

# Basics of dermatology



إعداد محمود بركات

# ملاحظات

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❖ هذا الملف مقدمة للجلدية الهدف منه تقرأه قبل ما تبلىش جلدية إذا حاب ما تكون زي رجل الطاولة في الراوند وطبعاً كل ما يمشي الوقت يبطل له معنى تفتحه روح أقرأ من الدوسية أحسنك

❖ الملف بالكامل مشمول في دوسيه الجلدية "Dermatology Detailed Dossier"

# Normal skin

# Normal skin

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Three layers:

❖ **Epidermis:** keratinocytes (squamous epithelial cells)

- Stratum **C**orneum
- Stratum **L**ucidum
- Stratum **G**ranulosum
- Stratum **S**pinosum
- Stratum **B**asalis
- Mnemonic: **C**ome, **L**ets **G**et **S**ome **B**ananas

❖ **Dermis:** connective tissue, vessels

❖ **Subcutaneous fat** (also called hypodermis or subcutis)

# Epidermal Layers

## ❖ Stratum Corneum

- Anucleated cells
- Filled with keratin filaments

## ❖ Stratum Lucidum

- Clear layer of dead skin cells

## ❖ Stratum Granulosum

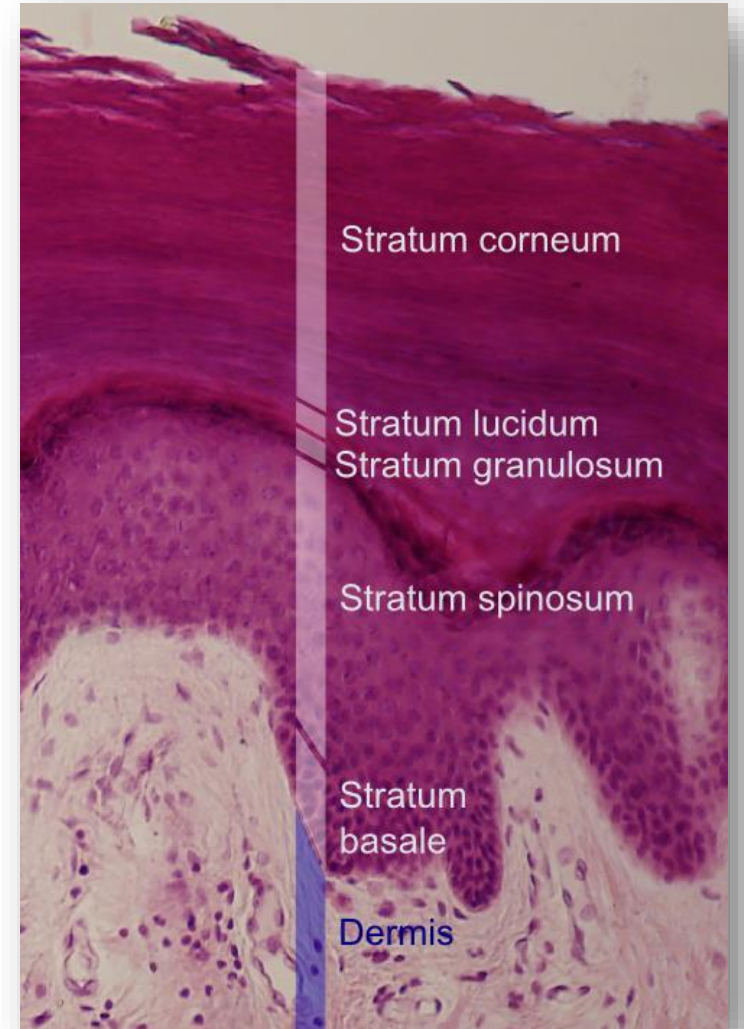
- Keratohyalin granules
- Form keratin filaments

## ❖ Stratum Spinosum

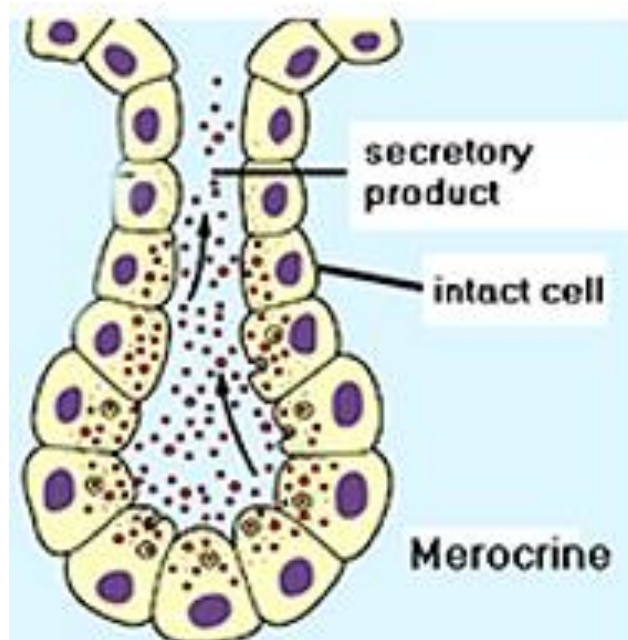
- **Desmosomes** form spines

## ❖ Stratum Basalis

- Stem cells

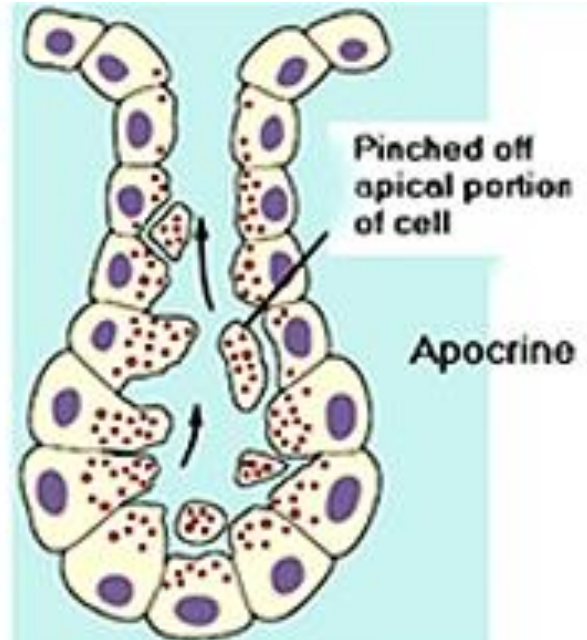


# Types of glands

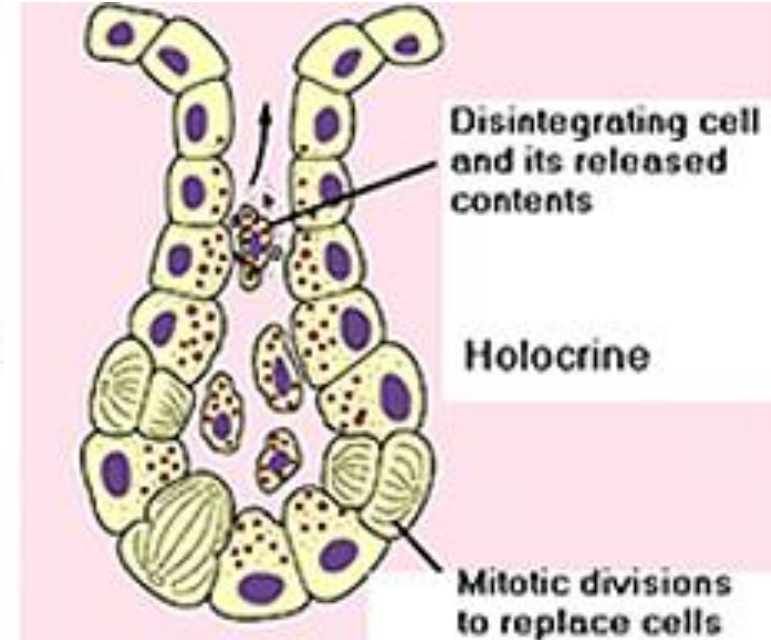


Salivary glands, eccrine sweat glands, and apocrine sweat glands

مش محطوبة بالغلط انتبه !



Mammary glands



Sebaceous glands and meibomian glands

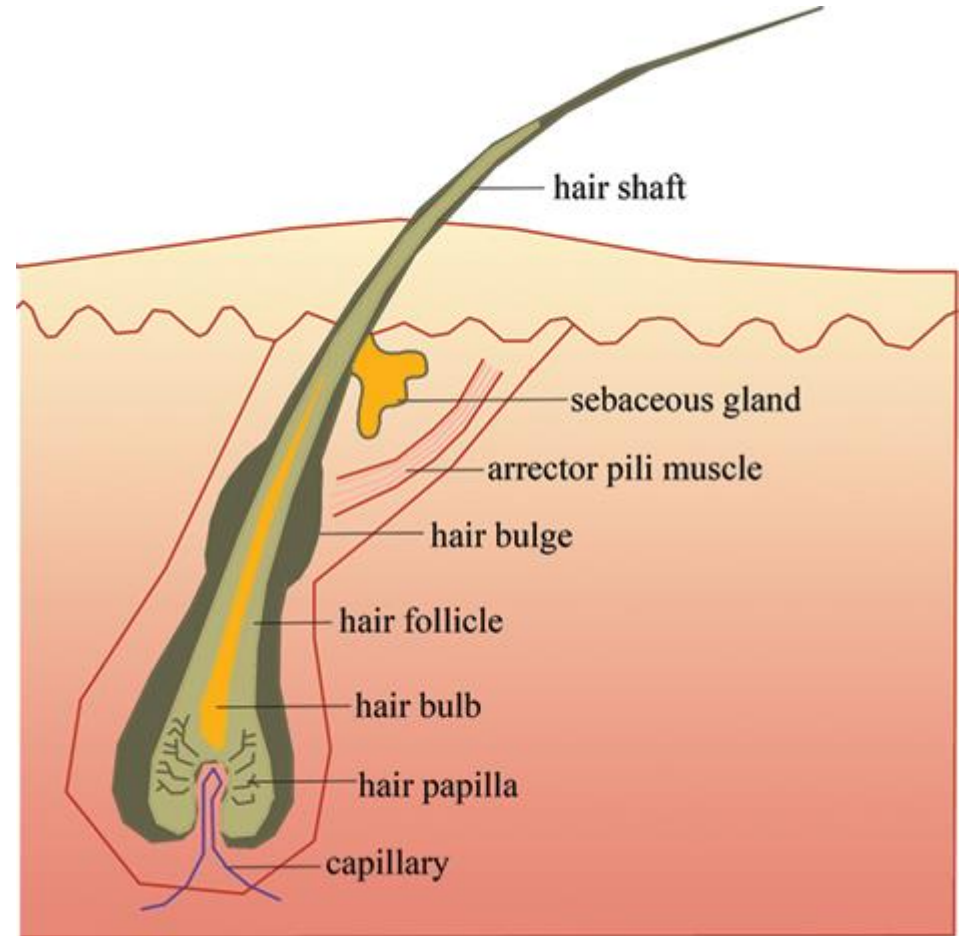
# Anatomy of the hair

## ❖ Hair is composed of:

1. **Shaft (Exposed part above the skin):**  
Composed of Medulla, Cortex and Cuticle
2. **Hair follicle (Under the skin):**  
Composed of Hair bulb (Dermal papilla and the Matrix) and the root Sheath

## ❖ Accessory structures of Hair:

1. Arrector pilli muscle.
2. Sebaceous glands.
3. Hair root plexus.



# Types of hair

## ❖ Lanugo hair:

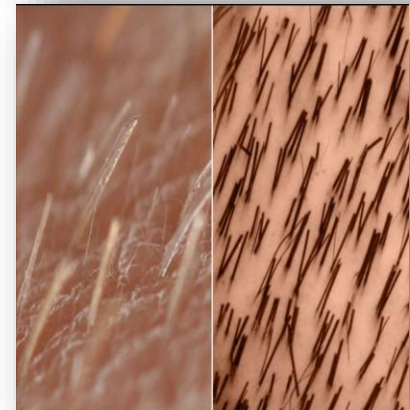
- Very thin, soft, usually unpigmented and long hair, produced by fetal hair cells and is usually shed before birth.

## ❖ Vellus hair:

- Short, thin, light colored and barely noticeable hair that develops on most of a person's body childhood sparing the palms and soles.

## ❖ Terminal hair:

- Thick, long and dark, it is limited to the eyebrows, eyelashes and scalp until puberty.
- During puberty, the increase in androgenic hormone levels causes vellus hair to be replaced with terminal hair in certain parts of the human body, also secondary terminal hair develops in the axillae, pubic region and central chest in men in response to androgens.





# Hair cycle

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## ❖ Write the hair cycle and the definition of each one

### ○ **Anagen** (growing phase):

- The active growth phase, which typically lasts 1000 days depending on predetermined genetic factors, it determines the length of our hair

### ○ **Catagen** (transition phase):

- The short growth arrest phase, of approximately 10 days; due to cessation of protein and pigment production and regression of the follicle due to detachment from the dermal papilla

### ○ **Telogen** (resting phase):

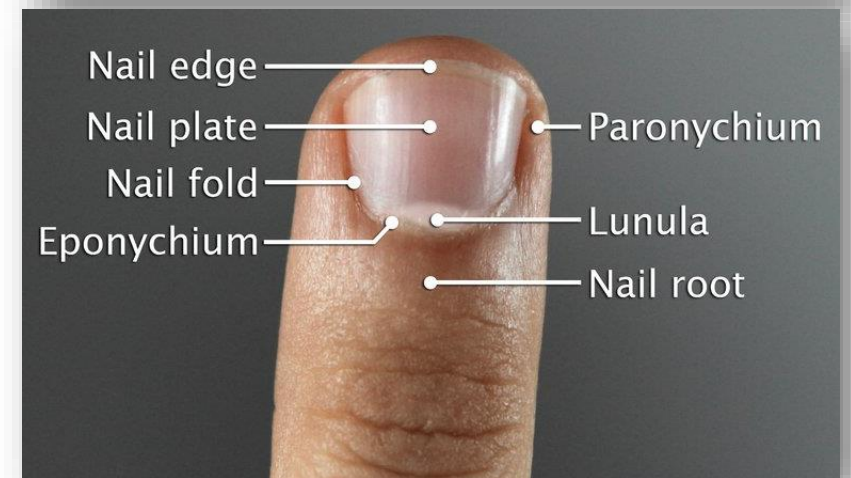
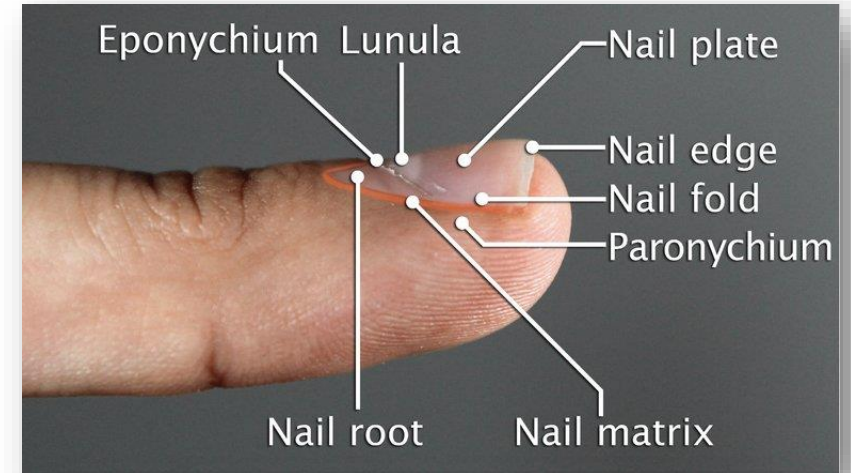
- The resting phase, lasting approximately 100 days irrespective of location
- Whilst the old hair is resting, a new hair begins the growth phase

### ○ **Exogen** (new hair phase):

- This is part of the resting phase where the old hair sheds and a new hair continues to grow

# Nail anatomy

- ❖ **Perionychium:** epidermal tissue surrounding the root and base of the nail
- ❖ **Eponychium:** proximal layer of epidermis extending over the nail base
- ❖ **Hyponychium:** epidermal tissue immediately underlying the free distal edge of the nail
- ❖ **Nail plate (nail body)**
  - Covers the nail bed
  - **Proximally:** consists of the matrix unguis or onychostroma (responsible for new nail growth) and the lunula (the white, crescent-shaped, poorly vascularized portion of the nail)
  - **Distally:** sterile matrix (provides the nail with bulk and strength)
- ❖ **Nail fold:** depression proximal to the nail plate from which the nail grows



# Skin color

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## ❖ Skin color factors:

- Hemoglobin (Pallor in anemia)
  - Exogenous pigments in or on the skin surface
  - Endogenously produced pigments (e.g., bilirubin)
  - The pigments produced in the skin itself: melanin and phaeomelanin
  - Carotenemia (Orange in color)
- ❖ The different skin colors result from the size and number of melanosomes not number of melanocytes. (i.e., Negro skin contains no more melanocyte than fair people).

# Description of the skin types

## ❖ Type I

- Skin burns very easily and doesn't tan. Likely to have light blonde or red hair.

## ❖ Type II

- Skin will usually burn in the sun. and has difficulty tanning.

## ❖ Type III

- Skin will sometime burn and will tan gradually.

## ❖ Type IV

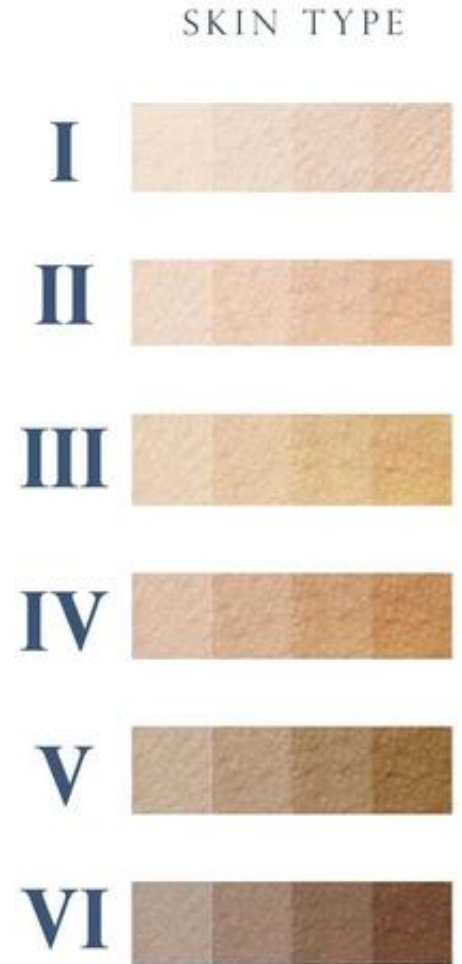
- Skin will tan easily and rarely burn.

## ❖ Type V

- Skin will tan without burning.

## ❖ Type VI

- Skin never burns and will tan very quickly.



# Melanin

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- ❖ Produced by **melanocytes** in the epidermal **basal layer**
- ❖ Synthesized from **tyrosine** in **melanosomes** (in melanocytes) by **tyrosinase** enzyme
- ❖ Melanosomes is the site of synthesis and storage of melanin. **It can be passed from melanocytes to keratinocytes**
- ❖ Its function to protect cell nuclei from damage by UV
- ❖ **Types:**
  - Eumelanin: deep brown-black
  - Pheomelanin: red mainly in hair

# Dermatopathology

# Dermatopathology

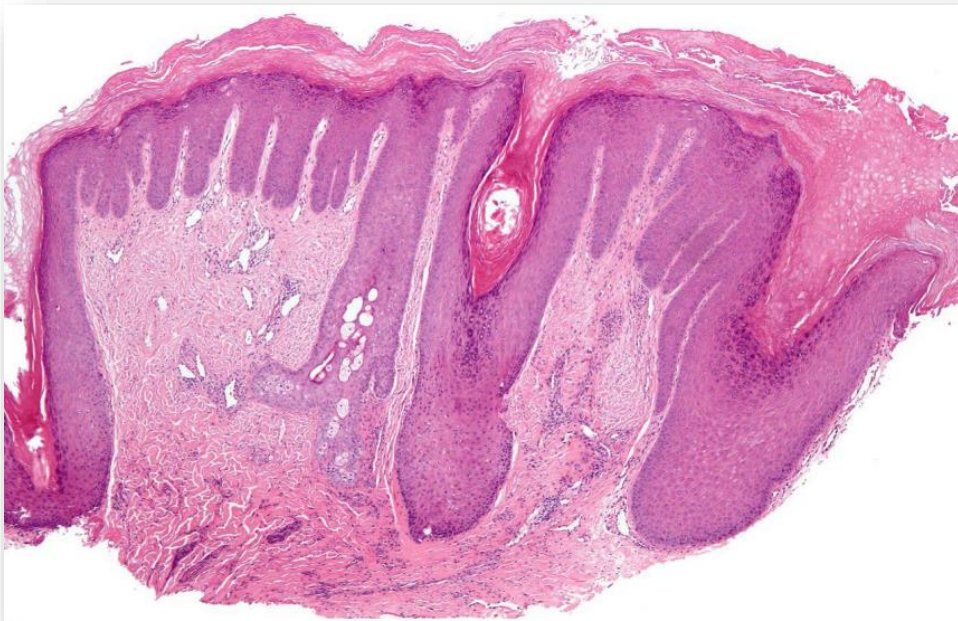
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- ❖ Terms used to describe microscopic findings
- ❖ Used in analysis of skin biopsies
- **Hyperkeratosis:** Thickening of stratum corneum
- **Parakeratosis:** Hyperkeratosis + retained nuclei in stratum corneum
- **Hypergranulosis:** Increased thickness of stratum granulosum
- **Spongiosis:** Fluid accumulation (edema) of epidermis
- **Acantholysis:** Loss of connections between keratinocyte
- **Acanthosis:** Diffuse epidermal hyperplasia, elongated rete ridges, spinous layer thickening

# Dermatopathology

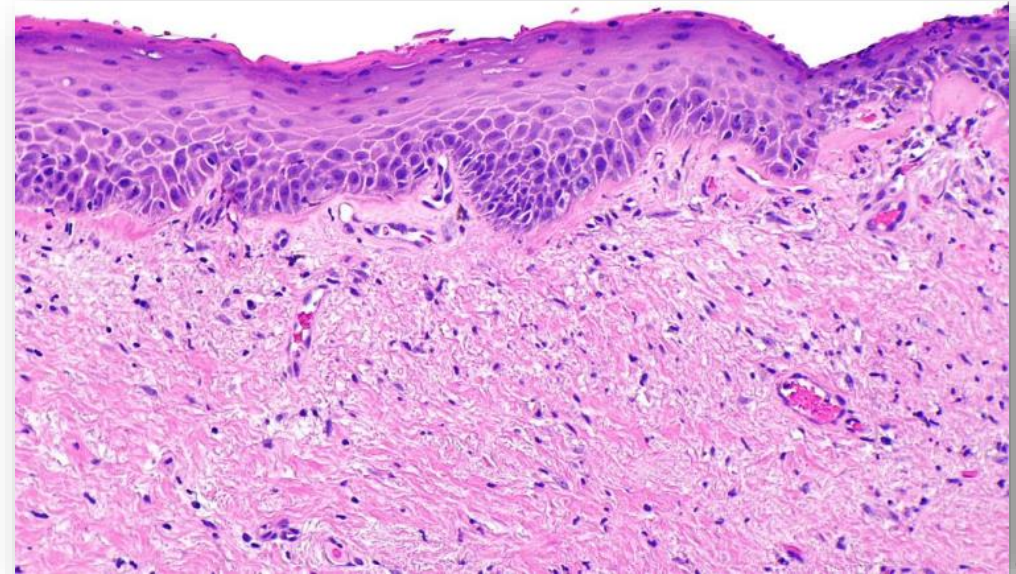
## Hyperkeratosis

- ❖ Thickening of stratum corneum
- ❖ Excess quantity of keratin
- ❖ Seen in **Psoriasis** and **Callus**



## Parakeratosis

- ❖ Hyperkeratosis + retained nuclei in stratum corneum
- ❖ Indicates hyperproliferation
- ❖ Seen in **psoriasis** and **malignancies**

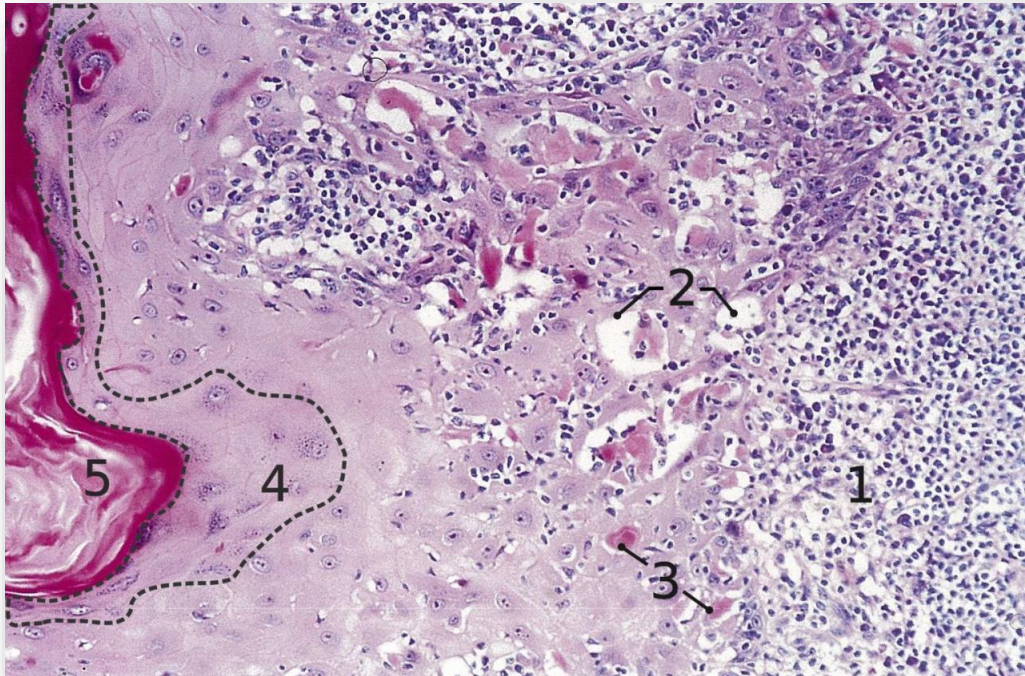




# Dermatopathology

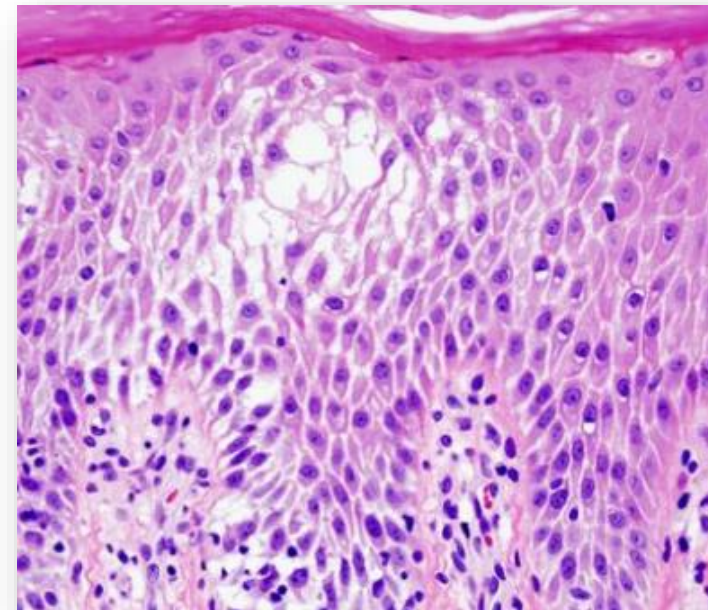
## Hypergranulosis

- ❖ Increased thickness of stratum granulosum (4 in the picture)
- ❖ Classic finding in **lichen planus**



## Spongiosis

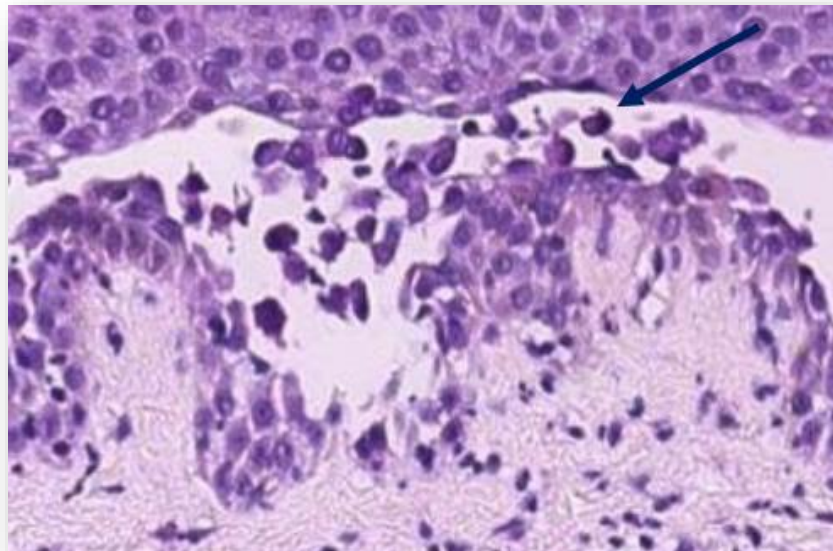
- ❖ Fluid accumulation (edema) of epidermis
- ❖ Seen in **eczema**, many other skin disorders



# Dermatopathology

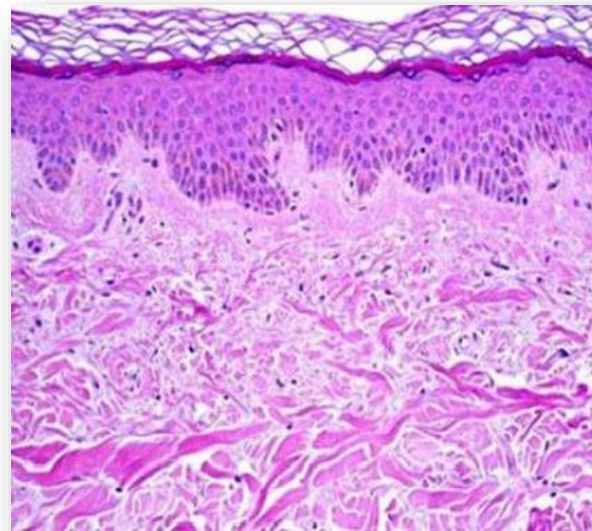
## Acantholysis

- ❖ Loss of connections between keratinocyte
- ❖ Often loss of **desmosomes**
- ❖ Detached, floating freely in epidermis
- ❖ Key feature of **pemphigus vulgaris**

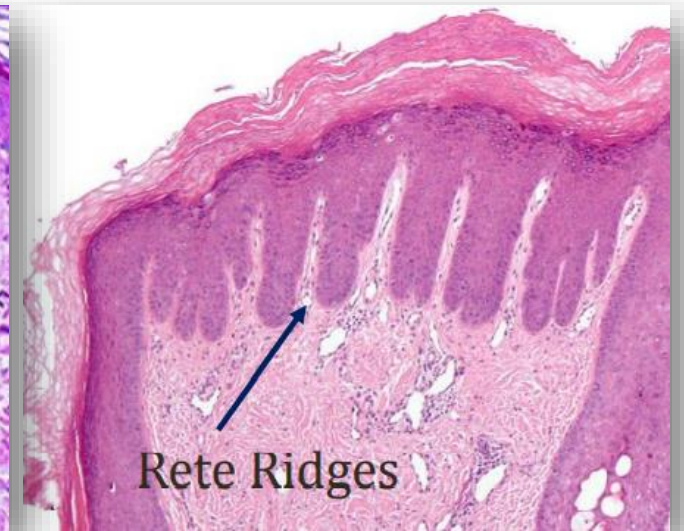


## Acanthosis

- ❖ Diffuse epidermal hyperplasia
- ❖ Elongated rete ridges
- ❖ Spinous layer thickening



Normal



Acanthosis

# Skin lesions

# Skin lesions

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## ❖ Primary lesions

- Directly caused by disease process
- Described using standard terminology
- Macules, papules, vesicles, bulla

## ❖ Secondary lesions

- Modification of primary lesion
- Or caused by trauma, external factors
- Scale, crust, erosion, fissure, ulcer

## ❖ Complex skin lesions

- Hemorrhage, rashes, lichenification, eczema

# Configuration

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**Configuration:** refers to how lesions are locally grouped (organized)

1. **Agminate:** in clusters
2. **Annular** or **circinate:** ring-shaped
3. **Arciform** or **arcuate:** arc-shaped
4. **Digitate:** with finger-like projections
5. **Discoid** or **nummular:** round or disc-shaped
6. **Figurate:** with a particular shape
7. **Guttate:** resembling drops
8. **Gyrate:** coiled or spiral-shaped
9. **Herpetiform:** resembling herpes
10. **Linear**
11. **Mamillated:** with rounded, breast-like projections
12. **Umbilicated:** have a small depression
13. **Reticular** or **reticulated:** resembling a net
14. **Serpiginous:** with a wavy border
15. **Stellate:** star-shaped
16. **Targetoid:** resembling a bullseye
17. **Verrucous** or **Verruciform:** wart-like

# Distribution

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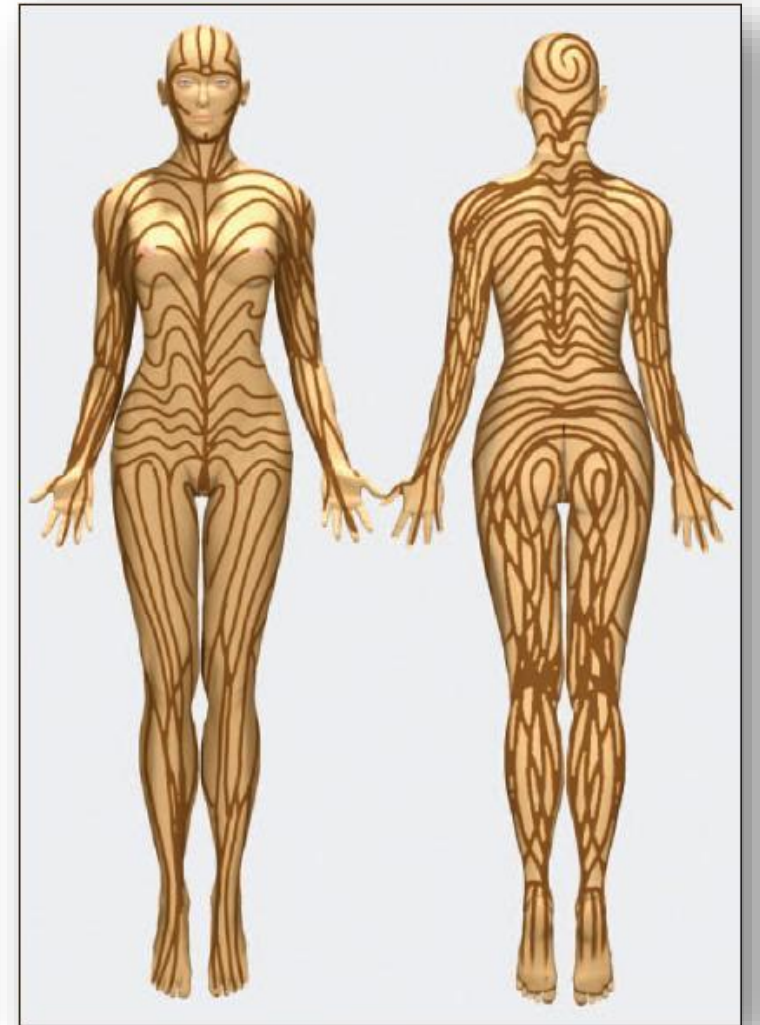
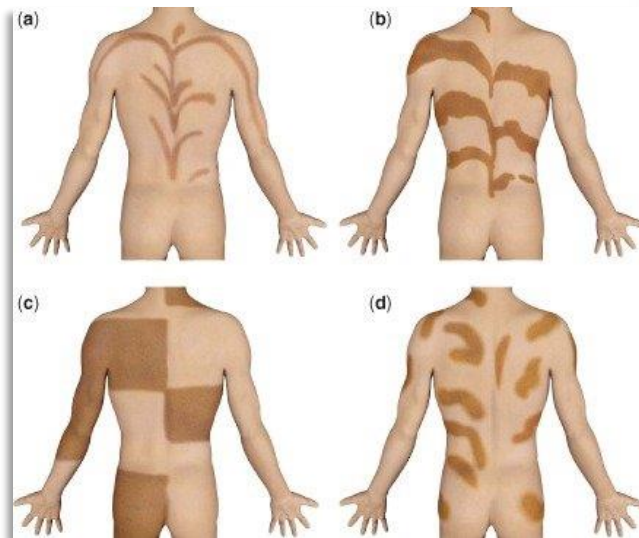
**Distribution:** refers to how lesions are localized. They may be confined to a single area (a patch) or may exist in several places.

1. **Generalized**
2. **Symmetric:** one side mirrors the other
3. **Flexural:** on the front of the fingers
4. **Extensor:** on the back of the fingers
5. **Intertriginous:** in an area where two skin areas may touch or rub together
6. **Morbilliform:** resembling measles
7. **Palmoplantar:** on the palm of the hand or bottom of the foot
8. **Periorificial:** around an orifice such as the mouth
9. **Periungual/subungual:** around or under a fingernail or toenail
10. **Blaschkoid:** following the path of Blaschko's lines in the skin
11. **Photodistributed:** in places where sunlight reaches
12. **Zosteriform or dermatomal:** associated with a particular nerve

# Blaschko's lines

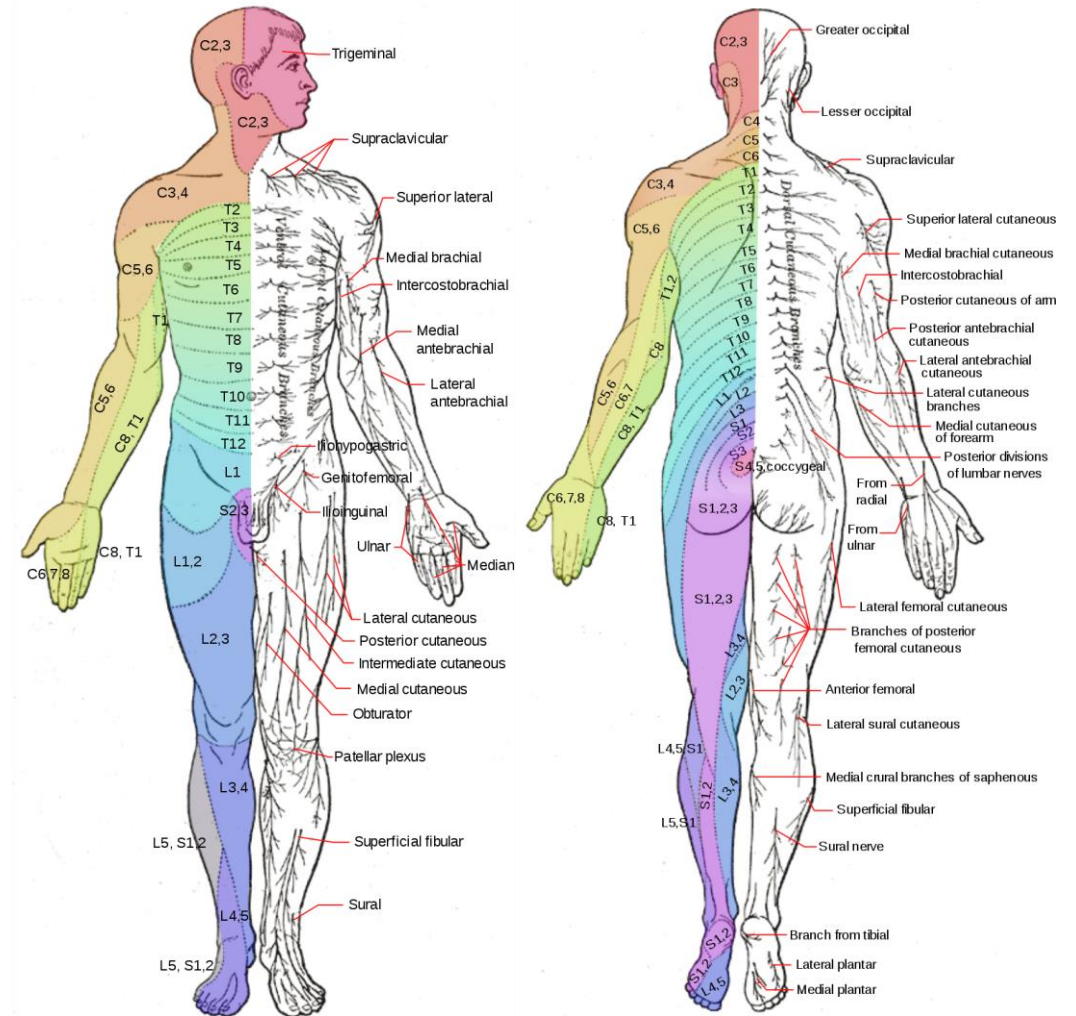
- ❖ Lines of normal cell development in the skin.
- ❖ These lines are invisible under normal conditions but can become apparent over the skin due to a mosaic skin condition.
- ❖ Many nevoid skin conditions follow Blaschko's lines, such as:

- Melanocytic nevi
- Achromic naevus
- Vitiligo
- CHILD syndrome
- Lichen planus



# Dermatome

- ❖ A dermatome is an area of skin that is mainly supplied by afferent nerve fibers from the dorsal root of any given spinal nerve.
- ❖ Some diseases can show dermatomal distribution (a zosteriform pattern) such as:
  - Varicella zoster virus (VZV)
  - Lichen planus
  - Impetigo contagiosa





# Koebner Phenomenon

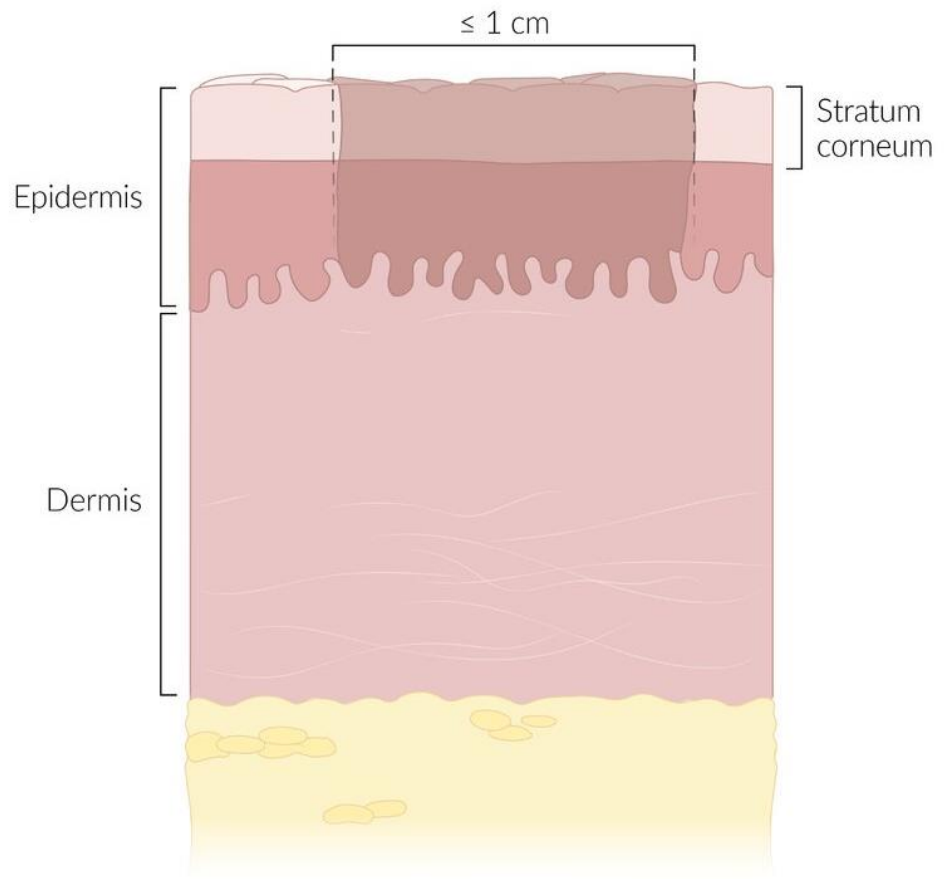
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- ❖ Also called isomorphic response
- ❖ Describes the appearance of new skin lesions of a pre-existing dermatosis on areas of cutaneous injury in otherwise healthy skin.
- ❖ **Causes:**
  - **Infective & chemical** causes; result in linear lesions after a linear exposure to a causative
    1. molluscum contagiosum
    2. **Warts**
    3. Kaposi sarcoma
    4. Cutaneous leishmaniasis
    5. poison ivy
  - Causes of the Koebner phenomenon that are secondary to scratching rather than infection or chemical
    1. **Vitiligo**
    2. **Psoriasis**
    3. **lichen planus**
    4. **Eczema**
    5. **Pityriasis rubra pilaris**

# Primary skin lesions

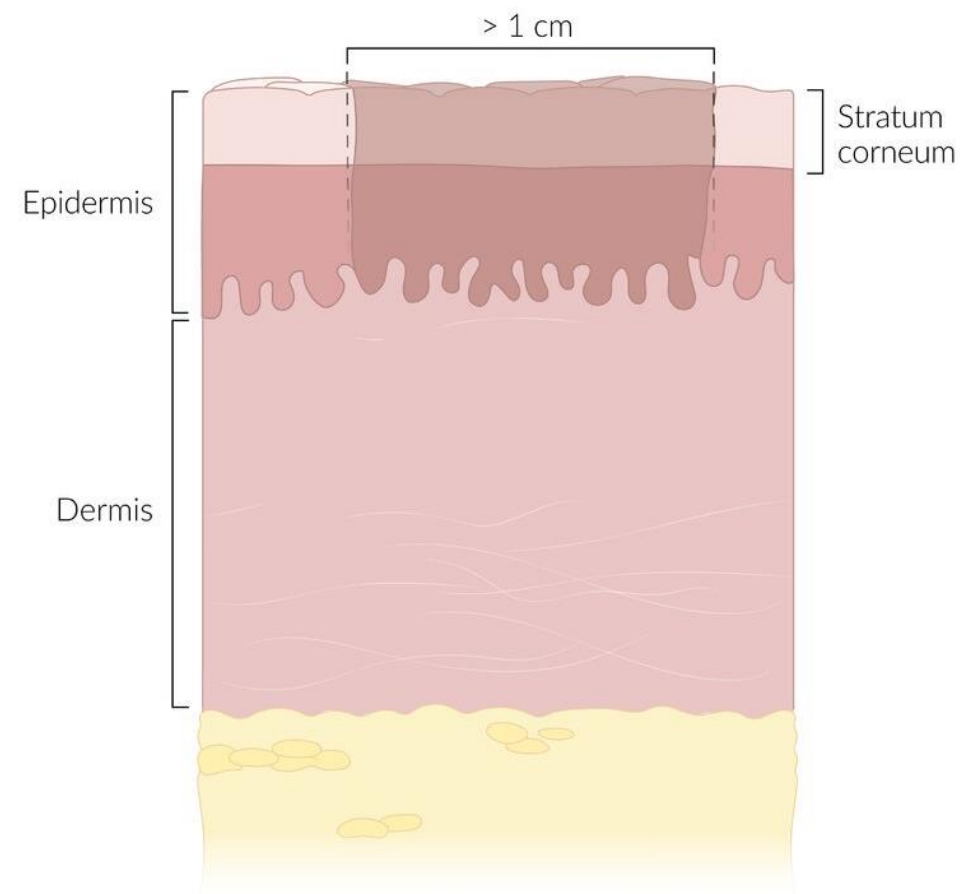
# 1. Macule

A flat (nonpalpable) skin lesion  $\leq 1$  cm in size that differs in color from surrounding skin (e.g., freckle; also seen in pityriasis versicolor, nevus spilus)



## 2. Patch

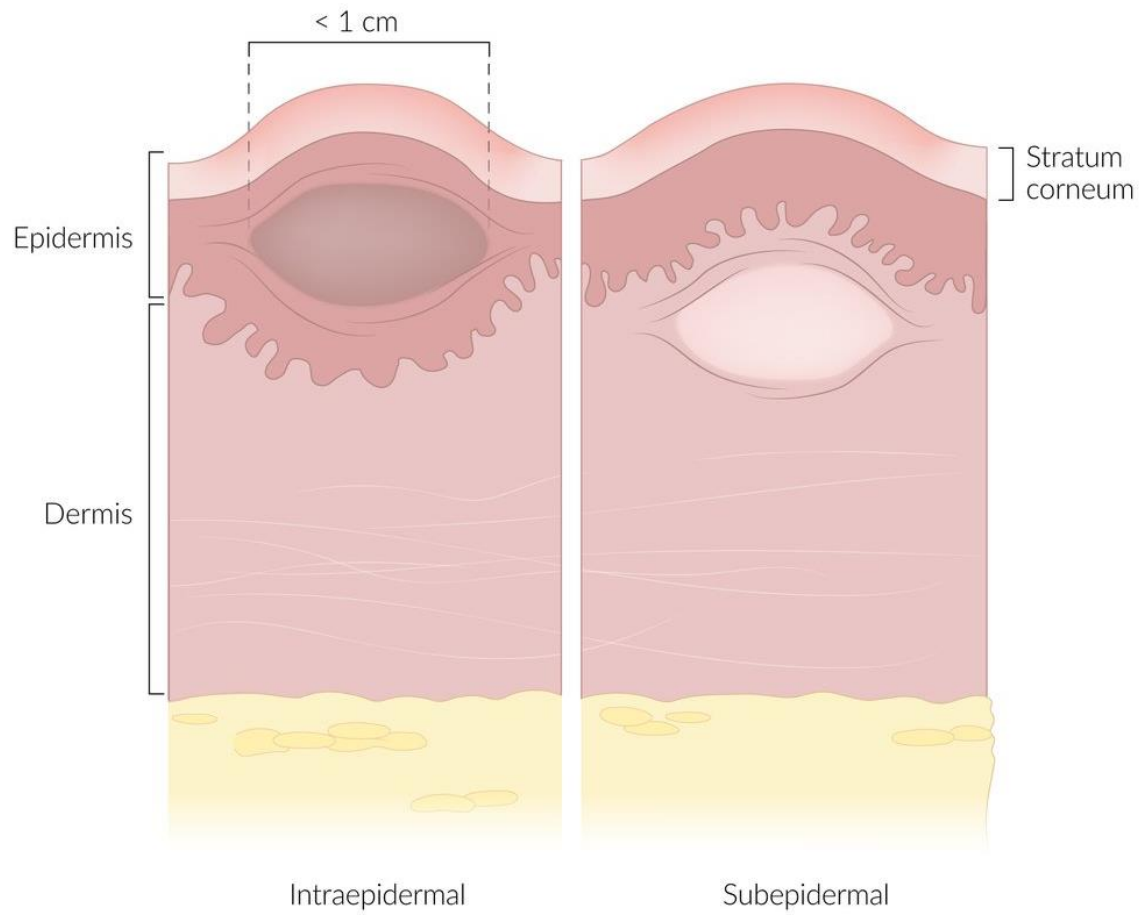
A flat skin lesion  $> 1$  cm in size that differs in color from surrounding skin (e.g., congenital nevus)



© Jere Mammino, DO

# 3. Papule

A small, palpable skin lesion  $\leq 1$  cm in diameter (e.g., seen in lichen planus, molluscum contagiosum, neurofibromatosis type 1, acne)



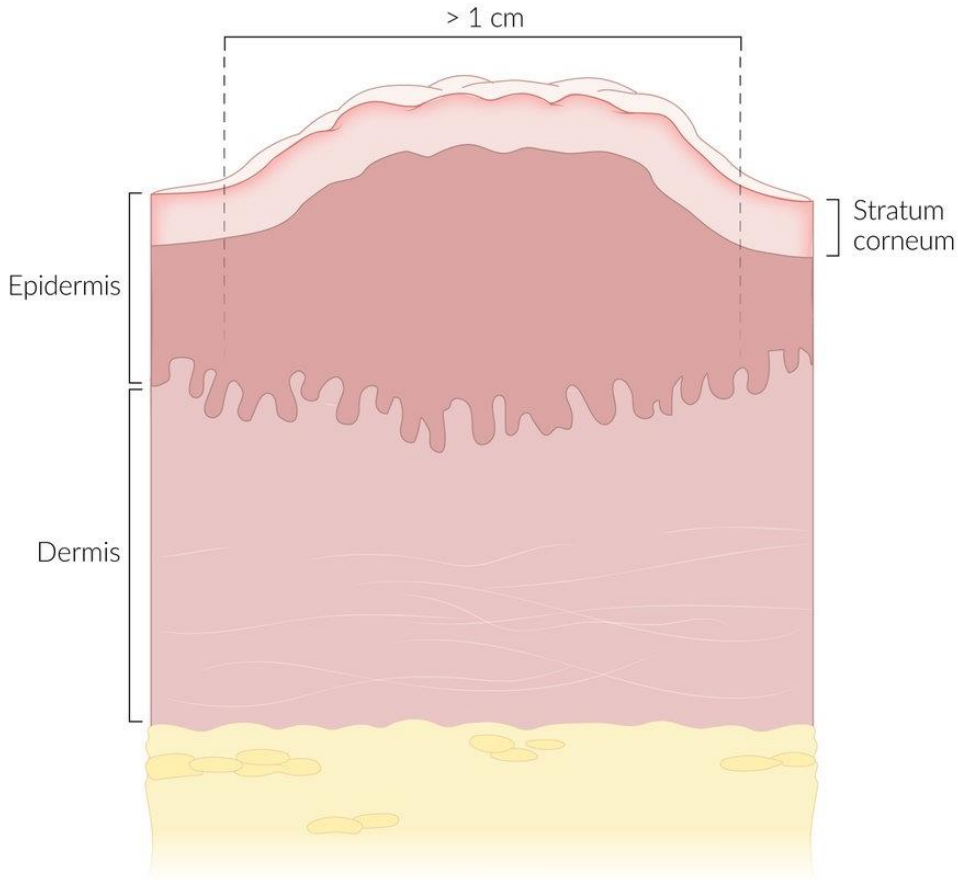
## 4. Comedone

- ❖ A skin-colored papule that forms when pilosebaceous ducts become blocked with keratinaceous debris and sebum (e.g., due to acne vulgaris).
- ❖ Subtypes include closed comedones (whiteheads) and open comedones (blackheads).



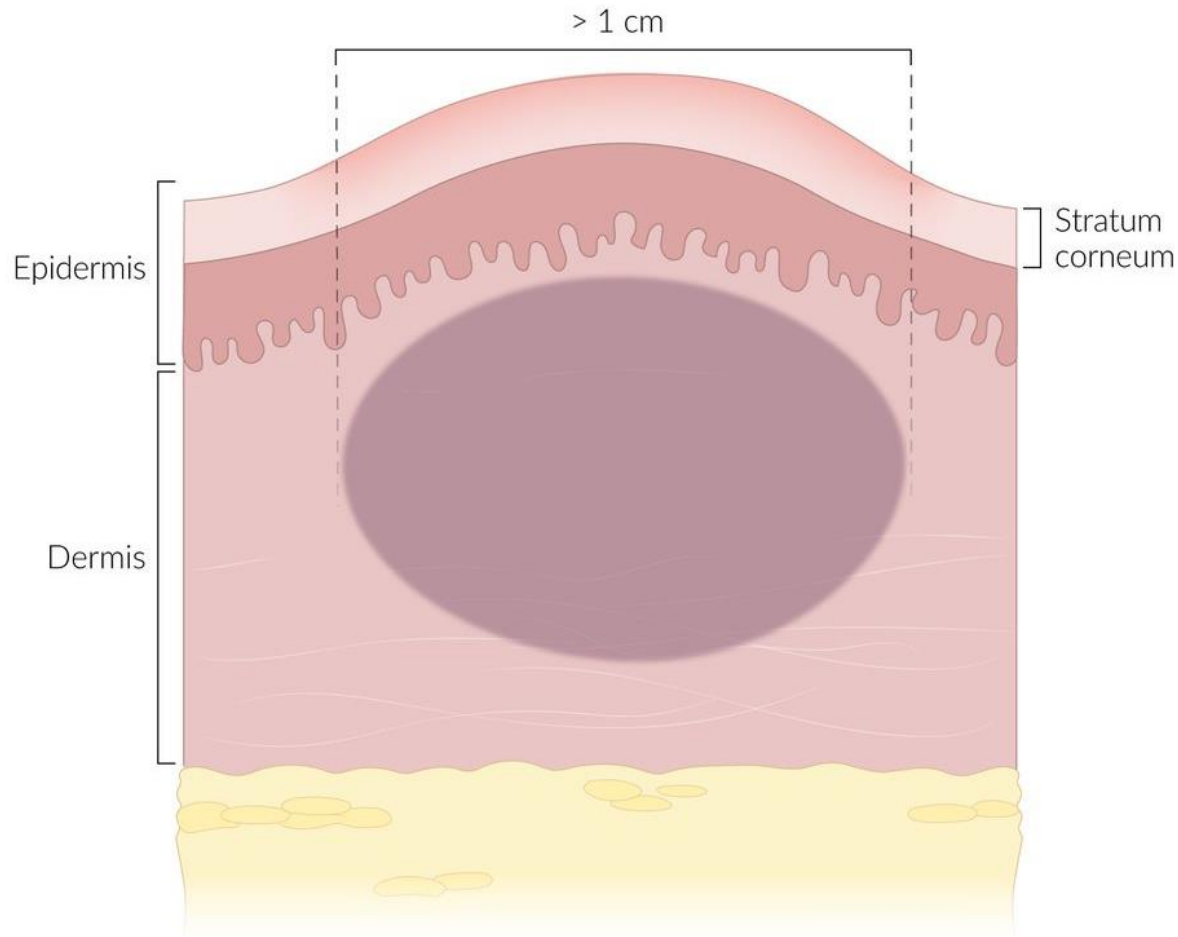
# 5. Plaque

Palpable, usually raised lesion > 1 cm (e.g., seen in pigmented BCC, pityriasis rosea, necrobiosis lipoidica, psoriasis)



# 6. Nodule

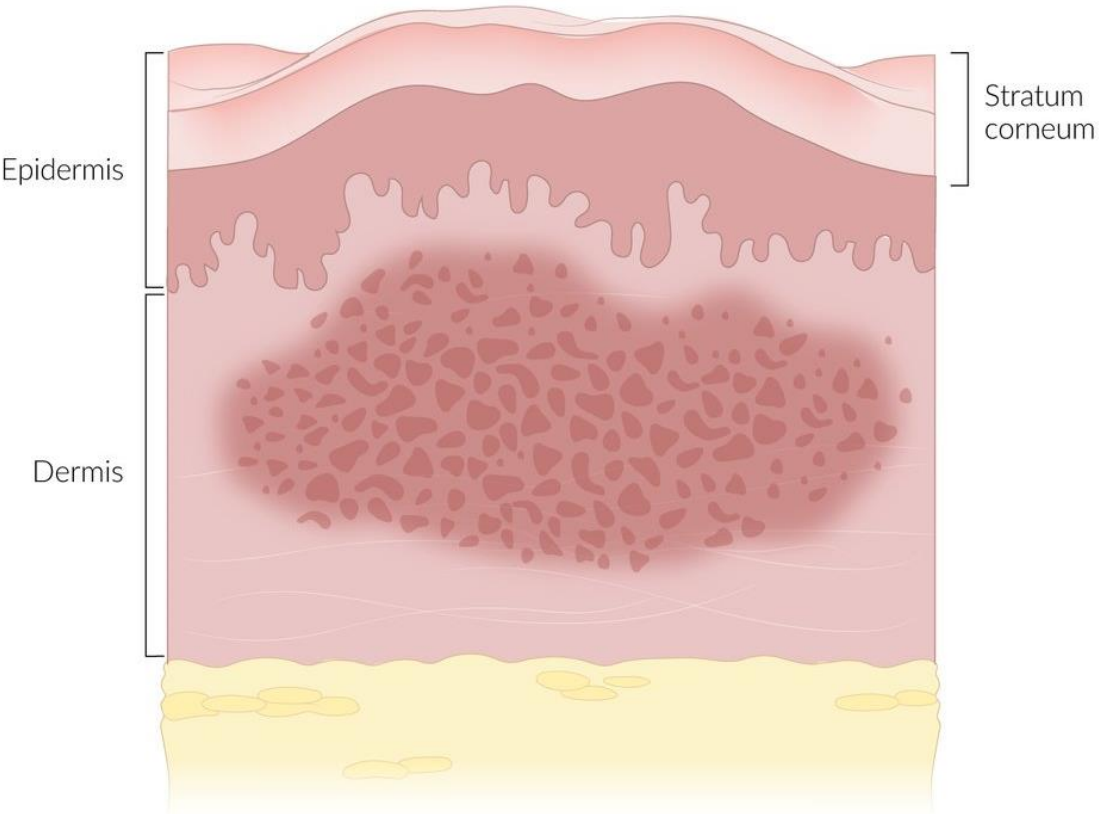
An elevated lesion,  $> 1$  cm in both diameter and depth





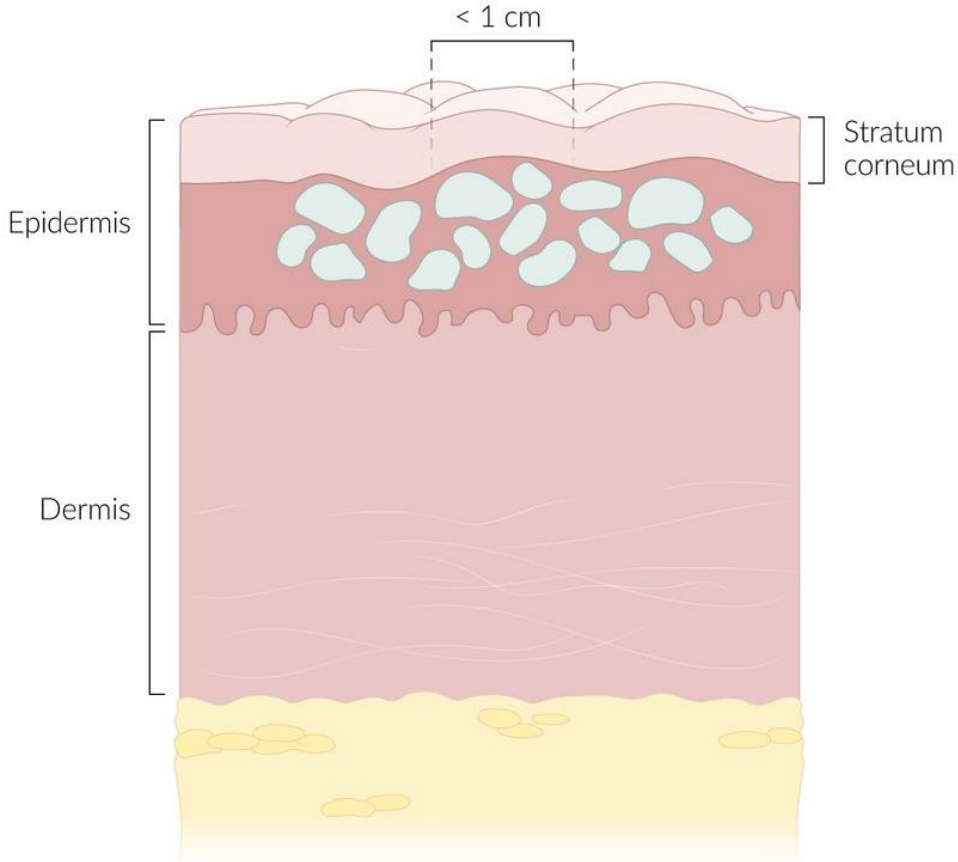
# 7. Wheal

- ❖ Well-circumscribed, pruritic, and erythematous papule or plaque with dermal edema and irregular borders (e.g., seen in urticaria)
- ❖ Transient (hours to days)



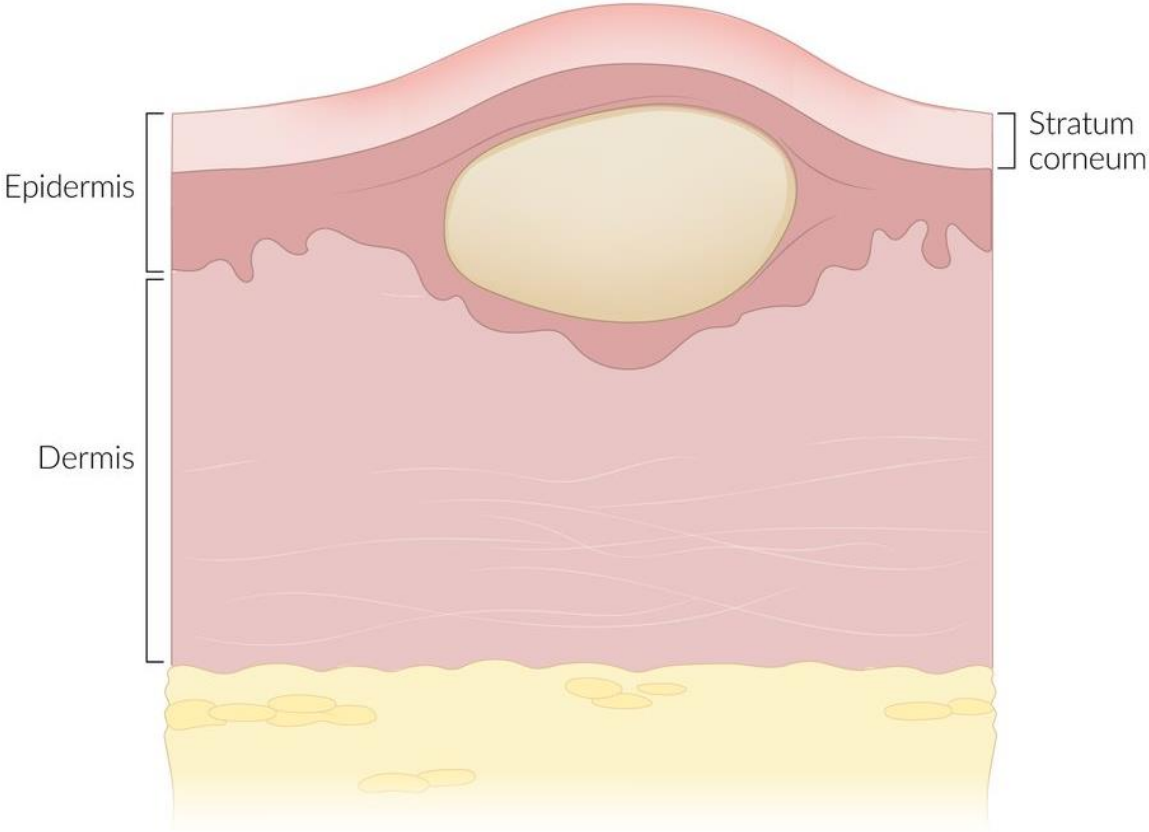
# 8. Vesicle

Small fluid-containing blister (collection of fluid in the skin)  $\leq 1$  cm in diameter (e.g., seen in eczema herpeticum, chickenpox, herpes zoster)



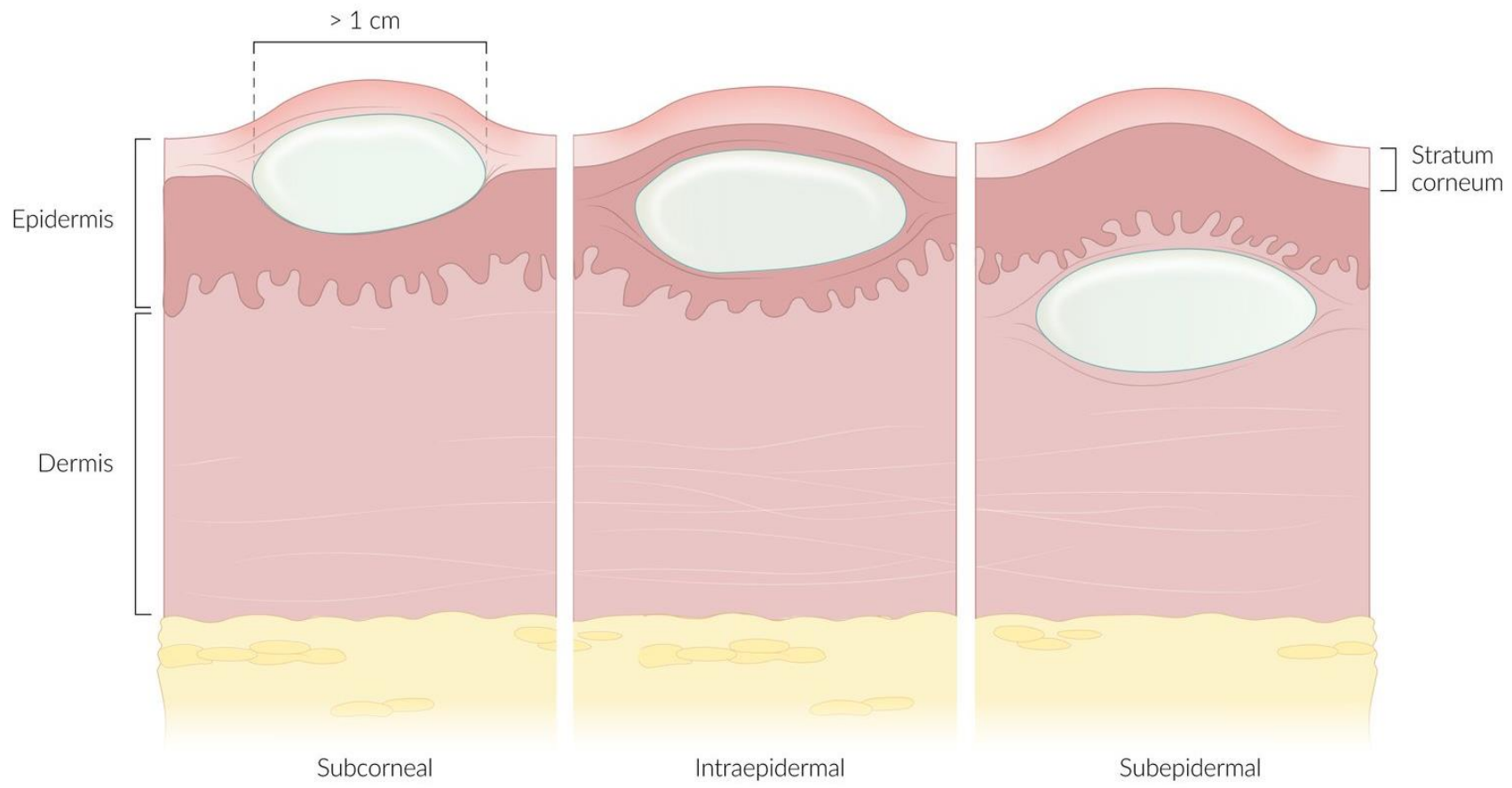
# 9. Pustule

Vesicle filled with pus (e.g., seen in pustular psoriasis)



# 10. Bulla

❖ Large fluid-containing blister > 1 cm in diameter (e.g., see in bullous pemphigoid, Stevens-Johnson syndrome)



# 11. Burrow

- ❖ Slightly elevated, grayish, tortuous line in the skin ended by papule.
- ❖ Example : scabies



# What is the primary skin lesion of the following ?

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## **Bacterial skin infections**

- ❖ Non-bullous Impetigo: Vesicle or pustule
- ❖ Bullous Impetigo: Bullae
- ❖ Folliculitis: Pustule
- ❖ Erythrasma: well-defined pink or brown patches
- ❖ Pitted keratolysis: whitish skin and clusters of punched-out pits

# What is the primary skin lesion of the following ?

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## Viral skin infections

- ❖ Herpes simplex: Vesicle
- ❖ Herpes zoster: Vesicles / blisters
- ❖ Common warts: Papules or plaques
- ❖ Flat (Plana) Wart: Small, smooth, flesh-colored, flattened wart
- ❖ Periungual wart: a cauliflower-like cluster of warts
- ❖ Orf: Nodule
- ❖ molluscum contagiosum: Papule
- ❖ Hand Foot Mouth disease: Vesicle

# What is the primary skin lesion of the following ?

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## Infestation

- ❖ Scabies: Burrow

## Acne

- ❖ Acne vulgaris: Comedone
- ❖ Drug eruptive acne: Monomorphic eruption of papules and pustules

## Eczema

- ❖ Dyshidrotic dermatitis (pompholyx): Blisters on hands and feet

## Psoriasis

- ❖ Psoriasis: Plaque



# What is the primary skin lesion of the following ?

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## **Pigmentary disorders**

- ❖ Junctional nevus: Hyperpigmented macule
- ❖ Freckle: Hyperpigmented macule
- ❖ Lentiginosities: Hyperpigmented patch or macule
- ❖ Café-au-lait: patch
- ❖ Melasma: tan or brown patch on sun exposed area
- ❖ Vitiligo: milky white depigmented patch
- ❖ Halo nevus: mole surrounded by a white ring

# What is the primary skin lesion of the following ?

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## **Bullous dermatosis**

- ❖ Pemphigus vulgaris: Bulla
- ❖ Bullous pemphigoid: Tense subepidermal bulla
- ❖ Dermatitis herpetiformis: Vesicles
- ❖ Erythema multiforme: Target lesions

## **Urticaria**

- ❖ Urticaria: Wheal or hives
- ❖ Insect bite: Bulla or wheal

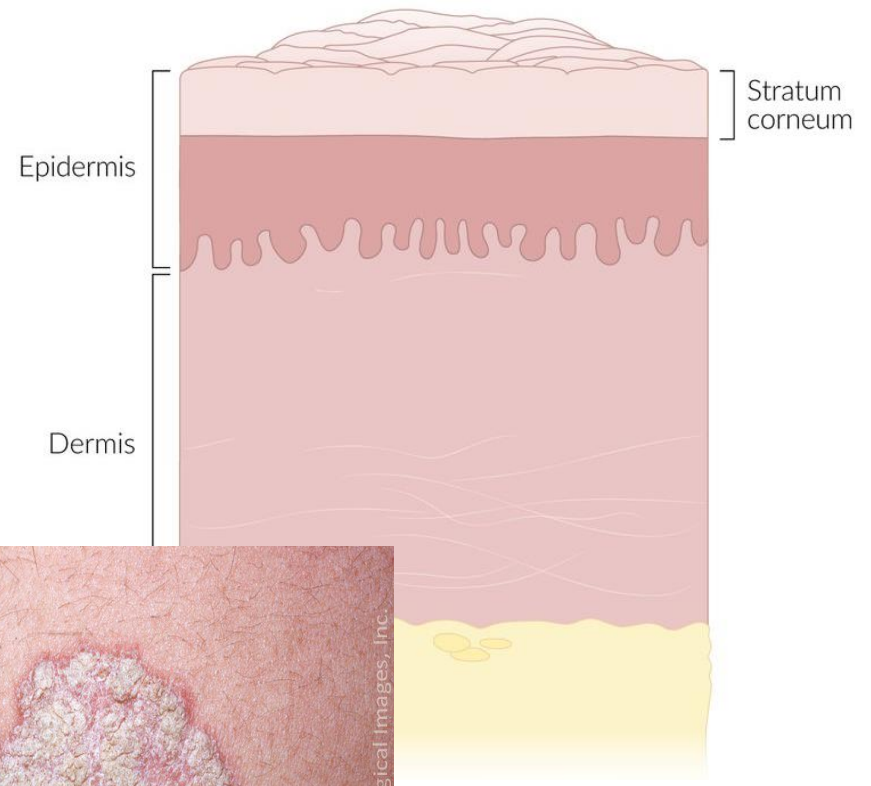
## **Papulosquamous disorders**

- ❖ Lichen planus :Papules

# Secondary skin lesions

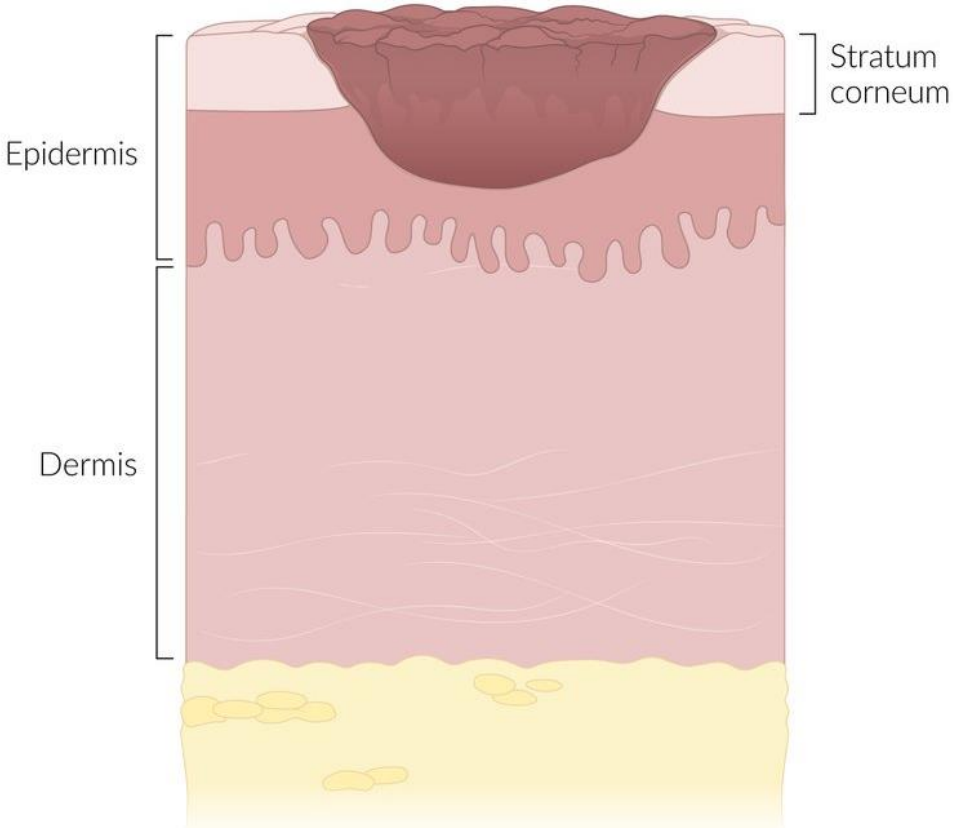
# 1. Scale

- ❖ Thickened stratum corneum
- ❖ Scales are flaky, dry, and usually whitish.
- ❖ In contrast, crusts are more often moist and yellowish or brown.
- ❖ E.g., seen in **ichthyosis vulgaris**, **squamous cell carcinoma**, **eczema**, **psoriasis**



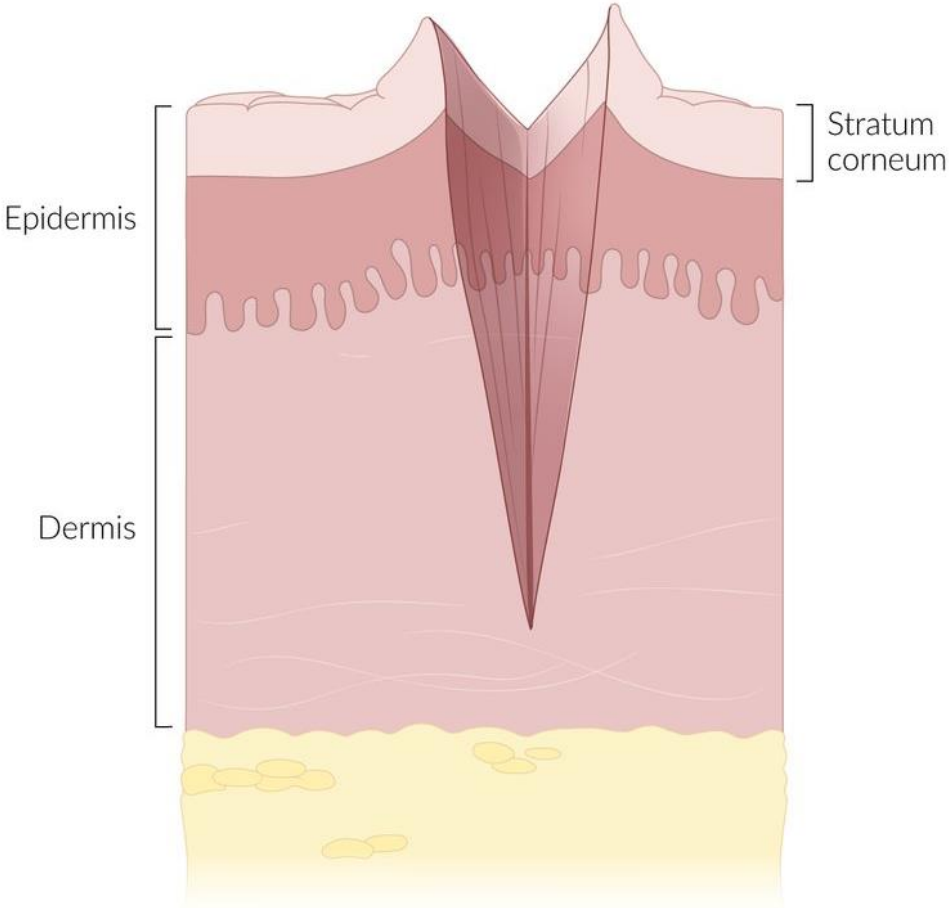
# 2. Crust

- ❖ Dried exudates such as pus or blood
- ❖ E.g., seen in **atopic dermatitis, non-bullous impetigo**



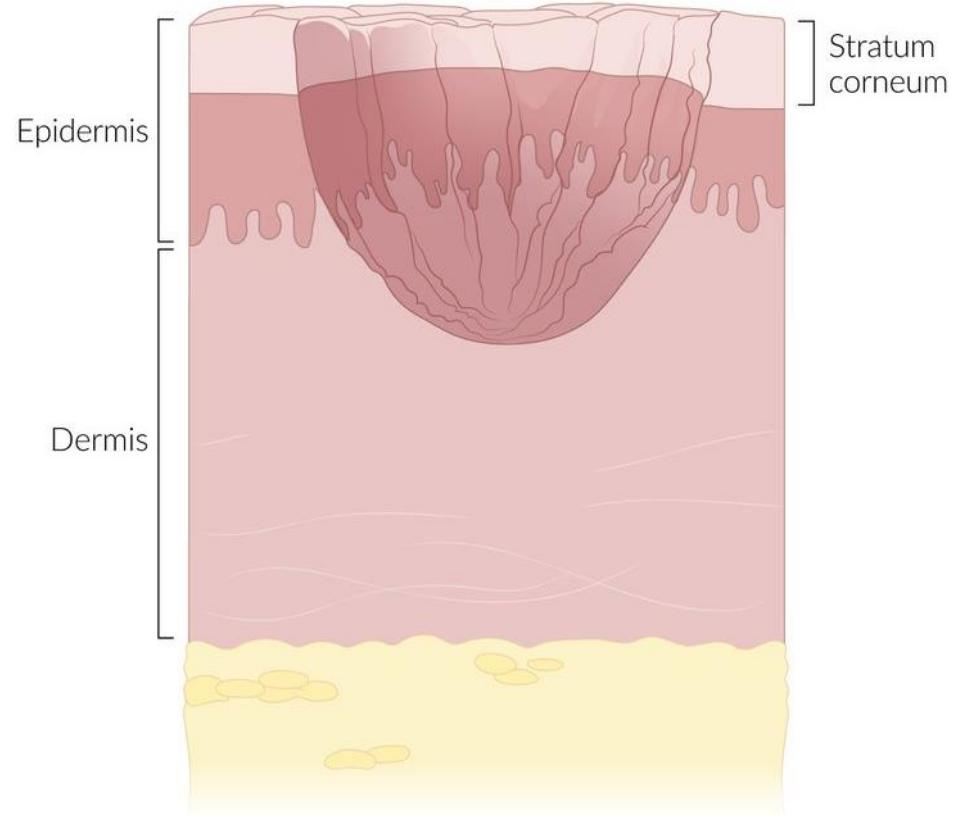
# 3. Fissure (cleft)

Linear crack through the epidermis that extends into the dermis



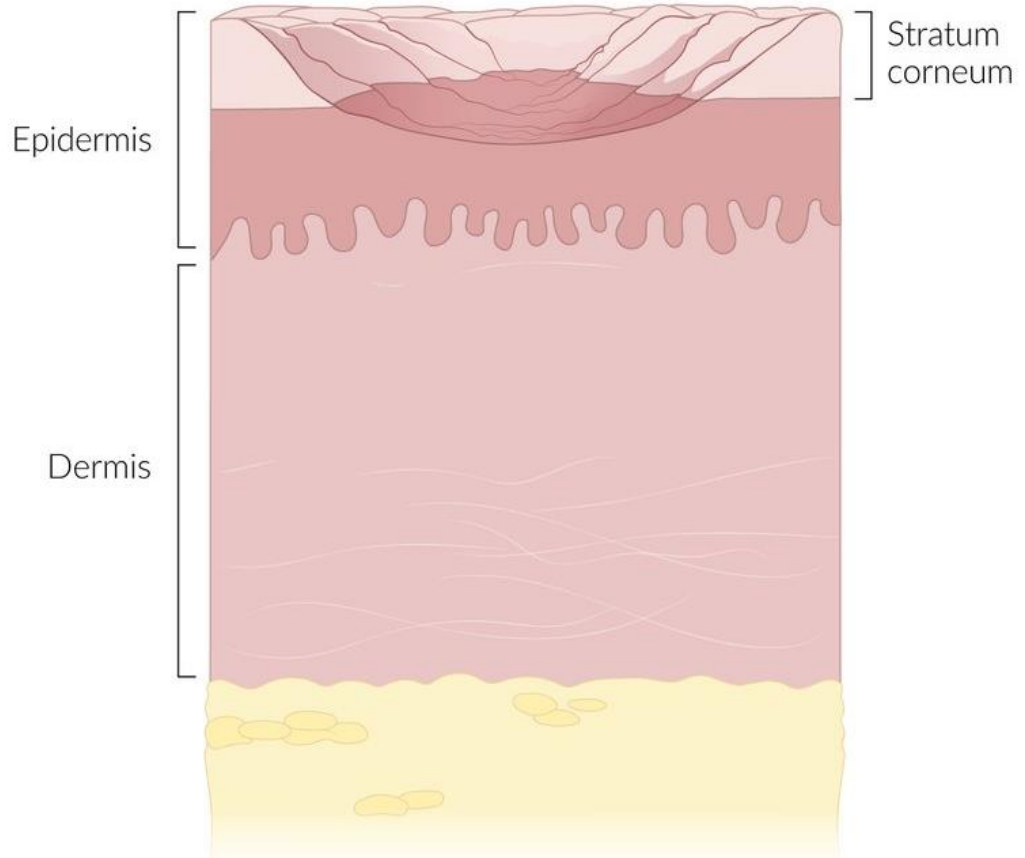
# 4. Ulcer

- ❖ Rounded or irregularly shaped deeper lesions that result from loss of the epidermis and some portion of the dermis.
- ❖ **Ulcers usually leave a scar.**



# 5. Erosion

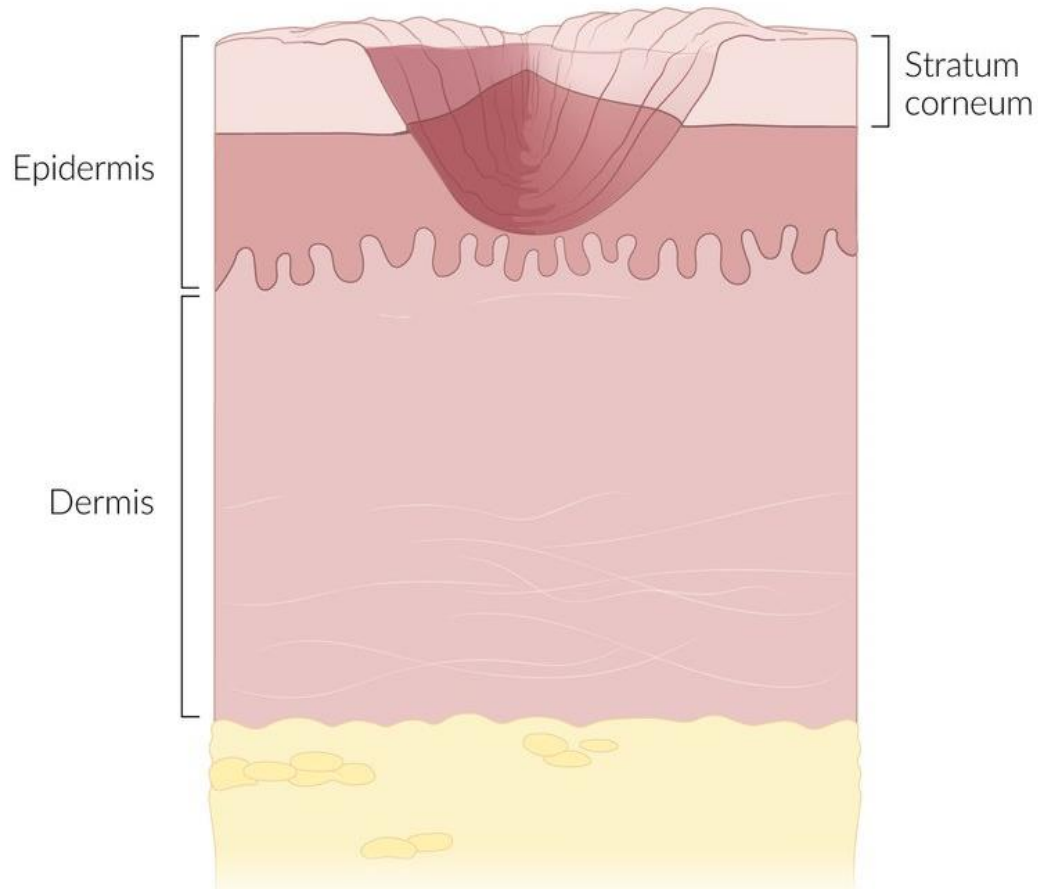
- ❖ Loss of all or portions of the epidermis
- ❖ Erosions usually heal without a scar.





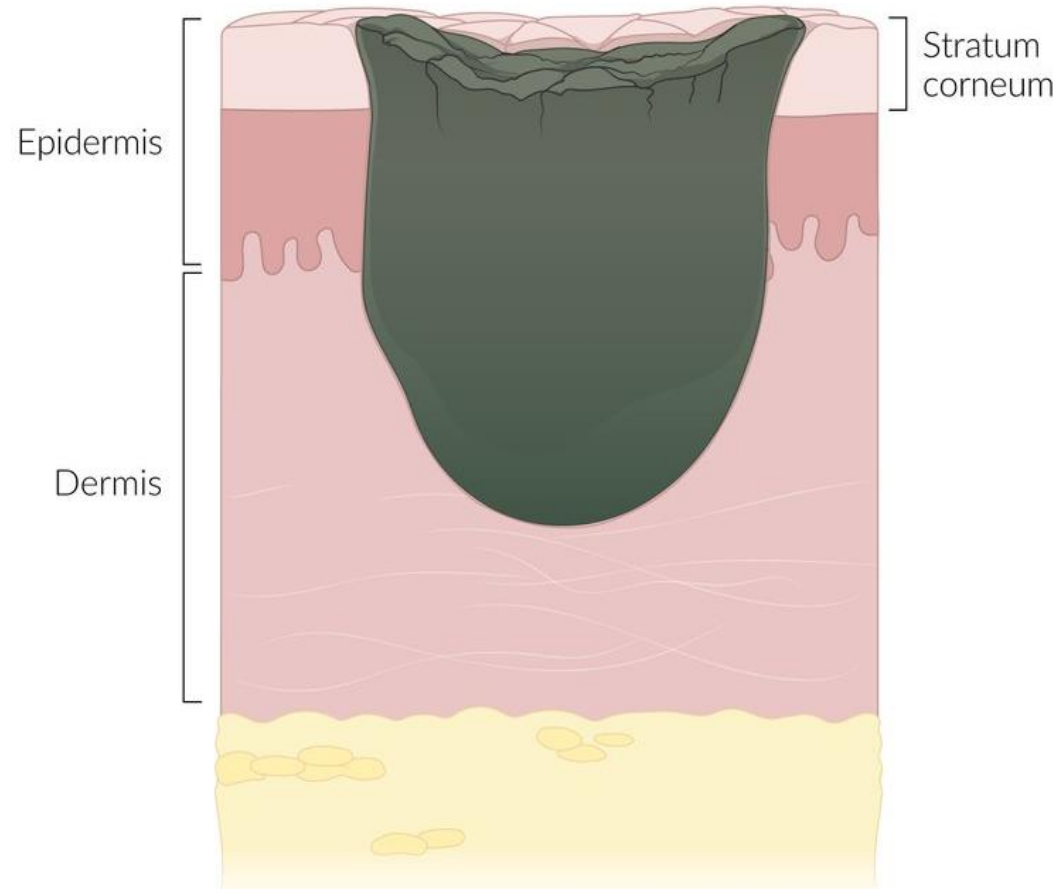
# 6. Excoriation (scratch marks)

Abrasion produced by mechanical force, usually involving the epidermis (but may reach the outer layer of the dermis)



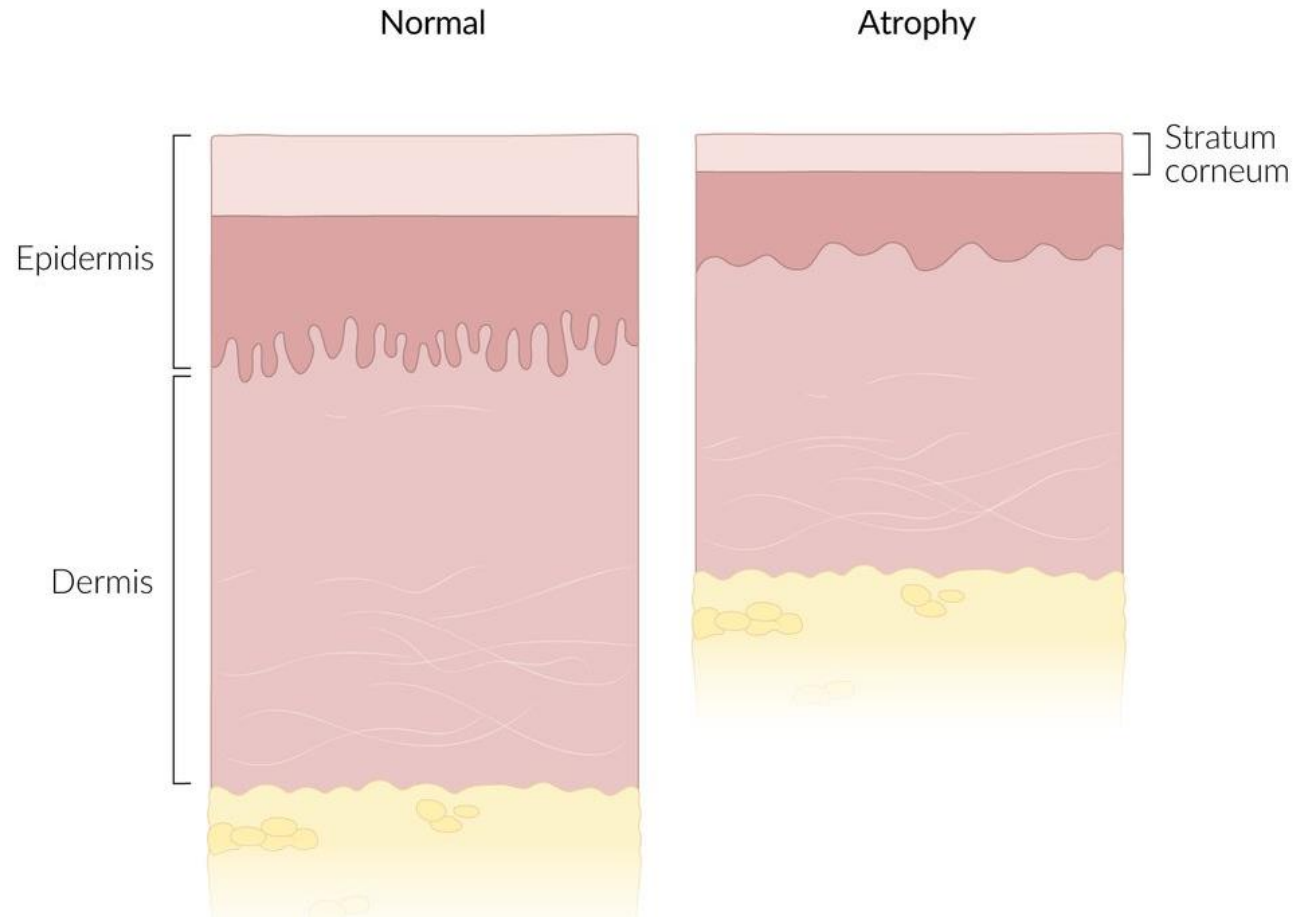
# 7. Necrosis

Dead skin tissue (Black or yellowish/brown)



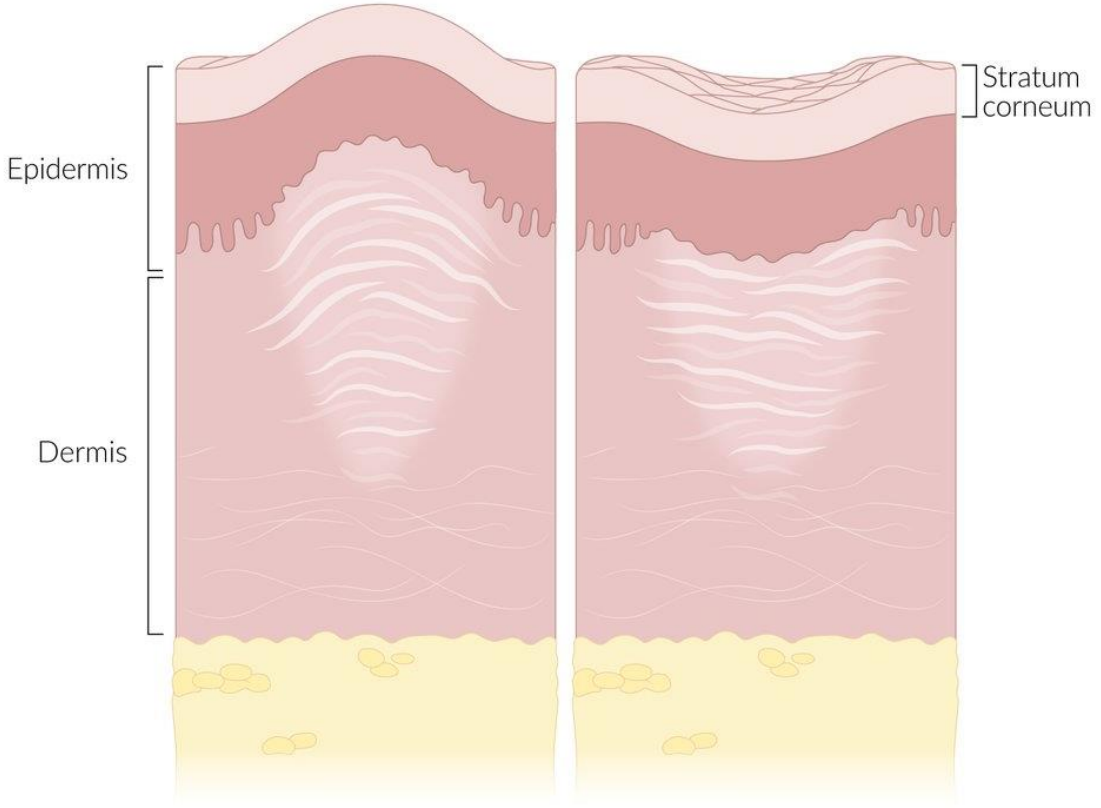
# 8. Skin atrophy

Thinning of skin without inflammation



# 9. Scar

- ❖ Composed of new connective tissue that has replaced lost substance
- ❖ An overgrowth of scar tissue manifests as a keloid (thickened, raised tissue that grows beyond the borders of the scar and shows no regression).



# 10. Maceration

- ❖ Swelling of tissue after prolonged contact with a fluid (e.g., maceration of skin after a long bath → "washerwoman skin")



# 11. Umbilication

- ❖ A descriptor for lesions that have a small depression (resembling the umbilicus).
- ❖ Examples include lesions of **molluscum contagiosum** and *Penicillium marneffe* infection.



# Complex skin lesions

# 1. Hemorrhage

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## A. Hematoma

## B. Purpura

- A subtype of hematoma that does not blanch upon the application of pressure
- Nonpalpable purpura
  - Petechiae
  - Ecchymosis
- Palpable purpura



# A. Hematoma

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- ❖ Caused by bleeding into subcutaneous tissue, muscle, organ tissue or a cavity
  - Immediately after trauma: red
    - Cause: release of hemoglobin
  - After 24–96 h: dark red, green, blue, purple, black
    - Cause: coagulation of the blood and degradation of hemoglobin into bile pigment
  - After 4–7 days: dark green
    - Cause: breakdown of heme into biliverdin
  - After 7 days: yellow; brownish
    - Cause: breakdown of biliverdin into bilirubin

## B. Purpura

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**Definition:** a subtype of hematoma that does not blanch upon the application of pressure

### ❖ **Nonpalpable purpura**

- **Petechiae:** Flat, red-purple, pinpoint lesions < 3 mm in size
- **Ecchymosis:** Flat, red-purple, larger form of petechiae, > 5 mm in size

### ❖ **Palpable purpura:** Raised, red-purple lesions

## 2. Rashes

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- A. **Exanthem:** Extended uniform rash (localized or generalized)
- B. **Enanthem:** Rash confined to the mucous membranes
- C. **Erythema:** Reddening of the skin as a result of vasodilation (blanches if pressure is applied)
- D. **Erythroderma:** Generalized reddening of the skin
- E. **Maculopapular rash:** Rash with both palpable and nonpalpable lesions  $\leq 1$  cm in size (e.g., seen in measles, infectious mononucleosis, secondary syphilis, fifth disease, rubella, roseola infantum)

## 3. Further lesions

- A. Lichenification:** Hard thickening of the skin with accentuated skin markings; indicates chronic eczema (In the exam consider it a secondary lesion)



Lichenification

# Clinical tests

# KOH mount test

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## ❖ Sample collection

- Skin: cleaned with alcohol, scraped with scalpel
- Hair: Plucked with forceps
- Nail: Undersurface of nail plate is scraped

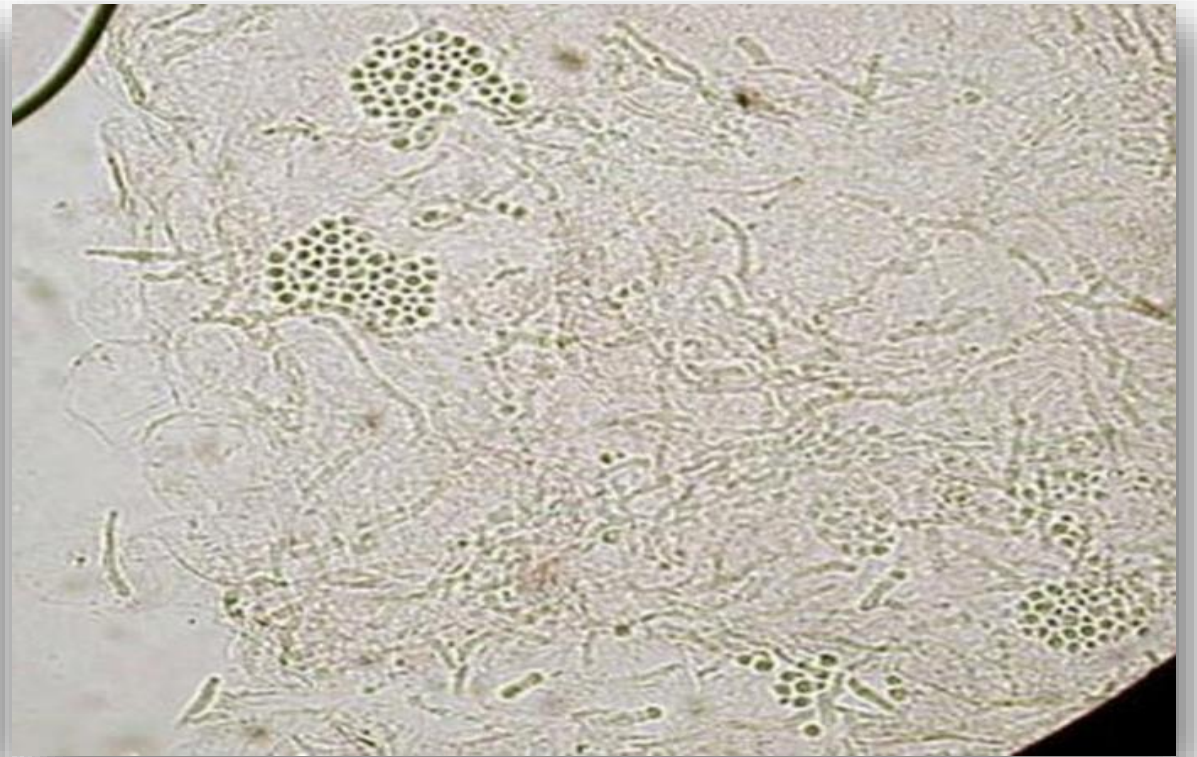
## ❖ KOH mount

- Skin & hair: 10% KOH added and heated left for half to 2 hours
- Nail: 20% KOH added and heated left for 24-48 hours

## ❖ Findings:

- Dermatophytes: Hyphae of Tinea
- **Tinea versicolor: "spaghetti and meatballs" appearance**
- Candidiasis: Budding yeast with pseudo-hyphae

# KOH mount test



# Wood's light test

❖ 365nm

❖ **Why do we use it ?**

- Establish contrast between normal skin and hyper or hypo pigmented skin and detect infection

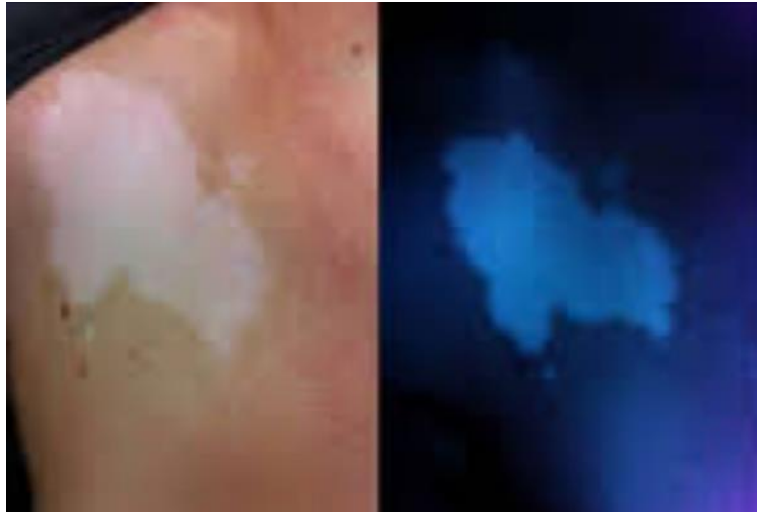
❖ **Indications and their colors:**

1. White/bright bluish: vitiligo
2. Pink: Erythrasma, pitted keratolysis
3. Green: Tinea capitis
4. Golden yellow: Tinea versicolor
5. Blue-green: Pseudomonas





# Wood's light test



Vitiligo



Tenia  
capitis



Tinea  
versicolor



Erythrasma

# Patch test

- ❖ Used for allergic contact dermatitis
- ❖ Wait 24 h (type 4 hypersensitivity) but if reactions occurred before remove it



Left column contains a suspected material that the patient might be allergic to, Right column contains control that facilitates the penetration of the allergen to the skin.



Positive patch test result : vesiculation, erythema and edema when the allergen is applied.

# Define Patch test

- ❖ **Patch test** is a diagnostic test to detect the allergic substance that cause the **allergic contact dermatitis**. Its avoidance cures the disease, and this is important in occupation related skin reactions
- ❖ **Photo patch test** is the same, but it is used for photo allergic dermatitis and the tested area needs exposure to ultraviolet light (sun light).



# Skin prick test

- ❖ A test for a type I hypersensitivity reaction. Tiny amounts of various allergens are applied to the skin. A lancet is then used to prick the surface of the skin, allowing allergens to penetrate the tissue. A wheal (typically within 15–20 minutes) equal to or larger than a histamine control (or greater than 3 mm) indicates a positive reaction to that allergen.
- ❖ Used for respiratory diseases, urticaria, and atopies (atopic dermatitis, allergic rhinitis, asthma)



# Dermoscope

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**Dermoscopy:** A technique wherein an instrument called a dermatoscope is used to visualize and magnify skin structures in the epidermis, dermoepidermal junction, and upper dermis, e.g., to diagnose skin lesions and triage skin cancers.



# Cryotherapy

## ❖ Name of instrument

- Medical cryotherapy gun

## ❖ Name of the used gas

- Liquid nitrogen of -196 c

## ❖ Indications

- Warts
- Molluscum contagiosum
- Orf
- Callus
- Actinic keratosis
- Skin cancers



# Overview of treatment

# Topical medications

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❖ First choice of treatment for most conditions; often preferred for treating dermatological conditions because they cause fewer systemic side effects

❖ **Topical steroids:**

- Most common side effects: Skin atrophy, Steroid acne
- Skin diseases that topical steroid aggravates them (contraindicated)
  1. Dermatophytosis as with Tinea incognita
  2. Acne
  3. Hypertrichosis



# Types of topical preparations

## ❖ Creams:

- Best for weeping eruptions

## ❖ Ointments:

- Best for dry, lichenified skin

## ❖ Lotions, foams, and gels:

- Best on hairy areas (e.g., scalp)

