  - Complications such as blindness, pneumonia or brain inflammation occur in 30%.
  - Prevented by MMR vaccine.
  - Still kills about 96,000 each year worldwide, mostly in Africa and Asia.
- **Roseola (Roseola Infantum or Sixth Disease)**
  - Occurs only in children.
  - Spots or patches of maculopapular rash appears after a 3-day fever. It starts on the trunk and moves to the neck and arms.
  - Herpes virus type 6 or 7

Herpes Virus Types

1	Cold sores
2	Genital Herpes
3 (Varicella-Zoster)	Chickenpox; Shingles
4 (Epstein-Barr)	Mononucleosis, Leukemias
5 (Cytomegalovirus)	Mononucleosis
6	Roseola
7	Roseola
8	Kaposi Sarcoma

NOTE: Herpes viruses are DNA viruses.

Infectious Skin Disorders: Fungal Infections

Superficial Dermatophyte Infections

- Three genera of fungi (dermatophytes) infect human skin.
- These organisms cause an infection known as **tinea**. Infections are named for the location:
  - Tinea capitis (scalp)
  - Tinea pedis (athlete's foot)
  - Tinea barbae (beard)
  - Tinea corporis ("ring worm"; skin other than scalp, groin, palms or soles)
- Manifestation is extremely variable depending on location. Most commonly lesions appear as **macules or plaques with peripheral scaling and central clearing.**
- **Onychomycosis** (fungal infection of a nail) is a white or yellow opaque discoloration that progresses to a thickened or deformed nail.
- Topical antifungals are very effective. Extensive infections require systemic therapy.

Infectious Skin Disorders: Fungal Infections

Tinea Corpis: Fungal infection

Tinea Capitis: Fungal infection

Tinea Pedis: Fungal infection

Infectious Skin Disorders: Fungal Infections

Onychomycosis: Dermatophyte (Fungus) Infection of the Fingernails

From Callen JP et al: Color atlas of dermatology, Philadelphia, 1993, Saunders, p 347.

Infectious Skin Disorders: Fungal Infections

Yeast Infection (Yeasts are unicellular fungi.)

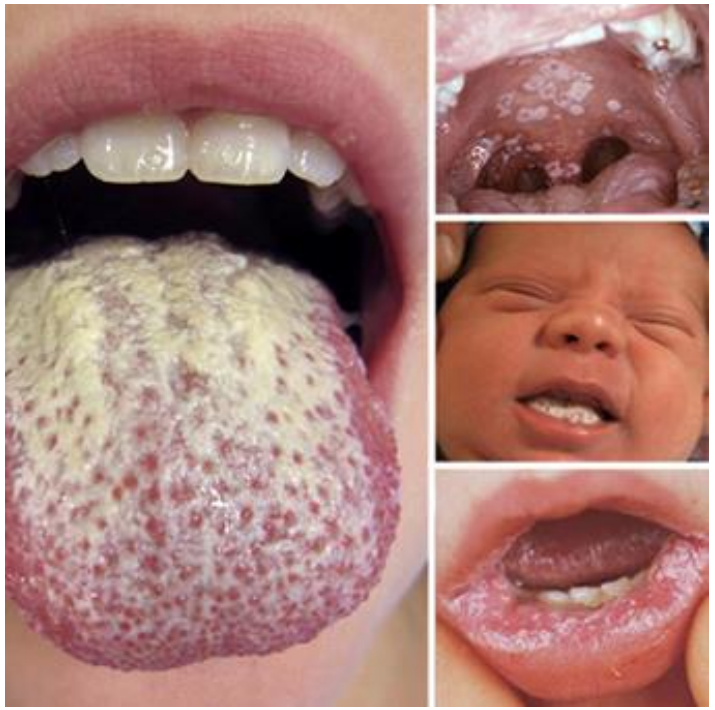
- ***Candida albicans*** infection is manifests in three ways:
  - **Thrush** in infants; white oral lesions
  - **Intertrigo** in infants and bedridden patients; usually develops in a warm, moist area (intertriginous), within a fold of skin.
  - **Chronic Mucocutaneous Candidiasis** occurs in immunocompromised individuals (HIV, etc.); affects skin, nails, and mucous membranes
- Treatment:
  - Mouth infections are treated with antifungal rinses or throat lozenges.
  - Widespread infections respond well to oral antifungals (Dyflucan).

Infectious Skin Disorders: Fungal Infections

Candida albicans (yeast) infection

Intertrigo

Oral Thrush



Infectious Skin Disorders: Bacterial Infections

Impetigo

- Acute, contagious skin disease characterized by vesicles, pustules, and yellowish crusts.
- It is caused by *Streptococcus pyogenes* or *Staphylococcus aureus.*
- Approximately 20% of adults are chronic carriers (in the nasal area) of ***Staphlococcus aureus*.**
- Staph infections are common among hospitalized patients.
- Treatment is with topical antibiotics. Extensive infections are managed with oral antibiotics.

Infectious Skin Disorders: Bacterial Infections

- **Acne Vulgaris**
  - Disease of the **sebaceous glands**
  - Infection by ***Proprionibacteria acne*** is usually involved.
  - Affects up to 90% of all individuals to some degree.
  - Severe cases cause scarring and disfigurement.
- **Etiology:**
- Affected by sex hormones, heredity, bacterial flora of the skin, stress, mechanical occlusions, and cosmetic use.
  - Thick sebum and loose epidermal cells form deposits in the hair follicle canal. Colonization by *P. acne* occurs and inflammation ensues.
  - If the follicle canal becomes closed off, a **closed comedone (white head)** results.
  - If the follicle canal remains open, a **open comedone (blackhead)** results. Deposits exposed to air darken in color
  - The follicle and/or the sebaceous gland may rupture.

Infectious Skin Disorders: Bacterial Infections

- **Topical Treatments**
  - Chemicals to stimulate **sloughing** of the stratum corneum cells and loosening of the follicular plug: sulfur, resorcinol, salicylic acid, retinol A, benzoyl peroxide
  - Astringents: alcohol and acetone based solvents to remove surface lipids and skin cells and to induce **drying.**
  - Topical antibiotics
- **Systemic Treatment (for cases with nodules or cysts)**
  - Antibiotics
  - Estrogen-dominant birth control pills
  - Vitamin A derivatives (**Accutane, Isotretinoin) Use by women of childbearing age requires concurrent use of two forms of birth control due to the risk of birth defects**.)
- **Corticosteroid injection** into cysts and nodules
- **Surgery** to drain cysts or extract comedones

Infectious Skin Disorders: Bacterial Infections

Acne Vulgaris

A.

B.

From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, p 151.

Infectious Skin Disorders: Bacterial Infections

Acne Vulgaris

A) Normal

B) Open Comedone

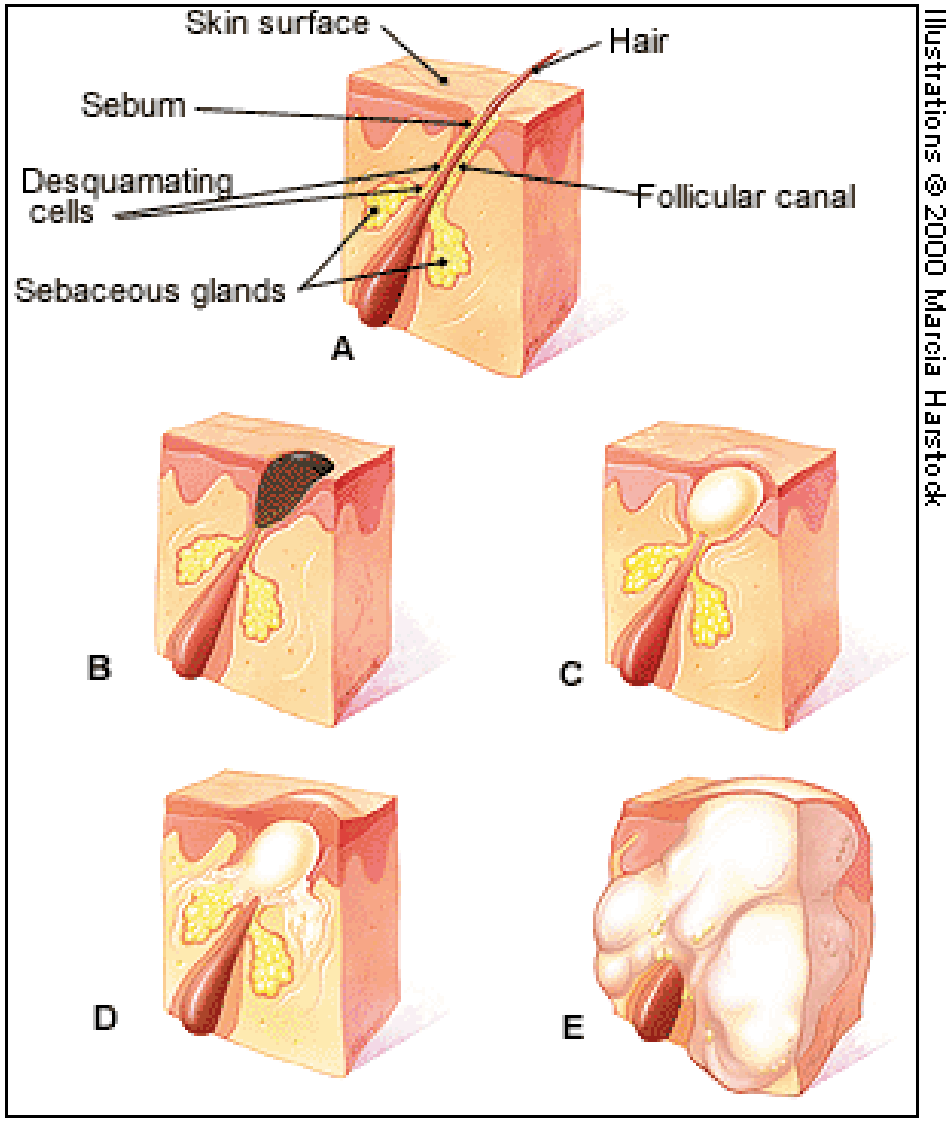
"Black head"

C) Closed Comedone

"White head"

D) Papule

E) Pustule



Lecture 5B
Noninfectious Skin Disorders
Altered Cell Growth
Other Skin Disorders

Non-Infectious Skin Disorders

- Lupus Erythematosus
- Seborrhea Dermatitis
- Psoriasis
- Pemphigus

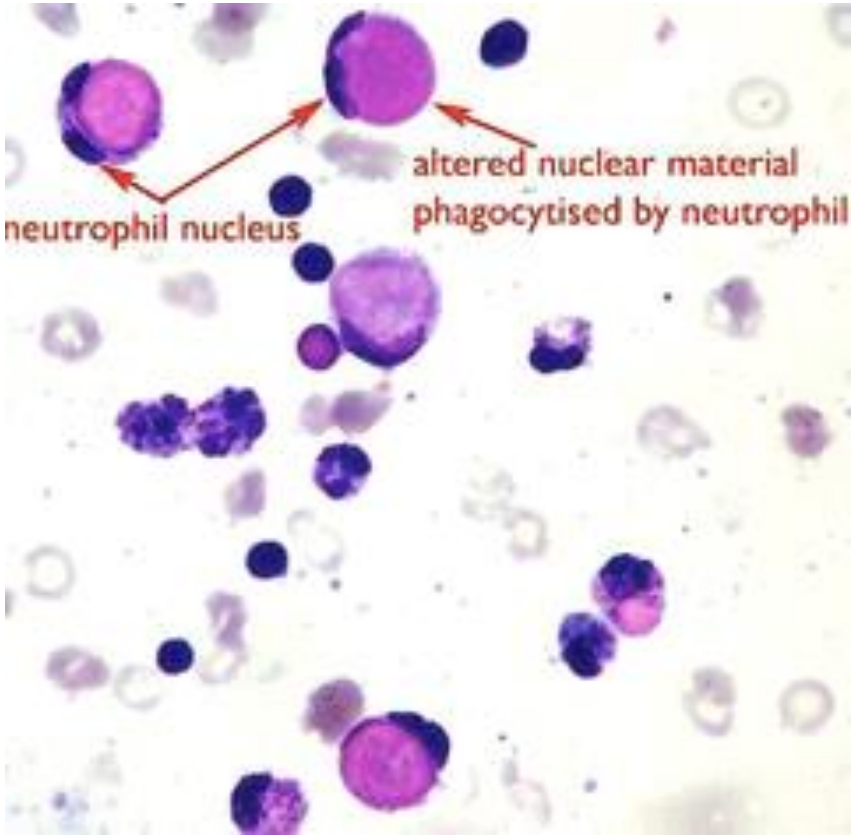
Non-infectious Skin Disorders

Lupus Erythematosus: Two Forms

- **Systemic Lupus Erythematosus**
  - Red, macular, scale-like, lesions
  - Face (malar rash=butterfly area=cheek-nose-cheek), arms, fingers, legs; usually **symmetric**
  - No scarring or pigment changes, but many systemic effects
  - **LE cell test is positive** (LE cells in peripheral blood)
- **Chronic Discoid Lupus Erythematosus**
  - Red, scale-like **well-circumscribed plaques,** elevated at edges, made worse by exposure to sunlight.
  - Face (butterfly area), scalp, ears, arms, chest; **may not be symmetric**
  - Scarring, pigment changes and hair loss often occur in lesions.
  - Not associated with systemic pathology
  - **LE cell test negative**

Non-infectious Skin Disorders

LE cell=a neutrophil (or monocyte) that has phagocytized the altered nuclear material of another cell. The nuclear contents of the other cell have been converted to a homogeneous mass by interactions with anti-nuclear antibodies. Recall that lupus involves an autoimmune response against nuclear contents.



Non-infectious Skin Disorders

Systemic Lupus Erythematosus
Malar (Butterfly) Rash
Note that the nasolabial folds are rash-free.

Non-infectious Skin Disorders

Chronic Discoid Lupus Erythematosus

A.

B.

From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, pp 15, 16.

Non-infectious Skin Disorders

Chronic Discoid Lupus Erythematosus

(From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, pp 15, 16.)

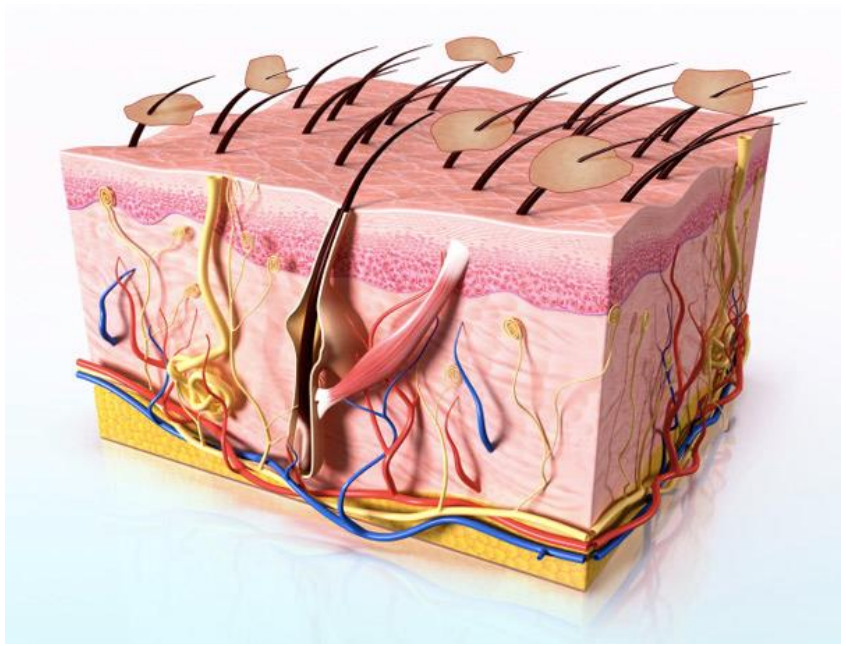
Non-infectious Skin Disorders

Seborrheic Dermatitis

- An inflammation caused by **overactive sebaceous glands** (seborrhea)
- Appears to be related to a heightened immune response to normal flora skin fungi of the genus *Malassezia*.
- Manifested by scaling and erythema (redness) in areas of high sebaceous gland concentration:
  - Scalp, eyebrows, glabellae (between the eyebrows), eyelids, nasolabial folds, pinna and posterior sulcus of the ears, sternum, axillae, umbilicus, and anogenital area.
- **Cradle cap** in infants
- **Dandruff** in adults
- No cure
- Treatment:
  - Tar, zinc, selenium, sulfide or salicylic acid shampoo for scalp.
  - Mild topical corticosteroids for face and ears.

Non-infectious Skin Disorders

Seborrheic Dermatitis



Non-infectious Skin Disorders

Psoriasis

- Multigene **inherited** condition that appears to be related to immune stimulation of epidermal keratinocytes. No cure
- Defects in the immune system promote chronic inflammation and **hyperproliferation** in the skin.
- Characterized by papules and plaques with **silvery scale**.
- Lesions appear most often on the knees, elbows, lower back, scalp, and nails.
- Progression is unpredictable with spontaneous exacerbations and remissions.
- Treatment:
  - Topicals (corticosteroids, vitamin D derivative ointment, tar preparations)
  - UV light exposure
  - Methotrexate and hydroxyurea are effective, but may be toxic.

Non-infectious Skin Disorders

Psoriasis

From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, p 280.

Non-infectious Skin Disorders

Pemphigus

- A group of disorders characterized by **bullae (blisters).**
- Patients have autoantibodies against keratinocytes and basement membrane components.
- A combination of **Type II and Type III hypersensitivity**
- Pemphigus vulgaris has the worst prognosis.
- Bullae can erupt on skin and mucous membranes.
- Toxemia and infection can be deadly
- Treatment: corticosteroids

Non-infectious Skin Disorders

Pemphigus Vulgaris

From Callen JP et al: Color atlas of dermatology, Philadelphia, 1993, Saunders, p 163.

Altered Cell Growth: Skin Tumors

Benign Dermal Tumors

- Squamous papilloma from keratinocytes
- Nevus (mole) from melanocytes
- Lipoma from adipocytes
- Hemangioma from endothelial cells
- Dermatofibroma from fibroblasts
- Neuroma from neurons

Dermal Malignancies

- **Kaposi sarcoma** (not a true sarcoma, despite its name) arises from **lymphatic vessel endothelial** cells (So, it's a carcinoma.) that have been infected with HSV (herpes simplex virus) Type 8 virus.
- Tumor cells break loose and metastasize to locations throughout the body, including the dermal layer of the skin. The internal tumors, not the skin tumors, are life-threatening.
- Occurs most often in persons with immunodeficiency (HIV, for example).

Altered Cell Growth: Skin Tumors

Kaposi Sarcoma: HSV type 8

Altered Cell Growth: Skin Tumors

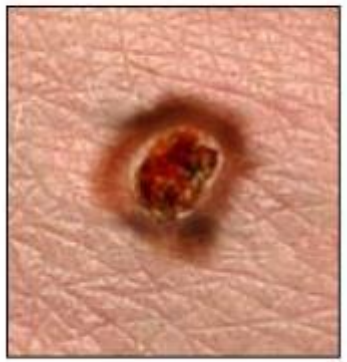
Epidermal Malignancies

- **Basal cell carcinoma** (stratum basale keratinocytes) is the most common and most benign skin cancer.
- **Squamous cell carcinoma** (stratum spinosum keratinocytes) is the second most common skin cancer and may metastasize.
- **Malignant melanoma** (melanocytes) is rare and unpredictable. It can be highly malignant. Prognosis is based on size, depth, and presence of metastasis.
  - Remember the ABCDE rule!
- Treatment: surgical excision

Altered Cell Growth: Skin Tumors

- **Basal cell carcinoma (BCC)** lesions commonly present as slowly growing nodules with a waxy/pearl-like surface, frequently with a shiny elevated border. They most often arise on the face.
- **Squamous cell carcinoma (SCC)** lesions present as enlarging scaly or crusted lumps. **Actinic keratosis** is a lesion (rough, scaly or crusty patch) that predisposes one to the development of SCC.

Squamous cell carcinoma



Basal cell carcinoma

Altered Cell Growth: Skin Tumors

Malignant Melanoma

ABCDE Rule
A-asymmetric shape
B-border is uneven
C-colors are multiple
D-diameter>6 mm
E-evolves (changes)

Altered Cell Growth: Skin Tumors

Xeroderma Pigmentosum (XP)

- XP is an autosomal recessive genetic disorder that impairs the ability of cells to repair DNA damage, especially by NER (nuclear excision repair).
- Patients have very sun-sensitive skin with freckles and lesions (actinic keratosis, for example) in sun exposed areas. Most XP patients will develop a skin cancer **before age 10!**
- In XP patients there is a 10,000X greater chance of non-melanoma skin cancers and a 2,000X greater chance of melanomas than in the population as a whole.
- Eye and neurological problems occur as well.
- XP occurs in all races, but skin with less melanin is more susceptible to DNA damage by the sun.
- Intermarriage in certain cultural groups has increased occurrence. This is true in both **Acoma and Navajo** tribal groups.

Altered Cell Growth: Skin Tumors

Xeroderma Pigmentosa (XP)

Altered Cell Growth: Epidermal Proliferation

- **Congenital Ichthyosis (“fish skin”)**
  - Rare, usually inherited; may be acquired (cancer, thyroid disorders, HIV//AIDS); excessive growth of keratinocytes (**hyperkeratosis**) giving skin a scaly appearance.
- **Corns (smaller, on or between toes) and calluses (larger, usually on the bottom of the foot)** result from **hyperkeratosis** due to stimulation of the epidermis by intermittent pressure.

Ichthyosis

Parasitic Skin Infestations

- Scabies
- Lice
- Bed Bugs
- Ticks: Rocky Mountain Spotted Fever
- Ticks: Lyme Disease

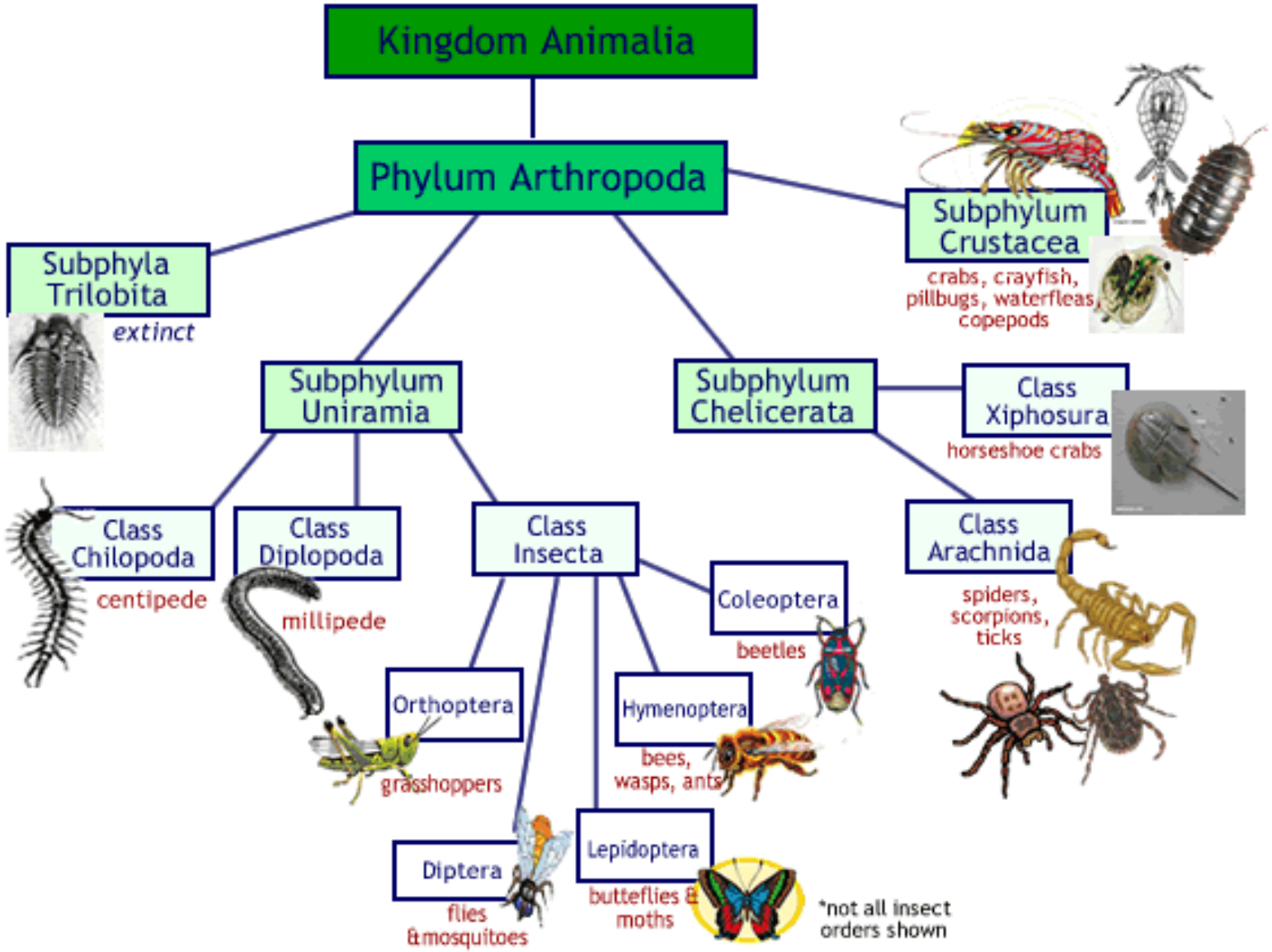
Parasitic Skin Infestations

Scabies

- A contagious **mite** infestation. Mites aren't insects. They are **chelicerates (like spiders).**
- Mite eggs are laid on the stratum corneum.
- Larvae appear in 3-4 days and grow to adulthood in about 2 months.
- The larvae burrow into deeper layers of the skin.
- Lesions are small (1-4 mm) **pruritic papules**, some with overlying scale or crust. **Linear brown furrows** may be seen top of lesions.
- Mites prefer finger webs, wrists, umbilicus, and groin areas. The eruptions spreads over a period of weeks.
- Treatment: Topicals to kill the mites; antipruritics

Parasitic Skin Infestations

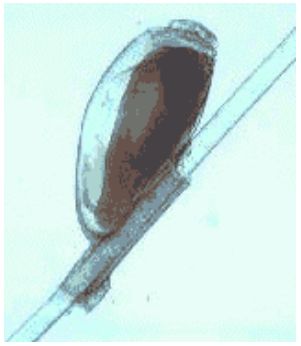
Scabies: Mites


Kingdom Animalia
Phylum Arthropoda
Subphyla Trilobita
extinct
Subphylum Crustacea
crabs, crayfish, pillbugs, waterfleas, copepods
Subphylum Uniramia
Subphylum Chelicerata
Class Xiphosura
horseshoe crabs
Class Chilopoda
centipede
Class Diplopoda
millipede
Class Insecta
Class Arachnida
spiders, scorpions, ticks
Coleoptera
beetles
Orthoptera
grasshoppers
Hymenoptera
bees, wasps, ants
Diptera
flies & mosquitoes
Lepidoptera
butteflies & moths
*not all insect orders shown

Parasitic Skin Infestations

Lice

- Three types of lice infest humans. Lice are **insects.**
  - **Crabs (pubic lice)**
  - **Head lice**
  - **Body lice**
- Lice eggs (nits) adhere tightly to hairs. Their bites appear as small red or pink bumps sometimes covered with a crust of blood.
- Lice **don't burrow like mites**, and they can be seen without magnification.
- Treatment: Topicals to kill the lice: liquid, gel, or shampoo.



Parasitic Skin Infestations

Bed Bugs

- Reddish brown insects that turn purple after consuming **human blood.**
- They live beyond 1 year if properly fed, and will feed on other animals, if humans are not available.
- They are nocturnal feeders and omit a foul odor when crushed.
- The lesion is a **pruritic oval or oblong wheal with a small hemorrhagic punctum at the center**. Bullous lesions are not uncommon.
- Usually lesions are multiple and arranged in **rows or clusters** on the face, neck, hands, and arms, but no area is exempt.
- Bites are probably a **type I hypersensitivity** reaction to the anticoagulant **saliva** of the bed bug.
- Secondary excoriation and bacterial infection may occur.
- The bite is painless, so it is not uncommon for the victim to sleep through the attack.
- Treatment: topical antipruritics.
- Professional extermination is advised because bedbugs are very good at hiding.

Parasitic Skin Infestations

Bedbugs

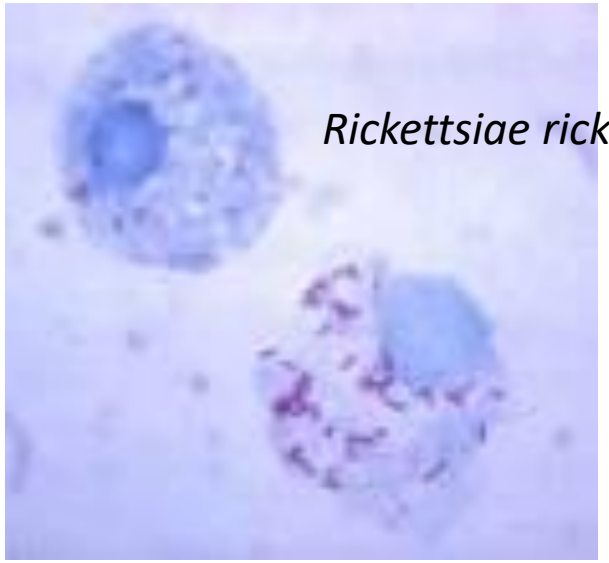
Parasitic Skin Infestations

Ticks-Rocky Mountain Spotted Fever

- Caused by ***Rickettsia rickettsii*** *(Gram– intracellular bacterium)*
- It is transmitted by **ticks** (chelicerates).
- The tick must be attached to the human host for 4-6 hours for the infection to take hold. *Rickettsiae* are found in tick feces and body parts.
- Within 4-8 days fever, headache, muscle aches, nausea, and vomiting occur.
- A **macular or maculopapular rash** then appears on a **wrist or ankle** and spreads to the rest of the body.
- Other symptoms: generalized edema, conjunctivitis, petechiae, photophobia, lethargy, confusion, and cranial nerve deficits.
- Treatment: hospitalization and antibiotic therapy
- Ticks should be removed by first dousing them with mineral oil or alcohol and then slowly pulling them out with tweezers. The practice of applying a hot match to the end of the tick is a bad idea as the tick may regurgitate into the open wound!

Parasitic Skin Infestations

Rocky Mountain Spotted Fever



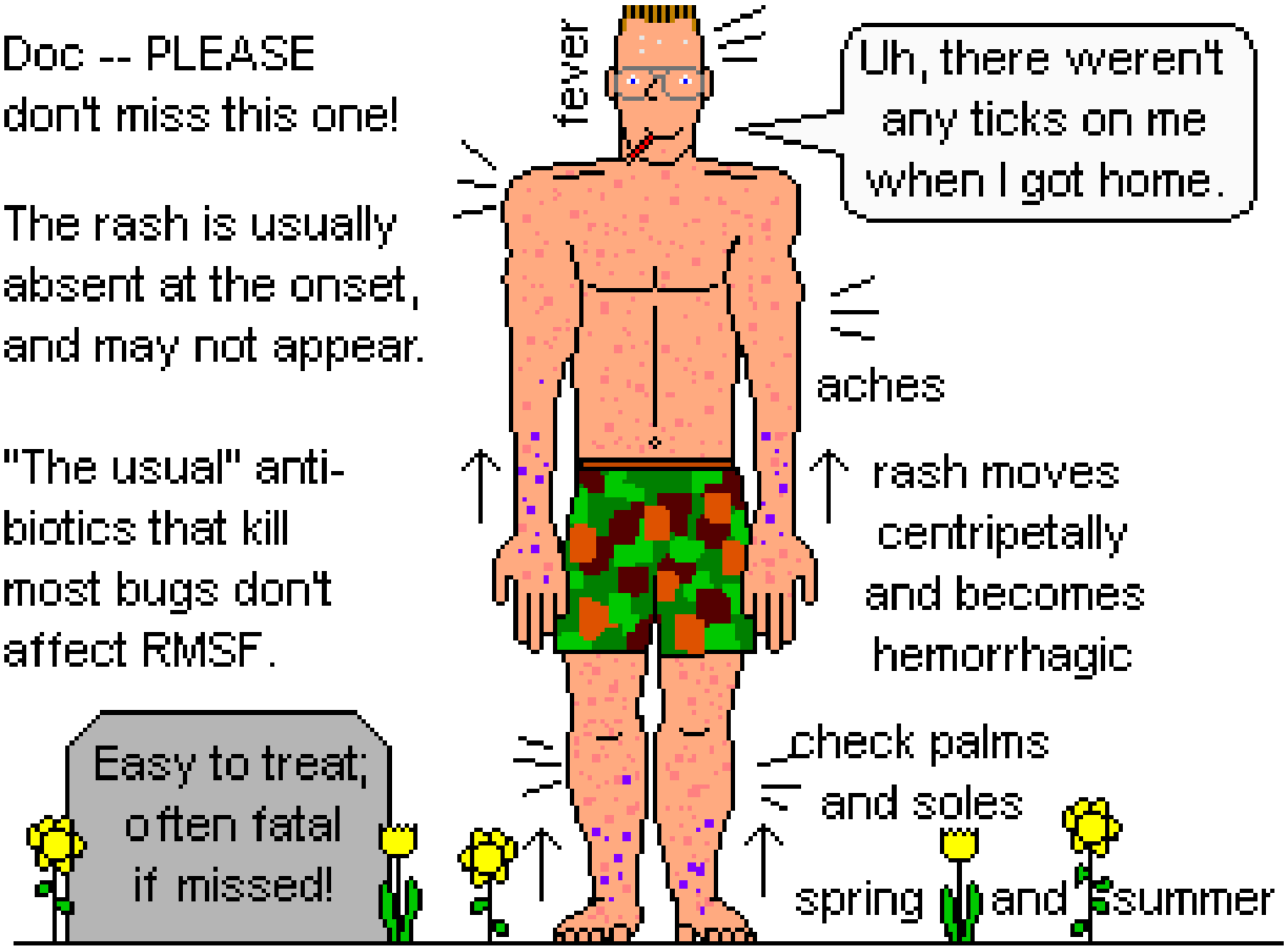
Rickettsiae rickettsii

Rocky Mountain Spotted Fever

Doc -- PLEASE
don't miss this one!

The rash is usually
absent at the onset,
and may not appear.

"The usual" anti-
biotics that kill
most bugs don't
affect RMSF.



Parasitic Skin Infestations

Ticks-Lyme Disease

- Caused by the spirochete, ***Borrelia burgdorferi.***
- Reservoirs include white-tailed deer and white-footed mice.
- Multiple symptoms affect the skin, nervous system, heart, and musculoskeletal system.
- Three stages:
  - **Stage I**: single or multiple papules with surrounding rash that clears in between the bite and periphery to form a **"bullseye" pattern**; may be accompanied by flu symptoms
  - **Stage II**: occurs weeks or months later if the patient remains untreated; meningitis; peripheral neuropathy; cranial nerve palsies, and possible cardiac involvement
  - **Stage III**: oligoarthritis (arthritis in 2-4 joints)
- Treatment: antibiotics

Stage I Bullseye

Other Skin Disorders

Sunburn and Photosensitivity

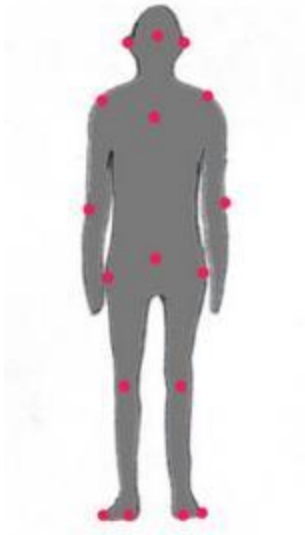
- Sunburn manifests as erythema, pain, heat, and occasionally blistering, edema, and tenderness.
- Severe sunburn may be accompanied by chills, fever, and nausea.
- Treatment: cold water compresses, topical steroids, systemic steroids if severe and widespread
- Prevention
  - Avoid or limit sun exposure
  - Use sunscreen. Sunscreens that contain avobenzones, zinc oxide or titanium dioxide protect against BOTH UVA and UVB light rays.
- **UVA vs UVB**
  - UVB has a shorter wavelength (higher frequency) than UVA. DNA absorbs uv light in the UVB range causing thymine dimer mutations. The damage could lead to skin cancer.
  - UVA is more abundant in sunlight than UVB. It is only slightly absorbed by DNA, but it is absorbed by other skin molecules leading to free radical production. The free radicals then damage the DNA. The damage could lead to skin cancer.

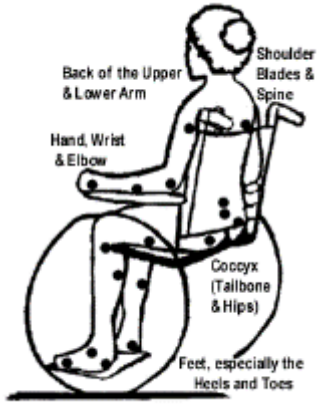
Other Skin Disorders

Decubitus Ulcers (Pressure Sores)

- Localized necrotic areas caused by prolonged pressure (ischemia) between any bony prominence and an external object such as a bed or wheelchair.
- Predisposing factors: poor nutrition, aging, immobility, superficial sensory loss, dementia, and disturbed autonomic control.
- Pressure sores are graded (1-4) according to depth.
- **Superficial sores** are reddened areas involving only the superficial skin layers.
  - They are caused by friction, shearing stresses, or saturation with urine or other wet agents.
  - They are painful but easily prevented and treated.
- **Deep sores** develop as a result of thrombosis and resultant occlusion of the vessels in deep tissue over bony prominences.
  - The sore begins as a reddening of the skin. In 1-2 days the lesions bursts through the skin to reveal a deep cavity full of black or infected slough, which may go through to the bone.
  - Extensive scarring occurs.

Other Skin Disorders





Decubitus Ulcer

Other Skin Disorders

Prevention of Decubitus Ulcers

- Change position every 2 hours
- Do not over-sedate or under-sedate
- Avoid malnutrition
- Avoid dehydration, maintain BP, and cardiac output
- Use an alternating pressure airbed or waterbed
- **Treatment** of deep pressure sores: vitamin supplements, avoid infection, avoid anemia, clean and dress lesions, irrigate with warm saline daily

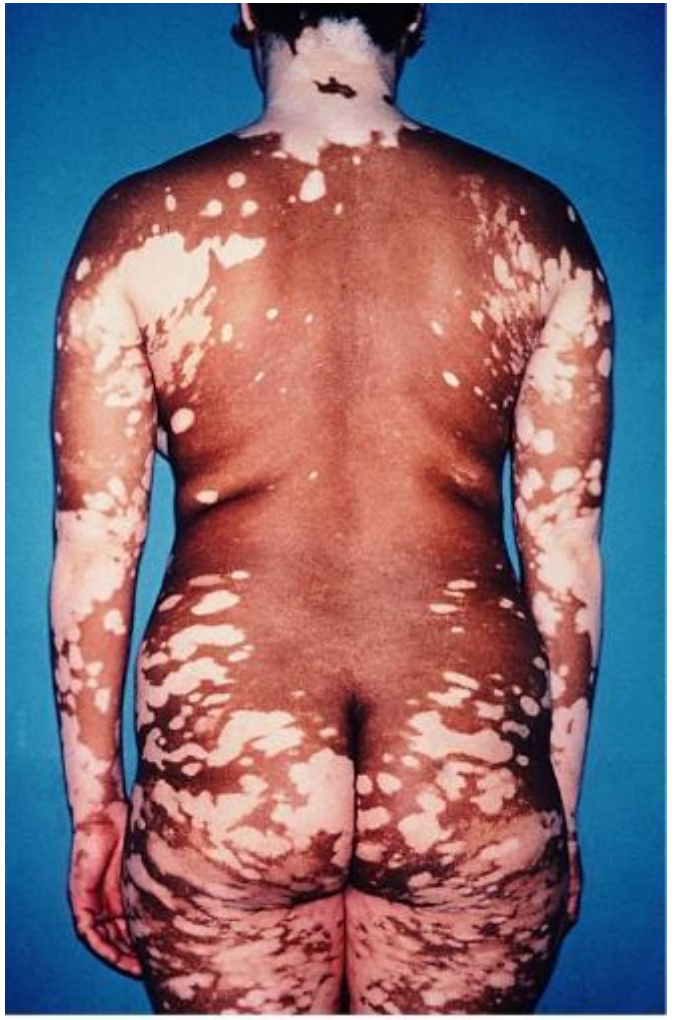
Other Skin Disorders

Vitiligo

- Pigment disappears from a patch of skin.
- It is a multifactorial disorder that has a sudden onset and an association with **autoimmune** destruction of **melanocytes.**
- It usually occurs before **age 21**. It is more noticeable in dark-skinned persons than light-skinned.
- Occurs on the face, axillae, neck or extremities. The borders are smooth. Size of depigmentation patches varies.
- Depigmented areas burn in the sun and appear bone colored or grayish blue.
- PUVA Treatment
  - **Psoralen (a plant extract)** in conjunction with ultraviolet radiation (**UVA**) to darken the skin
  - This treatment may also be useful in **psoriasis and eczema**.
- **Michael Jackson** had vitiligo.

Other Skin Disorders

Vitiligo



From Callen JP et al: Color atlas of dermatology, ed 2, Philadelphia, 2000, Saunders, p 282.

QUIZ 5AB

- COMPLETE QUIZ 5AB ON BLACKBOARD.
- THEN GO ON TO MODULE 5CD PPT.