Session 8
Integumentary System Disorders 2
Bioscience Department
Session Learning Outcomes

At the end of the session, student should be able to:

- Define Eczema and discuss general classification and clinical morphology of Eczema
- Discuss the aetiology, types, pathophysiology, clinical features, diagnosis, complications and management of Atopic eczema.
- Define other varieties of eczemas.
- Define Psoriasis and discuss its aetiology, pathophysiology, clinical features, investigations, and management.
- Define Lichen planus and discuss its clinical features, pathophysiology, diagnosis, and management.
- Discuss various skin infections and discuss their clinical presentation.
Session Plan

- Eczema
- Psoriasis
- Lichen planus
- Skin infections and infestations
  - Bacterial Infections
  - Viral Infections
  - Fungal Infections
  - Scabies
  - Lice
Eczema
Eczema

Definition: Eczema or dermatitis refer to distinctive reaction patterns in the skin, which can be either acute or chronic and are due to a number of causes.

<table>
<thead>
<tr>
<th>Classification of eczema</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Endogenous</strong></td>
</tr>
<tr>
<td>• Atopic, seborrhoeic</td>
</tr>
<tr>
<td><strong>Exogenous</strong></td>
</tr>
<tr>
<td>• Irritant, allergic, photoallergic, chronic actinic dermatitis</td>
</tr>
<tr>
<td><strong>Characteristic patterns and morphology</strong></td>
</tr>
<tr>
<td>• Asteatotic, discoid, gravitational, lichen simplex, pompholyx</td>
</tr>
</tbody>
</table>

## Eczema

### 28.22 The clinical morphology of eczema

<table>
<thead>
<tr>
<th>Acute</th>
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</thead>
<tbody>
<tr>
<td>• Erythema, oedema, usually typically ill-defined</td>
</tr>
<tr>
<td>• Papules, vesicles and occasionally bullae</td>
</tr>
<tr>
<td>• Exudation, fissuring</td>
</tr>
<tr>
<td>• Scaling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chronic</th>
</tr>
</thead>
<tbody>
<tr>
<td>• May be as above but less oedema, vesiculation and exudate</td>
</tr>
<tr>
<td>• Lichenification: skin thickening with pronounced skin markings, secondary to chronic rubbing and scratching</td>
</tr>
<tr>
<td>• Fissures, excoriations</td>
</tr>
<tr>
<td>• Dyspigmentation: hyper- and hypopigmentation can occur</td>
</tr>
</tbody>
</table>

Atopic Eczema

- **Definition:** Generalised, prolonged hypersensitivity to common environmental antigens, such as pollen and house dust mite, is the hallmark of atopy, in which there is a genetic predisposition to produce excess IgE.

- **Aetiology:**
  - Genetic factors: Filaggrin (FLG) gene mutations
  - Environmental factors
  - Epidermal barrier impairment

- **Classification:**
  - Extrinsic
  - Intrinsic
Atopic Eczema

Pathophysiology:

- Environment
  - Barrier disruption
    - Hapten exposure
    - Protein exposure
      - Contact dermatitis-like reaction (Th1)
      - Chronic hapten exposure
  - Allokinesis: sema3A
  - Pruritus/scratch
    - Development of AD (Th2)
      - T cell-derived itch mediator: IL-31
        - High IgE
          - Allergic march

Atopic Eczema

- Clinical features:
  - Extremely itchy and scratching
  - Widespread cutaneous dryness (roughness)
  - Distribution and character of the rash vary with age

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28.24 Atopic eczema: distribution and character of rash

<table>
<thead>
<tr>
<th>Babies and Infants</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Often acute and facial involvement prominent</td>
</tr>
<tr>
<td>- Trunk involved but nappy area usually spared</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Flexures: behind knees, antecubital fossae, wrists and ankles</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Face and trunk usually involved, limb involvement not restricted to flexures</td>
</tr>
<tr>
<td>- Lichenification common</td>
</tr>
</tbody>
</table>

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Atopic Eczema

- Diagnosis: Mainly depends on clinical history and examination.

28.23 Diagnostic criteria for atopic eczema

Pruritus and at least three of the following are required:
- History of itch in skin creases (or cheeks if < 4 yrs)
- History of asthma/hay fever (or in a first-degree relative if < 4 yrs)
- Dry skin (xeroderma)
- Visible flexural eczema (cheeks, forehead, outer limbs if < 4 yrs)
- Onset in first 2 yrs of life
Atopic eczema. A. This patient had life-long chronic atopic eczema and experienced a generalised flare of disease triggered by infection. B. Lichenification of chronic flexural eczema secondary to rubbing and scratching.
Atopic Eczema

- Complications:
  - Secondary bacterial or viral infection
  - Increased susceptibility to irritants
  - Increased susceptibility to allergy
  - Impact on life and health

- Management:
  - Continuous use of emollients and skin hydration
  - Avoid exposure to environmental irritants and foods
  - Topical corticosteroids
  - Wet-wrap therapy

Atopic Eczema: atopic skin disease, in which there is a genetic predisposition to produce excess IgE.

- Epidermal barrier impairment
  - immune stimulation and subsequent inflammation
  - Activation of keratinocytes to produce chemokines (IL, Nerve growth factors, Sema 3A)
  - Attract Antigen presenting cells and activate helper T cells
  - B cells activation and plasma cell differentiation to produce IgE
  - Mast cells sensitisation
- Mutations in the filagrin gene
  - Decreased production of Natural moisturising factor that maintains skin hydration and pH
  - Widespread cutaneous dryness and crust formation
  - Pruritus and scratching
  - Type I hypersensitivity: Enhanced Inflammatory reactions
    - Acute: Erythema, oedema, Papules, vesicles and occasionally bullae, Exudation, fissuring, Scaling
    - Chronic: Less oedema, Vesiculation and exudate; Lichenification; Fissures, excoriations; hyper- and hypopigmentation
- Environmental factors: exposure to allergens in utero or during childhood
  - Diagnostic Criteria: Pruritus and at least three of the following are required:
    - History of itch in skin creases (or cheeks if < 4 yrs)
    - History of asthma/hay fever (or in a first-degree relative if < 4 yrs)
    - Dry skin (xeroderma)
    - Visible flexural eczema (cheeks, forehead, outer limbs if < 4 yrs)
    - Onset in first 2 yrs of life
  - Management:
    - Avoid known irritants
    - Diet modification
    - Topical therapies
    - Antibiotics
    - Sedating antihistamines
  - Complications:
    - Secondary infection
    - Increased susceptibility to irritants and allergens
    - Impact on quality of life and health
## Other Types of Eczema

<table>
<thead>
<tr>
<th>Type</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Seborrhoeic</strong></td>
<td>Characterised by a red scaly rash and classically affects the scalp (dandruff), central face, nasolabial folds, eyebrows and central chest. It is due to <em>Pityrosporum ovale</em> infection of the skin.</td>
</tr>
<tr>
<td><strong>Discoid eczema</strong></td>
<td>Characterised by discrete coin shaped lesions, particularly on the limbs of young and elderly men.</td>
</tr>
<tr>
<td><strong>Irritant eczema</strong></td>
<td>Accounts for most occupational cases of eczema. Strong irritants have acute effects, whereas weaker irritants commonly cause chronic eczema. Detergents, alkalis, acids, solvents and abrasives are common irritants.</td>
</tr>
<tr>
<td><strong>Allergic contact</strong></td>
<td>Delayed hypersensitivity to allergens. Previous contact is must with common allergens. There are many recognisable patterns, e.g. eczema of the earlobes, wrists and umbilicus due to contact with allergens. Oedema may also be a feature.</td>
</tr>
</tbody>
</table>
# Other Types of Eczema

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Asteatotic eczema</td>
<td>Frequently seen in hospitalized elderly patients with dry skin, low humidity. Mostly on the lower legs as a rippled or crazy paving pattern of fine fissuring on an erythematous background.</td>
</tr>
<tr>
<td>Gravitational (stasis) eczema</td>
<td>This occurs on lower legs and is often associated with signs of venous insufficiency like oedema, redness or bluish discolouration, loss of hair, induration, hemosiderin pigmentation and ulceration.</td>
</tr>
<tr>
<td>Lichen simplex</td>
<td>Plaque of lichenified eczema due to repeated rubbing/scratching as a habit/due to stress. Common in nape of neck, lower legs and anogenital areas.</td>
</tr>
<tr>
<td>Pompholyx</td>
<td>Intensely itchy vesicles and bullae occur on the palms, palmar surface and sides of the fingers and soles.</td>
</tr>
</tbody>
</table>

Psoriasis
Psoriasis

- Definition: It is a chronic inflammatory, hyper proliferative skin disease characterised by well-defined, erythematous scaly plaques, particularly affecting extensor surfaces and scalp, and usually follows a relapsing and remitting course.

- Aetiology:
  - Genetic factors: *PSORS1* on chromosome 6
  - Environmental factors:
    - Trauma
    - Infection
    - Sunlight
    - Drugs
    - Psychological factors
    - Smoking and heavy alcohol
Psoriasis

Pathophysiology:
Hyperkeratosis and parakeratosis $\rightarrow$ Inflammation $\rightarrow$ Supra papillary plate thinning and vascular changes (tortuosity of dermal capillary loop vessels and release of vascular endothelial growth factor)

Psoriasis

- Clinical presentation:
  - Several presentations:
    - Chronic plaque psoriasis
    - Guttate psoriasis
    - Erythrodermic psoriasis
    - Pustular psoriasis
    - Psoriatic arthropathy
Chronic Plaque Psoriasis

- Clinical features:
  - Raised, well-demarcated erythematous plaque of variable size
  - Silver/White scale, more obvious on scraping the surface.
  - The most common sites: the extensor surfaces, notably elbows and knees, and the lower back.
  - Other sites: scalp, nails, flexures and palms
  - Nails: ‘Thimble pitting’, onycholysis, subungual hyperkeratosis and periungual involvement
Chronic Plaque Psoriasis

A

B

C

D

Grossman, S, Porth, CM 2013, Porth’s pathophysiology, Concepts of Altered Health States, 9th edn, Lippincott Williams & Wilkins
http://www.dermnetnz.org/doctors/principles/nails.html
Guttate Psoriasis

- Clinical features:
  - Most common in children and adolescents
  - May present shortly after a streptococcal throat infection and rapidly evolves
  - Droplet-shaped, small (usually less than 1 cm in diameter), erythematous, scaly and numerous lesions
  - Guttate psoriasis often heralds the onset of plaque psoriasis in adulthood
  - May clear spontaneously or with topical treatment within a few months, but UVB is highly effective.
Guttate Psoriasis


Erythrodermic Psoriasis

- Clinical features:
  - Rare form of psoriasis
  - Involves all body surfaces, including the hands, feet, nails, trunk, and extremities
  - Lesions scale and become confluent, leaving much of the body surface bright red, with continuous skin shedding
  - Severe itching and pain
  - Severe complications related to loss of body fluids, proteins, and electrolytes and disturbances in temperature regulation.

Pustular Psoriasis

- Clinical features:
- Two varieties
  - Generalised – Rare but serious
    - Sudden onset, large number of small sterile pustules erupting on a red base
    - Usually febrile and systemically unwell patient, coinciding with appearance of new pustules, requires immediate treatment.
  - Localised – More common
    - Primarily affects palms and soles
    - Chronic and comprises small sterile pustules on red base
    - Resolve leaving brown macules or scaling
    - More common in heavy cigarette smokers
Psoriatic Arthropathy

- Clinical features:
  - Between 5% and 10% of individuals with psoriasis develop an inflammatory arthropathy.
  - Five patterns:
    - Asymmetrical inflammatory oligoarthritis
    - Symmetrical polyarthritis
    - Distal interphalangeal arthritis
    - Psoriatic spondylitis
    - Arthritis mutilans
Psoriasis

Diagnosis:
- Mainly depend on clinical history and examination
- Biopsy
- Assessment of impact on life and psoriasis severity
- Rheumatology assessment

Management:
- Topical agents
- Photo(chemo) therapies
- Systemic agents
- Intensive inpatient or day patient care
Psoriasis: a chronic inflammatory, hyper proliferative skin disease characterised by well-defined, erythematous scaly plaques, particularly affecting extensor surfaces and scalp

Genetic factors: PSORS1 on chromosome 6

Environmental factors: Trauma, Infection, Sunlight, Drugs, Psychological factors, Smoking and heavy alcohol

Hyperkeratosis and parakeratosis

Inflammation with a T-cell lymphocytic infiltrate and release of cytokines and adhesion molecules

Supra papillary plate thinning, tortuosity of dermal capillary loop vessels and release of vascular endothelial growth factor

Raised, well-demarcated erythematous plaque

Silver/White scale, more obvious on scraping the surface.

Chronic plaque psoriasis
Guttate psoriasis
Erythrodermic psoriasis
Pustular psoriasis
Psoriatic arthropathy

Diagnosis:
Mainly depend on clinical history and examination
Biopsy
Assessment of impact on life and psoriasis severity
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Topical agents
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Colour Key:
Definition
Aetiology
Pathophysiology
Clinical features
Diagnosis
Management
Complications

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Lichen planus
Lichen Planus

- Definition: A rash characterised by intensely itchy polygonal papules with a violaceous hue involving the skin and less commonly the mucosa, hair, and nails.

- Aetiology:
  - Unknown

- Pathophysiology:
  An immune reaction to unknown antigen → heavy, bandlike T-lymphocyte infiltrate in the papillary dermis, with affinity for the epidermis → epidermal–dermal junction involvement (‘sawtooth’ appearance), with damage to the basal cell layer and hyperkeratosis.
Lichen Planus

- Clinical features:
  - On the distal limbs, most commonly on the flexural aspects of the wrists and forearms, and on the lower back.
  - Intensely itchy and violaceous, shiny, flat-topped, polygonal papules, with a characteristic Wickham’s striae.
  - Köbner phenomenon followed by generalised rashes
  - Mucous membrane involvement
  - Nail involvement
  - Scalp involvement
Lichen Planus

A. Violaceous papules on the flexural aspect of forearm, arising at a site of minor linear trauma (Köbner phenomenon).

B. Oral eruptions: white fine dots, slightly raised and present as lines (Striae of Wickham).

B. http://www.ouhsc.edu/geriatricmedicine/education/Oral_Health/Lichen_Planus.htm
Lichen Planus

- **Diagnosis:**
  - Mainly depend on clinical history and examination
  - Skin biopsy

- **Management:**
  - Self-limiting condition
  - Local corticosteroids
  - Systemic corticosteroids
  - Phototherapy
  - Retinoids or immunosuppressants
  - Surveillance and smoking cessation
Skin infections and infestations
Skin Infections and Infestations

- **Bacterial Infections**
  - Impetigo
  - Erythrasma
  - Ecthyma
  - Folliculitis, furuncles and carbuncles
  - Staphylococcal Scalded Skin Syndrome
  - Antibiotic resistance and MRSA
  - Cellulitis and erysipelas

- **Viral Infections**
  - Viral warts
  - Herpes simples
  - Chickenpox
  - Shingles

- **Fungal infections**
  - Tinea corporis
  - Tinea cruris
  - Tinea pedis

- **Scabies**

- **Lice**
Bacterial Infections
Impetigo

- Definition: common and highly contagious superficial bacterial skin infection that exists in two forms: non-bullous impetigo and bullous impetigo

- Aetiology:
  - Bullous impetigo: a staphylococcal epidermolytic toxin
  - Non-bullous impetigo: either *Staphylococcus aureus* or *Streptococcus pyogenes*, or both together


Non-bullous impetigo.
Impetigo

- Clinical features:
  - Usually affects the face, scalp and limbs.
  - Lesions may be single or multiple and coalesce
  - Non-bullous impetigo:
    - A thin-walled vesicle develops; it rapidly ruptures and is rarely seen intact. Dried exudate, forming golden crusting, arises on an erythematous base.
  - Bullous impetigo:
    - A superficial epidermal split and the occurrence of intact blisters with clear to cloudy fluid, which last for 2–3 days

- Management:
  - Oral antibiotic
  - Topical antiseptics
  - Systemic antibiotics
Erythrasma

- **Definition:** mild, chronic, localised, superficial skin infection

- **Aetiology:**
  - *Corynebacterium minutissimum*

- **Clinical features:**
  - Mildly itchy and lesions are well defined, red/brown and scaly usually occurs in flexures and toe clefts

- **Management:**
  - Topical azole
  - Oral erythromycin
  - Antiseptics

[Image of Erythrasma on skin]
Ecthyma

○ Definition: Purulent skin infection characterised by ulceration under an exudative crust.

○ Aetiology:
  • Staphylococcus or Streptococcus or both

○ Clinical features:
  • Adherent crusts overlying ulceration
  • Common in drug abusers
  • Predisposing factors: Poor hygiene, malnutrition and scabies, minor trauma

http://library.med.utah.edu/kw/derm/pages/in05_3.htm
Cellulitis and Erysipelas

- Definition: Cellulitis is inflammation of subcutaneous tissue, and erysipelas is bacterial infection of the dermis and upper subcutaneous tissue.

- Aetiology: Group A β-haemolytic streptococci

- Clinical features:
  - Face (erysipelas) and legs (cellulitis) mostly affected
  - Site is hot, painful, erythematous and oedematous.
  - Blistering often occurs and may be haemorrhagic.
  - Regional lymphadenopathy
  - Well-defined edge in erysipelas; ill-defined in cellulitis
Cellulitis and Erysipelas

Acute cellulitis of the leg: Note the chronic lymphoedema and the haemorrhagic blistering.

Erysipelas: Note the blistering and the crusted rash with raised, erythematous edge. The yellow discoloration is due to topical iodine treatment.

Superficial Folliculitis

Definition: Inflammation of the ostium of the hair follicle.

Aetiology: *Staphylococcus aureus*, physical or chemical injury

Clinical features:
- Mostly on the scalp or limbs
- Pustules usually resolve without scarring in 7–10 days but can become chronic.
- In older children and adults, they may progress to a deeper form of folliculitis

[Image: Folliculitis pustules](http://img.webmd.com/dtmcms/live/webmd/consumer_assets/site_images/articles/health_tools/visual_guide_to_boils_slideshow/dermnet_rm_photo_of_folliculitis.jpg)
Folliculitis (furuncles & carbuncles)

- **Definition:** Furuncle is an acute infection of the hair follicle, usually with necrosis. Carbuncle is an infection of a group of contiguous hair follicles.

- **Aetiology:** *Staphylococcus aureus*

- **Clinical features:**
  - Inflammatory follicular nodules that become pustular, fluctuant and tender
  - Upon rupture lesions discharge pus, become necrotic and leave a scar
  - Fever and mild constitutional upset

Staphylococcus Scalded skin Syndrome

- **Definition:** A potentially serious exfoliating cutaneous disease that occurs predominantly in children, particularly neonates.

- **Aetiology:** *Staphylococcus aureus* toxins

- **Clinical features:**
  - Fever, irritability and skin tenderness.
  - Erythema usually begins in the groin, axillae and around the mouth.
  - Blisters and superficial erosions
  - develop over 1–2 days and can rapidly involve large areas, with severe systemic upset.
Staphylococcus Scalded skin Syndrome

A Extensive erythema and superficial peeling of the skin.

B. Generalized confluent exfoliation of skin caused by toxic epidermolysis at the granular layer of the epidermis.

B. http://web2.tmu.edu.tw/g158090009/jacklecs/pic/test/ans014.html
Viral Infections
**Viral Warts**

- **Definition:** An exaggeration of the normal skin structures with an irregular thickening of the stratum spinosum and greatly increased thickening of the stratum corneum.

- **Aetiology:** Human papillomavirus (HPV)

- **Clinical features:**
  - Initially smooth, skin-coloured papules, which become hyperkeratotic and ‘warty’
  - Most common on the hands, also occur on the face, genitalia and limbs, often multiple.
  - Plantar warts (verrucae) have a slightly protruding rough surface and horny rim and are often painful on walking


Viral wart on the finger: The capillary loops are evident within the warty hyperkeratosis.
**Herpes Simplex**

- **Definition:** It causes infections of the skin and mucous membrane (i.e., cold sore or fever blister).

- **Aetiology:** Herpes simplex virus (HSV) type 1 and 2

- **Clinical features:**
  - Symptomatic later in life
  - Gingivostomatitis, pharyngitis or painful genital tract lesions.
  - Associated with fever and regional lymphadenopathy
  - Establishes latent infection in the nerve ganglia of autonomous neurone
  - Episodes of reactivation throughout life.

Grossman, S, Porth, CM 2013, Porth’s pathophysiology, Concepts of Altered Health States, 9th edn, Lippincott Williams & Wilkins
Shingles

- **Definition:** Reactivation of latent Varicella zoster virus that lie dormant in dorsal root ganglion of sensory nerves.

- **Aetiology:** Varicella zoster virus (VZV)

- **Clinical features:**
  - Burning discomfort occurs in the affected dermatome
  - discrete vesicles 3–4 days later.
  - a brief viraemia, distant satellite ‘chickenpox’ lesions.
  - Occasionally paraesthesia without rash
  - Chickenpox may be contracted from a case of shingles but not vice versa

Fungal Infections
Tinea corporis

- **Definition**: A superficial fungal dermatophyte skin infection commonly called ringworm.

- **Aetiology**: *Microsporum canis* (from dogs) and *Trichophyton verrucosum* (from cats)

- **Clinical features**:
  - Erythematous, annular and scaly, rashes with well-defined edge and central clearing.
  - Pustules at the active edge.
  - Usually asymmetrical
  - Single or multiple.

**Tinea Cruris**

- **Definition:** Itchy, erythematous plaques develop in the groins and extend on to the thighs, with a raised active edge.

- **Aetiology:** *Trichophyton rubrum*

**Tinea Capitis**

- **Definition:** A dermatophyte infection of scalp hair shafts and is most common in children.

- **Aetiology:** *Trichophyton tonsurans, Microsporum audouinii, Microsporum canis*

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*Trichophyton rubrum* infection of the groin

*Microsporum canis* infection of the scalp


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Tinea pedis (athlete’s foot)

- **Aetiology:** *Trichophyton rubrum, T. interdigitale* and *Epidermophyton floccosum*

- **Clinical features:**
  - An itchy rash between the toes, with peeling, fissuring and maceration.
  - Involvement of sole or palm with fine scaling
  - Vesiculation or blistering

(a) The scaling of tinea pedis appears between and under the toes and on the plantar surface.
(b) Tinea pedis may also present as vesicles.

Scabies and Lice
Scabies

- Aetiology: *Sarcoptes scabiei*

- Clinical features:
  - Palms and soles with pustules in small children
  - Pruritus
  - Secondary eczematization elsewhere on the body;
  - Face and scalp are rarely affected, except in infants.
  - Involvement of the genitals in males and of the nipples
  - Itch can continue and occasionally nodular lesions persist even after successful treatment
Scabies

- **Diagnosis:**
  - Identification of the scabietic burrow and visualising the mite (by extracting with a needle or using a dermatoscope)

- **Management:**
  - Topical treatment
  - Immunosuppression
  - Systemic treatment

- **Complications:**
  - Secondary infection
  - Glomerulonephritis due to nephritogenic streptococci.

Lice

- Head lice: Infestation with the head louse, *Pediculus humanus capitis*. Scalp itch leads to scratching, secondary infection and cervical lymphadenopathy.

- Body lice: These are similar to head lice but live on clothing, particularly in seams, and feed on the skin. Itch, excoriation and secondary infection occur.

- Pubic (crab) lice: Usually, these are sexually acquired and very itchy.

Reading and Resources

- Crowley LV, 2012, *An Introduction to Human Diseases – Pathology and Pathophysiology Correlations*, 9th edn, Jones and Bartlett Learning
Reading and Resources

- Mosby’s dictionary of medicine, nursing and health professions 2013, 9th edn, Elsevier, St. Louis, MO.
- VanMeter, KC & Hubert, RJ 2014, *Gould's pathophysiology for the health professions*, 5th edn, Elsevier, St Louis, MO.
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