



433 Teams

DERMATOLOGY

L1: structures and functions of the skin.

(basic anatomy and physiology)

+

L2: The Language of Dermatology

(descriptive and morphology skills)



جامعة
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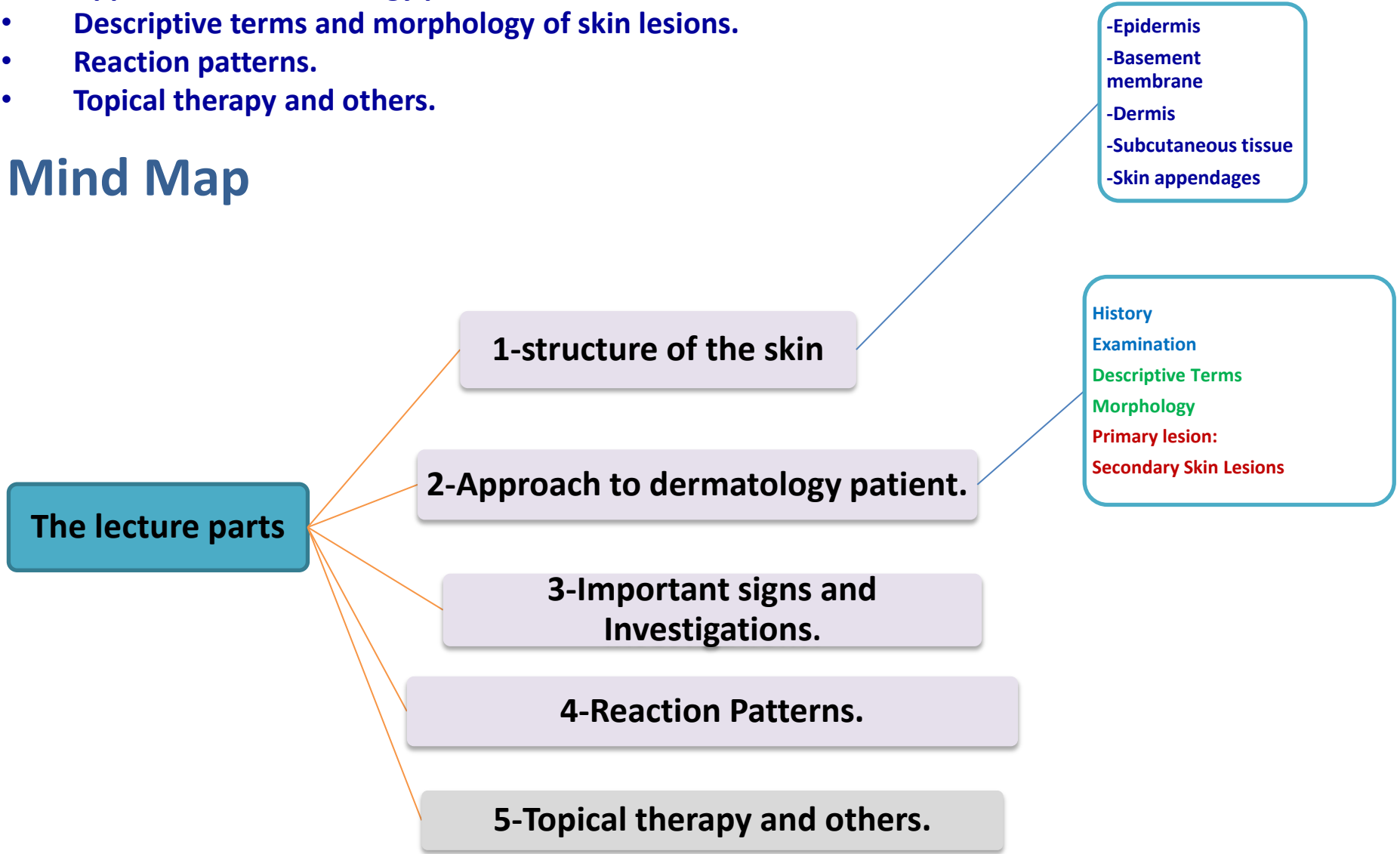


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Lecture outlines

- Function , Structure of the skin.
- Approach to dermatology patient.
- Descriptive terms and morphology of skin lesions.
- Reaction patterns.
- Topical therapy and others.

Mind Map



-Epidermis
-Basement membrane
-Dermis
-Subcutaneous tissue
-Skin appendages

History
Examination
Descriptive Terms
Morphology
Primary lesion:
Secondary Skin Lesions

Introduction to dermatology

- The skin is a complex, dynamic organ.
- It is the largest organ of the body.
- It consist of many cell types called **Keratinocytes**
- Specialized structures like the Basement Membrane.
- It serves multiple functions that are crucial to health and survival.

Function:

- Barrier to harmful exogenous substance & pathogens
- Prevents loss of water & proteins
- Sensory Qorgan protects against physical injury
- Regulates body temperature
- Important component of immune system
- Vitamin D production by absorbing UVB
- Has psychological and cosmetic importance such as hair, nails

1-Skin Structure

The skin consists of:

- A. Epidermis
- B. Basement membrane
- C. Dermis
- D. Subcutaneous tissue
- E. Skin appendages



Next slides

Skin Appendages include:

1. Eccrine/ apocrine sweat glands.
2. Sebaceous glands.
3. Hair Follicles.
4. Nails

A) Epidermis

Epidermal peg (وتند) → Anchors it to the dermis

Epidermis: Consist of several zones (from inward to outward)

1. **Basal layer** (stratum basale): **columnar** dividing cells.
2. **Spinous layer** (stratum spinosum): **polyhedral** cells attached by **desmosomes**.
3. **Granular layer** (stratum granulosum): **flat cells** containing **keratohyaline granules**.
4. **Cornified layer** (stratum corneum): **dead cell** with no organells.

1-Basal cell layer:



- Rest on the basement membrane ; divides continuously and move upwards.
- **Melanocytes** are dendritic cells lying between basal cells only
- The ratio of Melanocytes to Keratinocytes is **1:10** and in sun over exposed skin areas (e.g. Face) the ratio increases up to **1:5**
- They synthesize melanin stored in **melanosomes**.

Melanosomes are transferred to adjacent cells by means of dendrites → **thus forming the Epidermal Melanin Unit**

Melanosomes are distributed to the adjacent keratinocyte evenly, each one keratinocyte gets **36 melanosomes (1:36)** thus forming the **Epidermal Melanin Unit**

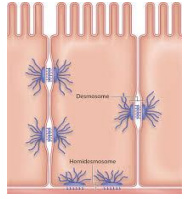
- The **size** of melanosomes and **packaging** differentiate white from dark skin.
- The **number of melanocytes** are **equal** in white and dark skin.

- **There are 2 types of melanin in the skin and hair.**
 - **Eumelanin** gives **black or blond hair color**.
 - **Pheomelanin** gives **red hair color**.
- Skin color depends on melanin and other pigments like **carotene** and **hemoglobin**.
- Melanin is **photoabsorbant**=photoprotective
- .

Characteristic features	Darkly pigmented skin	Lightly pigmented skin
Stage of melanosomes	Stage IV	Stage II & III
Size (Diameter)	0.5-0.8 mm	0.3-0.5 mm
Number of melanosomes per cells	>200	< 20
Transport to keratinocytes	Single	Group of 2-20
Rate of degradation	Fast	Slow
		

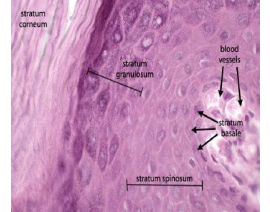
2-Spinous cell layer:

- Adhere to each other by **Desmosomes** (complex modification of the cell membrane).
- Desmosomes **appear like spines** hence the designation Stratum Spinosum.
- Langerhan cells are **antigen presenting present in abundance** (skin has immune function)



3-Granular cell layer :

- Diamond shaped cells. →Cytoplasm is filled with **Keratohyaline granules**.
- Thickness of this layer is proportional to the thickness of the stratum corneum layer .
- In **thin skin it is 1 -3- cell layers** and **10 cell layers** in **thick skin like palms and soles**.



4-Stratum corneum layer: (layer of protection)

- The cells in this layer have no nucleus . **It is 25 cell layer**
 - **thick & compact layer** → in Thick skin
 - **basket weave layer** → in Thin skin
- Cells have thick envelope that **resist chemicals, bacteria**

Stratum lucidum is found in **thick skin** below Stratum corneum.

REMEMBER!

This layer is acellular, if nuclei is present it's a **pathological condition called** → **Parakeratosis** **except in mucous membrane** , normally we don't have stratum corneum , but we have nuclei in the outermost layer of mucous membrane

So this is → called **Physiological parakeratosis and it is normal**



Parakeratosis=presence of nuclei in stratum corneum layer

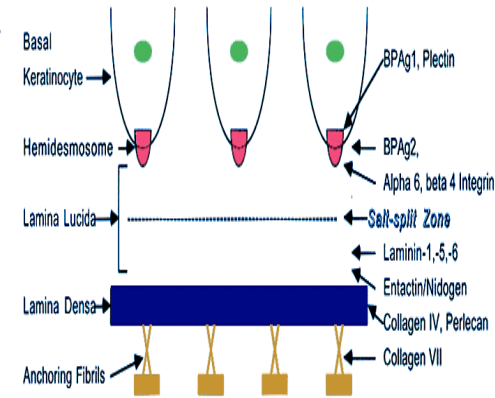
= Always it is pathological condition except in mucous membrane

B) Basement membrane

- It is a pink undulated homogenous area **between the epidermis and dermis**.
- It consist of **number of proteins**.
- It is the site of **attack injury in blistering diseases**.

Basement membrane Formed by:

- Plasma membrane of **basal cells** and **hemidesmosomes**
- Thin clear amorphous space (**lamina lucida**)
- An electron dense area (**lamina densa**).
- **Anchoring fibrils** that anchors the epidermis to dermis .



C) Dermis

Dermis is divided into

1. Papillary dermis
2. Reticular dermis

Dermis Consists of :

1. Collagen fibers

Provides strength

- **Thin fibers in papillary dermis**
- **thick and coarse in the reticular dermis.**

2. Elastic Fibers.

•Provides elasticity

- Protection against shearing forces.

3. Ground substance Binds water and maintains the skin turgor.

4. Blood vessels. To nourish the overlying epidermis also.

5. Fibroblasts Produce the above elements..

Function of dermis:

- It provides **nourishment to the epidermis** and interact with it during wound repair.
- It gives the **skin its strength**, elasticity, and softness.

As we get older the less ground substance , collagen fibers, and elastic fibers we have → wrinkles and dry skin

D) Subcutaneous tissue

Subcutaneous Fat:

- Composed of **lipocytes**
- Inflammation of the subcutaneous fat is called **panniculitis**

panniculitis It is either:

- **Lobular panniculitis**
- **Septa panniculitis**

E) Skin appendages

Skin Appendages include:

1. Eccrine/ apocrine sweat glands.
 2. Sebaceous glands.
 3. Hair Follicles.
 4. Nails
- } Next slide

1-Eccrine sweat glands

- Tubular structures open freely on the skin; **not attached to hair follicles.**
- Under the influence of **cholinergic stimuli.**
- Present everywhere **except The vermilion border ; nail beds ; labia minora ; glans**
- **Abundant in palms & soles.**

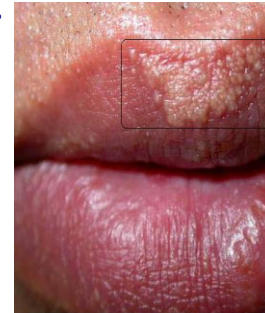
2-Apocrine sweat glands:

- Secrete viscous material that give musky odor when acted upon by bacteria
- Present in the axillae ; anogenital area ; modified glands in the external ear canal ; the eye lids (moll's glands) ; and areolae.
- **Under adrenergic stimuli.**

3-Sebaceous glands:

- **Attached to hair follicles**
- Or open freely. → Present in the scalp, forehead, face, upper chest except palms and soles.
 - ✓ In the areola as → **Montgomery tubercles** .
 - ✓ In the eye lids as → **Meibomian glands**.
- Sebaceous glands are **under the control of androgens**.

Sometimes present in abnormal location such as the lips or the mucus membrane on the inside (we don't have hair in that area **so the presentation of sebaceous glands is abnormal**)
So Ectopic glands in the mucous membrane are called → Fordyce spots.



4-Hair follicles:

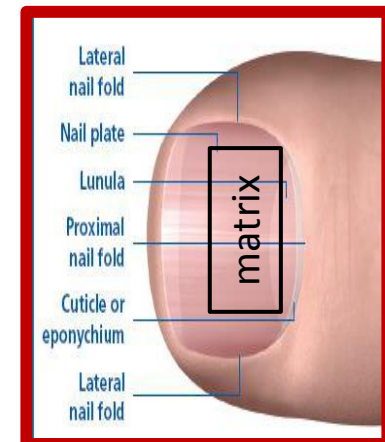
The **hair follicle** with its attached **sebaceous gland** form → **the Pilosebaceous Unit.**



- Pilosebaceous unit = hair follicle + sebaceous gland.
- Acne is a disease of Pilosebaceous unit.
- Apocrine and sebaceous glands open in the hair follicle

5-Nails.

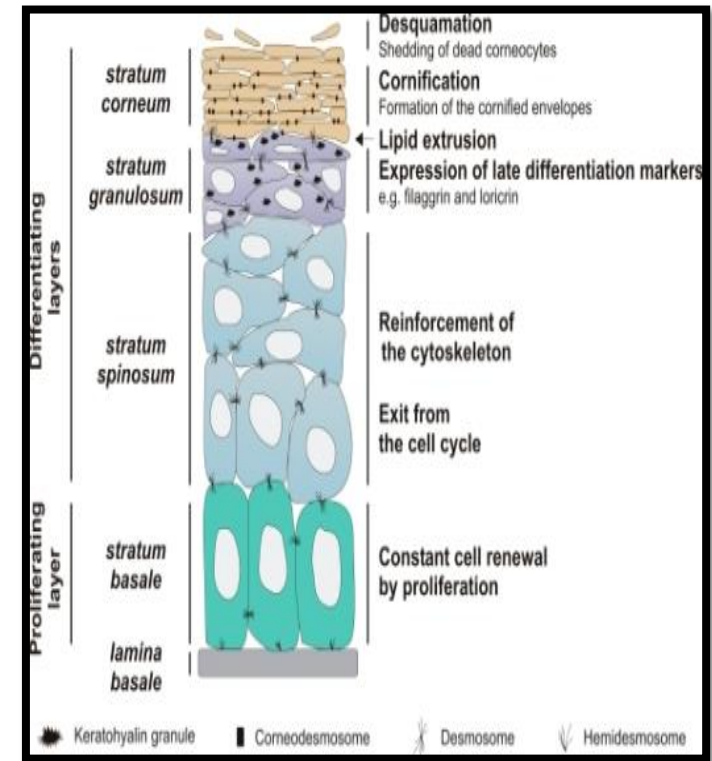
- The **nail plate** is formed of **hard keratin**.
- Proximal nail fold morphology can be altered in connective tissue disease .
- The **lunula** is the **visible part of the matrix**.
- The matrix covers the midportion of the distal Phalanx.
- ✓ **Fingernails grow 3mm/month.**
- ✓ **Toenails grow 1mm/month.**



Nails can be affected in systemic and skin diseases. → Next slide

NAIL DISORDERS

- 1- **ABSENT PART:** Anonychia congenita
- 2- **NAIL PITTING:** Psoriasis
- 3- **CUTICLE INVASION:** Lichen planus
- 4- **PIGMENTATION & RIDGING:** Monilla
- 5- **DISTAL ONYCHOLYSIS:** Tinea
- 6- **SPOON NAILS:** Iron deficiency Anemia
- 7- **DISCOLORED & INVERTED EDGES:** Ectodermal Dysplasia
- 8- **CLUBBING:** Hypoxia, Malignancy or Toxins
- 9- **BITTEN NAILS (SHORT):** Anxiety
- 10- **SPLINTER HAEMORRHAGE:** Bac. Endocarditis
- 11- **YELLOW:** Bronchiectasis, Lymphoma & Edema
- 12- **HALF & HALF:** Hepatic Necrosis
- 13- **RIDGING:** Rheumatoid arthritis
- 14- **LONGITUDNAL BROWN LINES:** Addisons's, Breast cancer & Melanoma
- 15- **WHITE NAILS:** Anemia
- 16- **RED NAILS:** SLE, Polycythemia
- 17- **HORIZONTAL WHITE & PINK BANDS:** Nephrotic Syndrome
- 18- **BRITTLE NAILS:** Hypothyroidism



Cornification (keratinization)

- The viable cell in the basal cell layer passes upwards and becomes a dead cell.
- The terminal differentiation of keratinocytes into dead horny cell (corneocyte).
- The total process takes **approximately 2 months.** → if the process duration shortens it will causes abnormal scaly skin.
- Abnormalities in this process secondary to abnormal immune response such as in psoriasis leads to roughness and scaling of the skin.
- It involves the formation of keratin polypeptides.

2-Approach to Dermatology Patient

Step 1: Start with basics → Age ,Race ,Sex ,**Occupation** → • ask about it in any case of contact allergy

Step 2 : → Present complaints. → **History of skin lesion** • (hairdressers , builders , florists are prone to contact dermatitis)

- Onset - when?
- Where? site of onset.
- Extension of lesions.
- Evolution. → mean the lesion changes over time
- Itchy/ painful
- Provocative factors (sun , cold, friction).
- Treatment.
- Past medical history.
- Family history.
- Drug history.
- Recreational and social history.

Step3 → Examination

- Use good light when examining a patient.
- **Examine nails & mucous membrane.**

Examination

A) Describe

- Describe the **general** appearance of patient
 - Describe **distribution** of lesions
 - Describe arrangement of Lesions (**configuration**) relation of lesions to each other
- Describe the type of the lesion
- Describe the shape.
 - Describe the color, size.

B) Palpation

- Look for
- Consistency
- Mobility
- depth
- tenderness.

Distribution

1-Generalized: can be

I. Symmetrical

- A. Universal (head to toe)
- B. Bilateral

II. Asymmetrical

- A. Diffuse
- B. Unilateral

2-Localized to:

- Acral → (toes, fingers, ear, nose)
- Sun exposed.
- Trauma sites.
- Flexures.
- Specific part.

Descriptive Terms (Arrangement)

Photodistribution :

Lesions occurring **over sun exposed skin**.

Protected areas remain free of lesions.

Linear:

Forms a line .

Dermatomal

Occurring within the distribution of nerve

Annular

Ring like .

Herpiform/Grouped

Lesions **grouped** in a manner similar to herpes simplex lesions

Reticular

Net like .

Verrucous, warty, papillomatous:

Surface consisting of finger like projections.

Nummular/discoid:

Refers to round, **coin like lesions**.

Guttate:

Drop like, “en gouttes”.

Targetoid:

(Iris like)

Round lesions with **concentric** border and a dark center.

Umbilication:

Round depression in the center.



Photodistribution



Linear



Annular



Dermatomal



Reticular



Herpiform (Grouped)



Verrucous, warty, papillomatous:



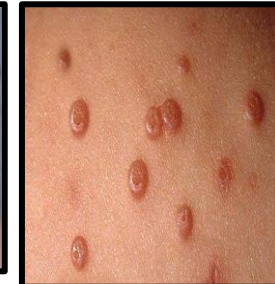
Guttate



Nummular/discoid:



Targetoid



Umbilication

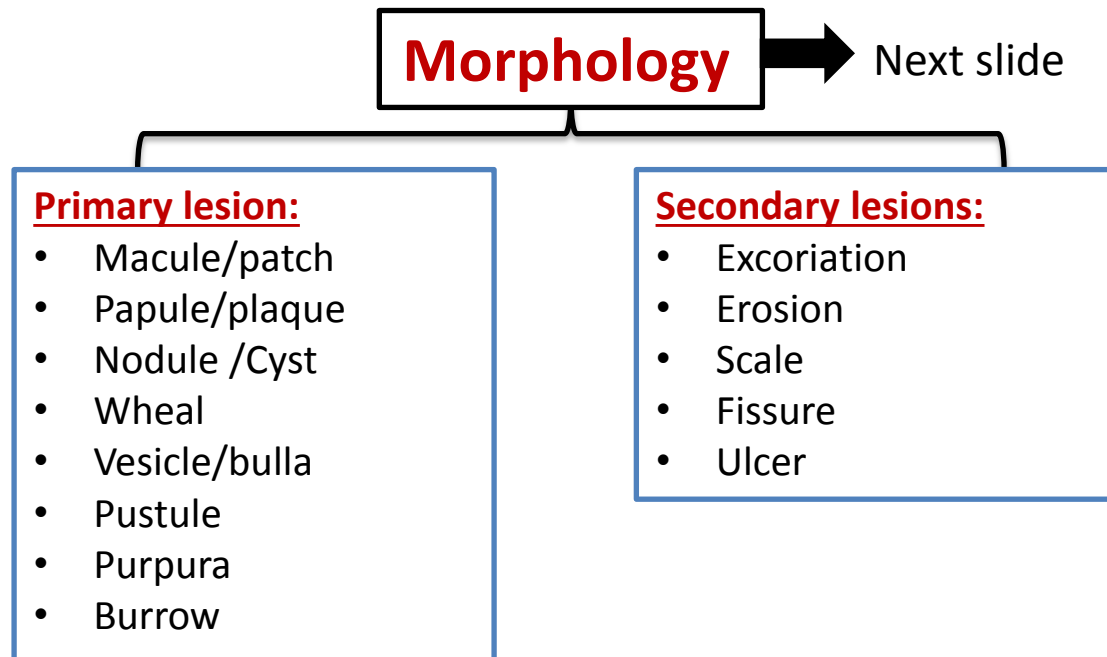
Morphology

Skin lesions are divided :into

1. **Primary** =Basic lesion.
 2. **Secondary**= **Develop** during evolution of skin disease or created by scratching or infection
- **There are two steps in establishing the morphology of any given skin condition:**
 1. Careful visual and tactile inspection
 2. Application of correct description

Morphology includes:

- The type of the lesion.
- The shape of lesion (oval, round, bizarre, geographic)
- The margination of the Lesion (well defined, ill defined)
- Color of the lesion.
- Configuration (**relation of lesions to each other.**)
- Distribution.



1-Primary Skin Lesions

1-Macule : only change in color no elevation no depression

- Flat circumscribed discoloration
- that lacks surface elevation or depression.
- **less than 1 cm in size.**
 - Vitiligo.
 - Freckle.



2-Patch: only change in color no elevation no depression

- Flat circumscribed discoloration;
- **a large macule more than 1cm.**
- Vitiligo.
- Melasma.



3-Papule :

Elevated, Solid lesion
< 0.5cm in diameter.

Notice

- **color**
- **and surface changes** (like →

- Umblicated
- Keratotic
- Papillomatous
- Flat topped.

e.g

- Molluscum Contagiosum.
- Acne.

Macule with elevation become papule



4-Plaque:

Elevated, solid confluence or expansion of papules,
> 0.5 (lacks a deep component).

A flat topped palpable lesion more than 1 cm in size.
e.g. Psoriasis.

Patch with elevation become plaque.



5-Nodule :

A solid, circumscribed elevation whose greater part lies beneath the skin surface.

> 0.5 cm in diameter;
with deep component

(**elevation+depth**)

- Erythema Nodosum.
- Basal cell carcinoma



6- Cyst:

Nodule that contains fluid
or **semisolid material**.



7-Vesicle (Describe The Base Of Lesions and content of lesion)

Elevation that contains **clear fluid**.

A small **less than 5 mm** in diameter
e.g. Dermatitis Herpetiformis. Herpes.

8-Bulla:

- Localized fluid collection. **>0.5cm** in diameter
- a large vesicle.
- e.g. Bullous Pemphigoid



11-Wheal:

Firm, **edematous** plaque
that is **evanescent** (**short lived**) and pruritic
also called a hive.

with a pale center and a pink margin.

less than 24 h
e.g. Urticaria.



9-Burrow: (specific only for scabies)

Linear tunnel in the
epidermis **induced by scabies mite**.



10-Purpura:

Extra-vasation of red blood cells
giving **non-blanchable erythema** → Doesn't
turn white when you press on it



12-Pustule:

Elevation that contains
purulent material.

- Pustular Psoriasis.
- Acne.



2- Secondary Skin Lesions

Scale :

Thick stratum corneum

Crust: (also called scab)

A collection of **cellular debris**, **dried serum** and **blood** .

Antecedent primary lesion usually a **vesicle**, **bullae**, or **pustule**.

Erosion:

A partial **focal loss of epidermis** that heals **without scarring**.

Erosion= the dermis not involved

Excoriation :

Linear erosion induced by scratching.

Fissure :

Vertical loss of epidermis and dermis with sharply defined walls:
crack in skin.

Ulcer :

A full thickness **focal loss of epidermis and dermis**; heals with scarring.

Scar:

A collection of **new connective tissue**; may be **Hypertrophic** or **atrophic**. **Implies dermoepidermal damage**
scar happen → when dermoepidermal junction damage

Lichenification:= Acanthosis(histological term)

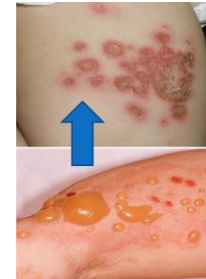
Increased skin markings secondary to scratching

Acanthosis

histological term used to describe epidermal thickening due to increase keratinocytes in the spinous layer.



Scale



Crust



Erosion



Excoriation



Fissure



Scar



Ulcer



Lichenification

****Specialized Terminology**

Sclerosis:

Hardening of the skin .(Skin is un-pinchable) .

Quiz(1)(describe the Lesions)



- Size
- Type
- Color
- Surface
- Margination
- Configuration
- Distribution



Bilateral well defined yellow rectangular plaques



Keratotic papillomatous skin colored plaque



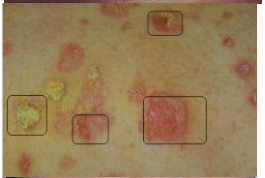
Umbilicated pearly papules, some are grouped



Annular erythematous scaly plaque



Grouped tense vesicles on erythematous base



Yellow crust, erosions, flaccid bulla on erythematous base



Unilateral erythematous patch over the cheek, inner canthus, and upper lip



1 cm cyst with telangiectasia

3-Important signs and Investigations.

1-Important signs

1-Nikolsky Sign:

Rubbing of apparently normal skin induce blistering.

Seen **only** in pemphigus vulgaris and toxic epidermal necrolysis (TEN)



Nikolsky Sign

2-Auspitz Sign

forceful removal of scale on top of a red papule produces **bleeding points**

Seen in psoriasis



Auspitz Sign

3-Koebner's phenomenon:

Trauma to the skin re- produce certain diseases like

- A. Psoriasis
- B. Vitiligo
- C. Lichen planus.
- D. Warts. Ask patients not to shave



Koebner's phenomenon

4-Dermatographism:

Firm stroking of the skin produces → erythema and wheal.

Seen in physical urticaria.



Dermatographism

In patient with **atopy**, stroking produces white dermatographism rather than red.

3-Important signs and Investigations.

2-Investigations.

1-Wood's lamp:

- Produces long wave UVL (360 nm)
- Useful in:
 - **Tinea Versicolor** -yellowish green fluorescence
 - **Tinea Capitis** -yellow green fluorescence in M.canis, M. andouini
 - **Vitiligo** - Milky white depigmentation
 - **Erythrasma** –coral red fluorescence.
 - **Melasma** becomes more intensified.

2-KOH preparation →for fungus (used for scaly lesions not vesicular)

- Cleanse skin with alcohol Swab.
- Scrape skin with edge of microscope slide onto a second microscope slide.
- Put on a drop of 10% KOH.
- Apply a cover slip and warm gently

Examine with microscope objective lens. (Will show the fungal elements more clearly because KOH will digest the keratin)

3-Tzank smear : →(used in vesicular lesions):

- **Important in diagnosing**
 - Herpes simplex or VZV (**multinucleated giant cells**)
 - Pemphigus Vulgaris (**acantholytic cells**).
- Select a fresh vesicle. →De-roof and scrape base of the vesicle. → Smear onto a slide. → Fix with 95% alcohol.
→ Stain with **Giemsa stain**. → Examine under microscope.

4-Prick test :

Put a drop of allergen containing solution

A non bleeding prick is made through the drop.

After **15-20 min** the antigen is washed and the reaction is recorded.

Positive test shows

- urticarial reaction at site of prick.
- Detects immediate-type IgE mediated reaction. (**type 1** hypersensitivity reaction).

Emergency therapeutic measures should be available in case of anaphylaxis. (**Resuscitation cart**)

5-patch Skin Test

- Important in **contact dermatitis**. (**Type 4** cellular immunity)
- Select the most probable substance causing dermatitis.
- Apply the test material over the back.
- Read after **48 & 72 hr**. Look for (erythema, edema, vesiculation)
- **Positive patch test showing**
 - erythema and edema.
 - In severe positive reaction vesicles may be seen.

Ask patient to keep it and not to remove it.
Then read it after 48 hours (first reading) then remove the patch. Look for any redness.
The red lesions are then followed up after 24 hours (72 hours since the patch was applied) is the second reading.
If the redness increased or there is vesicle formation this is a positive test for allergic contact dermatitis. But if the redness subsided it is irritant contact dermatitis

6-skin Punch Biopsy

- Clean skin with alcohol.
- Infiltrate with 1-2% xylocaine with adrenaline.
- Rotate 2-6 mm diameter
- punch into the lesions.
- **Lift specimen and cut at base of lesion.**
- Fix in 10% formalin
- **For Immunofluorescence → Put in normal saline.** (to keep the tissue fresh).
- Suture if 5 mm is used. (if less the 4 mm we do not need to suture it but if more the 4 mm we need to suture)

7-Direct immunofluorescence DIF

- ❑ Used to diagnose autoimmune diseases e.g.
 - Pemphigus Vulgaris
 - Bullous pemphigoid
- ❑ Detects immunoglobulin and complement deposits in skin.
- ❑ The deposits will give a green fluorescence

Fluorescence will be noted if

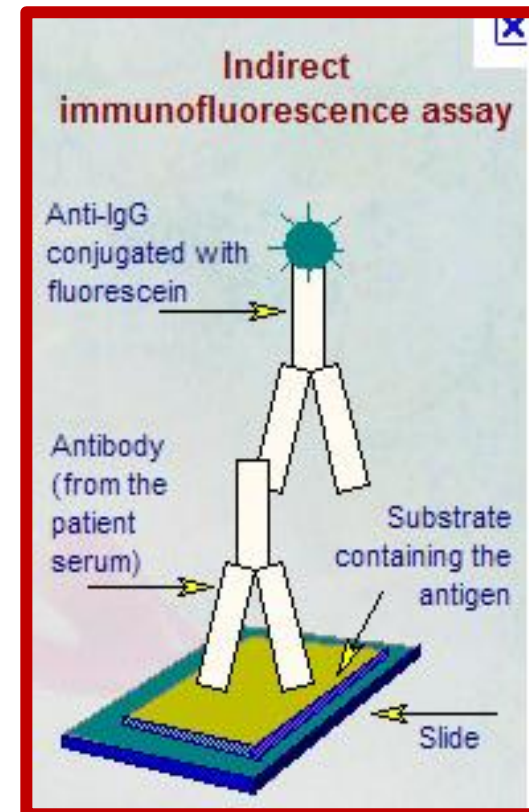
- immunoglobulin deposits are found intercellular between the epidermal cells as in **pemphigus vulgaris**
- OR**
- the Basement membrane zone as in **bullous pemphigoid**.

8-Indirect Immunofluorescence : IDIF

Detect auto antibodies in the serum.

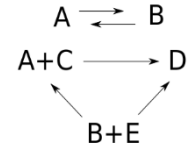
It is used:

- To confirm a diagnosis
- To differentiate between bullous diseases
- To monitor disease activity.



4-Reaction Patterns.

- Skin has limited number of responses to stimuli whether inflammatory or neoplastic.
- These responses are called reaction patterns.
- Reaction patterns aid in formulating differential diagnoses.



1-Psoriasiform:

Well defined erythematous Papules or plaques with thick scale.

Differential diagnosis

- Psoriasis.
- Lichen simplex chronicus

2-Pityriasiform:

Papules and plaques with **delicate or thin scales**.

e.g Pityriasis rosea

3-Lichenoid :

Flat topped polygonal papules.

Differential diagnosis

- Lichen planus
- Lichenoid drug reaction

4-Bullous:

Differential diagnosis:

- Pemphigus Vulgaris
- Bullous Pemphigoid

5-Pustular:

Differential diagnosis:

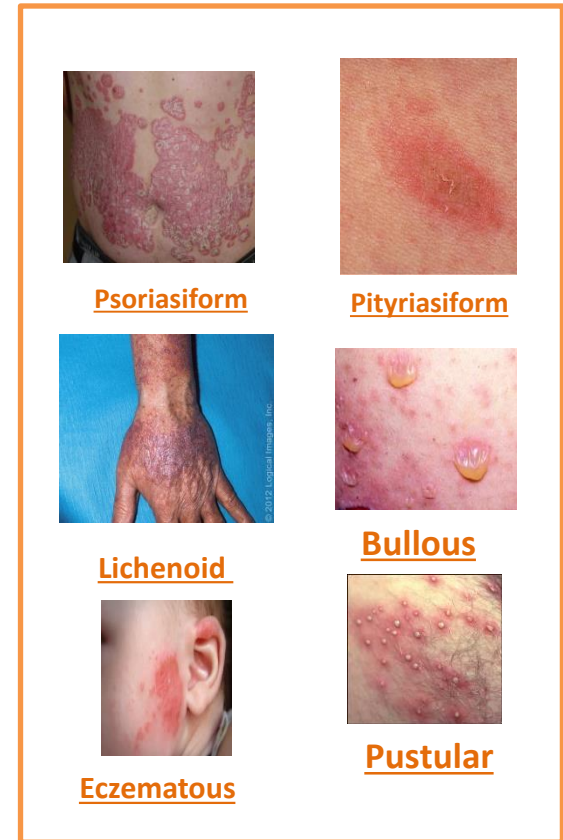
- Folliculitis
- Varicella
- Pustular psoriasis

6-Eczematous:

Pruritic, **ill defined erythematous** edematous, vesicular eruption.

Differential diagnosis

- Atopic dermatitis.
- contact dermatitis.



Difference between eczema and psoriasis?

- Eczema is ill defined while psoriasis is well defined.
- Eczema in acute phase form edematous papules.

5-Topical therapy and others.

- A wide variety of topical agents are available.
- Delivers the drug to target site.
- (Golden rule).
 - IF the lesion is dry -wet it → How to wet it? Creams, ointments
 - IF wet -dry it → How to dry it? Using compressors (cloth of water) will cause it to evaporate

Topical drugs consist of

1-Active substance: → like steroids, antimicrobial agents.

2-Vehicle: → Is the base in which the active ingredient is dispersed

Guidelines regarding steroid use:

- Avoid use for extended periods of time.
- Avoid high potency steroid on flexures and face. → except in case of discoid lupus, Patients usually start with a potent topical steroid because it is very scarring disease
- Avoid high potency steroid in children.

Wet compresses - dries wet lesions.

- Like acetic acid, $KMNO_4$
- Wet compresses are: →
 - Antibacterial.
 - Cause debridement.
 - Suppress inflammation.



Topical steroids side effects:

- Atrophy and striae.
- Telangiectasia and purpura.
- Masking the initial lesion.
- Perioral dermatitis and rosacea or acne.
- Systemic absorption. (Adrenal suppression)
- Tachyphylaxis. (sudden loss of response)
- Hypertrichosis and hypopigmentation.

Creams are mixture of **oils and water** in which the active substance is dispersed.

- Creams **are white** in color- useful in folds.
- Creams are **applied to wet lesions**.

Ointments are primarily grease.

- They are useful in dry lesions.
- They Preserve moisture.
- Like petrolatum jelly and mineral oil.
- Ointments are applied to **dry skin**.
- **Are translucent**.

Gels are mixtures of **propylene glycol and water**.

Sometimes they contain Alcohol.

They are **translucent** and are **best used in wet disorders and hairy regions**.

How much to use?

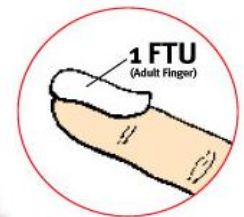
Finger tip unit:

The amount of cream/ointment expressed from 5mm nozzle.

- It weighs 0.5g → It covers 2 hand units.

The fingertip unit method*

FTU = Fingertip unit (adult)
 1 FTU = 1/2 g of cream or ointment.
 Measurement based on 5mm nozzle.



FACE & NECK	ARM & HAND	LEG & FOOT	TRUNK (front)	TRUNK (back inc buttocks)	Age Group	
1	1	1½	1	1½	3-6 months	
1½	1½	2	2	3	1-2 years	
1½	2	3	3	3½	3-5 years	
2	2½	4½	3½	5	6-10 years	
FACE & NECK	ONE ARM	ONE HAND	ONE LEG	ONE FOOT	TRUNK (front)	TRUNK (back)
2½	3	1	6	2	7	7

Adult

Other therapeutic modalities

1-Phototherapy machine/NBUVB

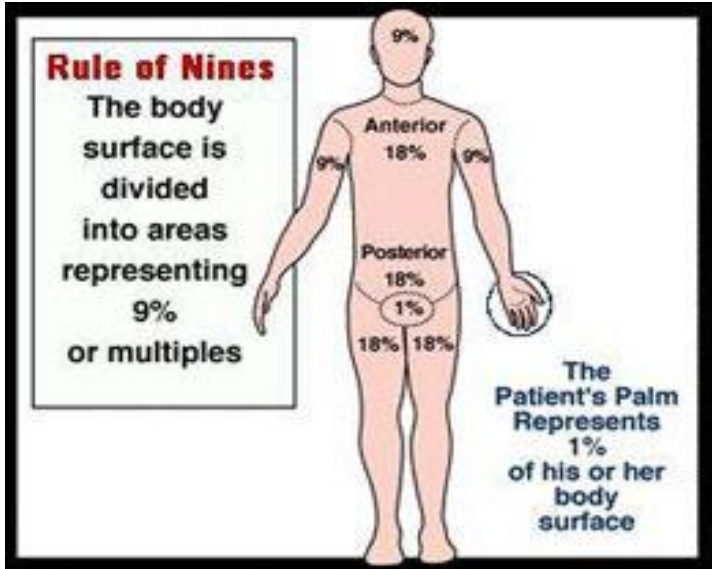


Vitiligo treated by NBUVB

Other indications include

- psoriasis
- Lichen planus
- Eczema

How to calculate the disease surface area?



2-Hand and feet narrow band UVB



3-Liquid nitrogen gun.(Cryotherapy)

Used to treat warts.



4-Electric cautery

Used to destroy skin tags(Malignant tumors).



Quiz(2)(describe the Lesions)



Linear nodules with ulceration



Multiple erosions



Erosions, crusts, annular bullae



Scales, plaques, scars, erosion, hyperpigmentation



Confluent flat topped papules forming plaques



Erythematous papules

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