Skin Disorders

Bio 375
Pathophysiology

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

### Table 27–1

<table>
<thead>
<tr>
<th>Description of Some Skin Lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Macule</strong></td>
</tr>
<tr>
<td><strong>Papule</strong></td>
</tr>
<tr>
<td><strong>Nodule</strong></td>
</tr>
<tr>
<td><strong>Furuncle</strong></td>
</tr>
<tr>
<td><strong>Vesicle</strong></td>
</tr>
<tr>
<td><strong>Pustule</strong></td>
</tr>
<tr>
<td><strong>Crust</strong></td>
</tr>
<tr>
<td><strong>Lichenification</strong></td>
</tr>
<tr>
<td><strong>Keratosis</strong></td>
</tr>
<tr>
<td><strong>Rupture</strong></td>
</tr>
<tr>
<td><strong>Ultraderm</strong></td>
</tr>
<tr>
<td><strong>Erosion</strong></td>
</tr>
<tr>
<td><strong>Comedone</strong></td>
</tr>
</tbody>
</table>

### 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)
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)

- 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
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

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)
Eczema is common in infancy and childhood

<table>
<thead>
<tr>
<th>Type of eczema</th>
<th>Sites</th>
<th>Typical age</th>
<th>History</th>
<th>Other points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atopic eczema</td>
<td>Face, elbows, hands, and knees</td>
<td>1-5 years</td>
<td>May also have asthma</td>
<td>May develop eczema in atopic family, atopic dermatitis</td>
</tr>
<tr>
<td>Contact eczema</td>
<td>Skin contact sites</td>
<td>Childhood or adulthood</td>
<td>May develop eczema in contact with irritants or allergens</td>
<td>May develop eczema in sensitive individuals</td>
</tr>
<tr>
<td>Nummular eczema</td>
<td>Axilla, elbow, knee, and foot</td>
<td>Adults</td>
<td>May develop eczema in response to various irritants or allergens</td>
<td>May develop eczema in individuals with skin sensitivity</td>
</tr>
</tbody>
</table>

- **Atopic eczema** is common in infancy and childhood and often persists into adulthood. It is often associated with other atopic conditions such as asthma and allergic rhinitis.
- **Contact eczema** typically occurs in individuals with skin sensitivity to irritants or allergens. It is often seen in children who have been exposed to substances such as soap, detergent, or certain foods.
- **Nummular eczema** usually affects adults and is characterized by circular patches on the skin. It is often triggered by irritants or allergens.

Diagnosis and management of eczema involve identifying the specific type of eczema and addressing the underlying cause. Treatment options include medications, topical creams, and lifestyle modifications to reduce exposure to irritants and allergens.
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

- 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

Psoriasis
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

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.

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
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.

Furuncles

- 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

Impetigo
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.

**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.
Recurrance 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.

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.
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
- **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.

- **Pediculosis (Lice)**
  - Three forms in humans:
    - Pediculus humanus corporis or body louse
    - Pediculus pubis or pubic louse
    - Pediculus humanus capitus 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.
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

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
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

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
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.

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.
Kaposi’s Sarcoma

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