Derma Team 436

Introduction to Dermatology Part 1&2 (Skin Structure & Dermatological Language)

Course Objectives:

Below is a summary of the key objectives of the course.

- To understand the basics of skin anatomy.
- To be familiar with the language of dermatology by learning the primary and secondary skin lesions and to be able to describe various skin conditions.
- To enable medical students to recognize the most common skin diseases and to manage them.
- To be familiar with the diagnostic laboratory tests pertinent to dermatology.
- To help students to formulate decent differential diagnoses of skin diseases.
- To gain an overview of the skin manifestations of systemic diseases.
- To be able to deal very appropriately with different emergencies in dermatologic diseases

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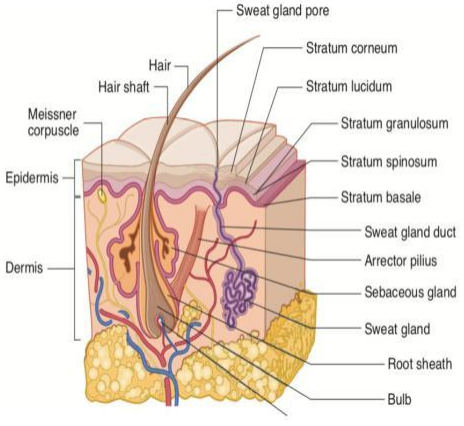
Before you start.. CHECK THE EDITING FILE
Sources: doctor's slides and notes + FITZPATRICK color atlas +435 team
[Color index: Important | doctor notes | Extra]

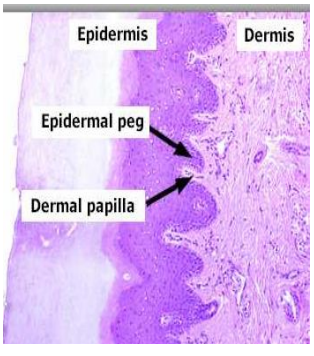
The Skin:

- The **human skin** is the outer covering of the body. The skin is a complex, dynamic organ and it is **the largest** organ of the body. It has a body surface area of 1.5 – 2 m^2 and it contributes to 1/6 to 1/7 of body weight.

Skin function:



- Barrier to harmful exogenous substance & pathogens.
- Prevents loss of water & proteins. (metabolic & endocrine function)
- Sensory organ protects against physical injury.
- Regulates body temperature (Thermal regulation through the sweat glands, constriction or dilation of blood vessels)
- Important component of the immune system.
- Vit.D production by absorbing UVB.
- Has psychological and cosmetic importance such as hair, nails.



The Skin structure consists of:

1. Epidermis
2. Basement membrane
3. Dermis
4. Subcutaneous tissue
5. Skin appendage.

1) The epidermis:

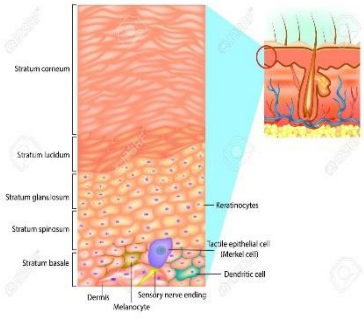
Is the **outermost** layer of the skin. **The main cell types which make up the epidermis are:**

1-Keratinocytes 90% of epidermis + produce keratin the main cell type in the skin

2-Melanocytes produce melanin responsible for skin color and protection against UV light.

3- Merkel cells serve a neurological function They are is essential for light touch.

4-Langerhans cells are antigen presenting cells (immune system).



Cornification (keratinization):

- It is the cytoplasmic events that occur in the cytoplasm of epidermal keratinocytes during their terminal differentiation into dead horny cell (corneocyte). The total process takes approximately 2 months
- It involves the formation of keratin polypeptides.
- Abnormalities in this process lead to roughness and scaling of the skin like PSORIASIS (In psoriasis it takes 3 days which will result in a lot of scales)

The Epidermal Zones:	1) **Stratum corneum (cornified layer horny cell layer):** is the outermost layer of the epidermis (dead cells with no organelles, the cells in this layer have No nucleus =(corneocytes). Its 25-cell layer. The cells have a thick envelope that helps it resist external chemicals. In psoriasis you see a nucleus in the stratum corneum, this is NOT normal! **(Parakeratosis)**

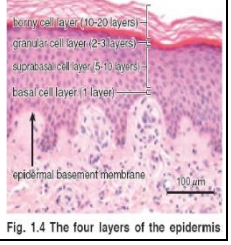


Fig. 1.4 The four layers of the epidermis

2) Stratum lucidum (wasn't mentioned in the slides) very thin absent in areas with thin skin (back)it is only found in palms and soles, present under the stratum corneum.

3) Stratum granulosum (granular cell layer) (flat cells containing keratohyalin organelles):

- Diamond shaped cells
- Cytoplasm is filled with keratohyalin organelles (the proteinKeratohyalin forms dense cytoplasmic granules that promote dehydrationof the cellswell as aggregation and cross-linking of the keratinfibers. The nucleiand other organelles then disintegrate, and the cells die)
- The thickness of this layer is proportional to that of the stratum corneum thicker in palms and soles than in the face because the stratum corneum is thicker there.
- In thin skin its 1-3 cell layers and 10 cell layers in thick (fingertips, hand and soles)

4) Stratum spinosum (spinous cell layer, larger nucleus, **polyhedral cells attached by desmosomes):**

- In the spinous layer they are connected to each other by desmosomes and gap junctions which appear as spines thus called spinous layer. Desmosome is a complex modification of the cell membrane. When there is a problem with desmosomes, the patient develops "blistering diseases" > the connection between keratinocytes is no longer there due to autoimmune antibodies or other causes.

- Bone marrow derived **Langerhans cells** which are antigen presenting cells (MHC II) are found in this layer. (skin immune function/adaptive immunity) And they can be identified through birbeck granules. Abnormal proliferation of these cells is seen in Langerhans cell histiocytosis

5) Stratum Basale (basal cell layer) (columnar or cuboidal dividing cells): stem cells

- This layer Rests on (above)the basement membrane
- **Divides continuously and moves upwards.**
- It takes 28 days to transmit cells from this layer to stratum corneum
- Melanocytes are dendritic cells lying between basal cells in a ratio of **1:10** for every 10 keratinocytes, there is ONE melanocyte. Melanocytes are scattered among the keratinocytes. They produce and store melanin + transfer pigment granules (melanosomes) into keratinocytes "Melanosomes are transferred to adjacent cells by means of dendrites thus forming **the epidermal melanin unit**". Melanosomes serve as the packaging of melanin pigment. The **size of melanosomes**and packaging differentiate white from dark skin. The number of melanocytes is **equal** in white and dark skin what differs is the SIZE of the melanosomes. Melanocytes are cells responsible for skin pigment and provide protection from UV light. They are mainly seen in this layer. Melanocytes can also be found in the hair bulb, eye and brain.

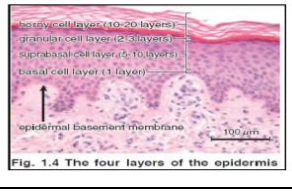
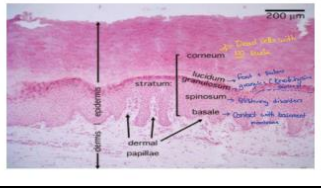
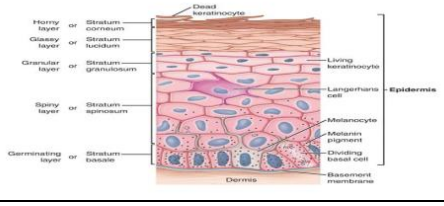
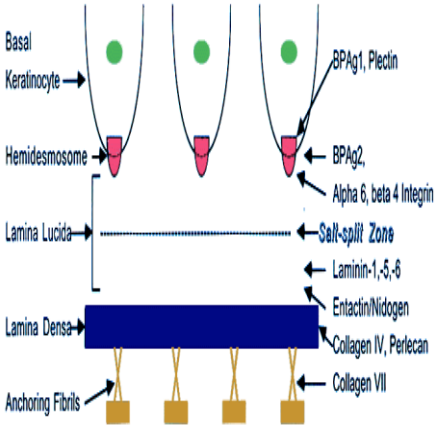


Fig. 1.4 The four layers of the epidermis





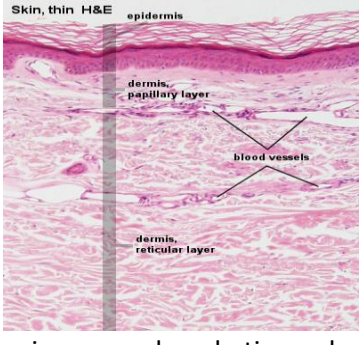
2) Basement Membrane:



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

2) Dermis:

- Upper layer is called papillary dermis
- The lower part is called reticular dermis. "Bigger part"



Consists of:

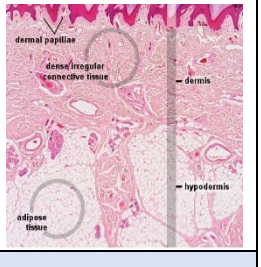
1. Collagen fibers (strength): Thin fibers in papillary dermis but thick and coarse in the reticular dermis.
2. Elastic fibers (elasticity). Protects against shearing forces collagen and elastin are reduced with age, this is why we give collagen for age related wrinkles.
3. Ground substance (softness) binds water and maintains skin turgor. proteoglycans
4. Fibroblasts (produce collagen)
5. Blood vessels (It provides nourishment to the epidermis and interact with it during wound repair, nerves, lymphatics and muscles)

   So, the function of dermis is to give the skin its strength and elasticity and to provide the epidermis with nourishment

The cells in the dermis include: macrophages, fibroblasts, dermal dendritic cells and mast cells (immune functions).

3) Subcutaneous fat:

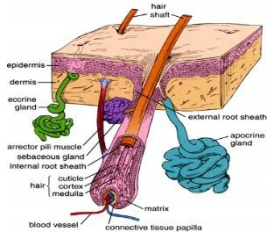
- Lies below the dermis. Composed of **Lipocytes**. What is the fundamental unit of Subcutaneous fat? lipocytes.
- Attach the skin to underlying bone and muscle as well as supplying it with blood vessels and nerves.
- The main cell types are fibroblasts, macrophages and adipocytes

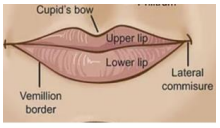
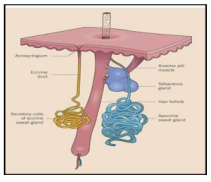
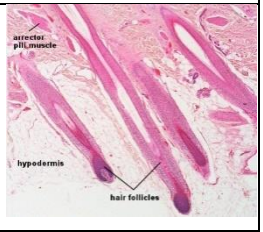
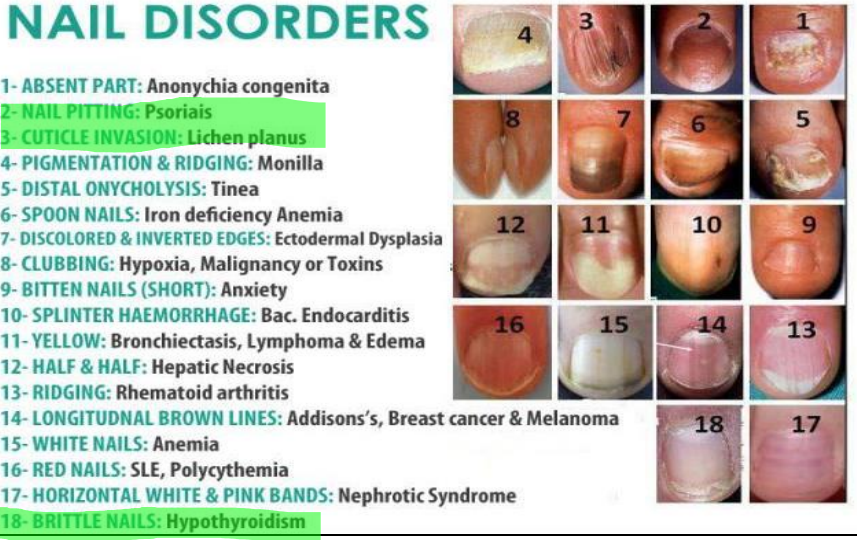


5) Skin appendage:

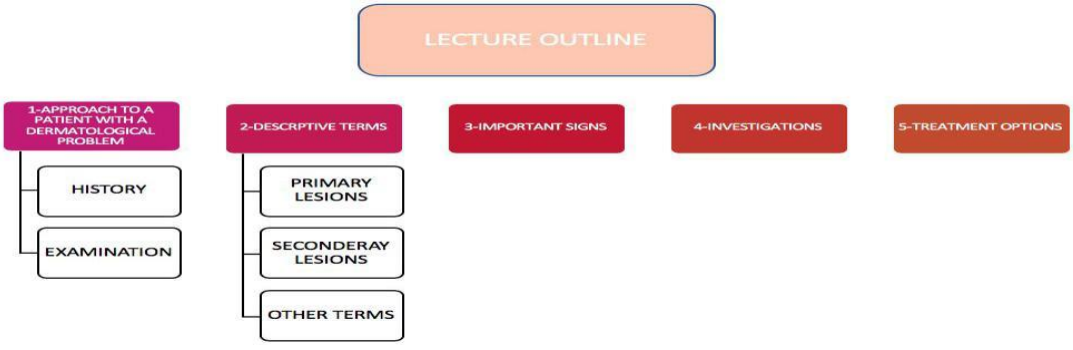
are skin-associated structures that serve a particular function It includes:

1-Eccrine/apocrine glands.
2-Hair follicles.
3-Sebaceous glands.
4-Nail.



Eccrine glands:	• Tubular structures open freely on the skin, **not attached to hair follicles.** While apocrine is attached to hair follicles. • Under the influence of **cholinergic stimuli**. parasympathetic • Present everywhere except: -The vermilion borders. -Nailbeds. -glans penis. -Labiaminora. • Abundant in palms and soles.  
Apocrine glands:	• Secrete viscous material that gives musky odor when acted upon by Bacteria. • Presentin: The axillae, Anogenital area, Modified glands in the external ear canal, The eyelids (moll's glands) andareolae. • Under **adrenergic** stimuli.
Sebaceous glands:	• Attached to hair follicles or open freely. If attached, it's called pilosebaceous unit. • Present in the scalp, forehead, face and upper chest **except palms and soles.** • Secrete sebum to moisturize the skin. • Sebaceous glands are under the control of **androgens** • SG in the areola are called **Montgomery tubercles**, in the eye they are called meibomian glands. Ectopic glands in the mucous membrane are called → Fordyce spots 
Hair follicles:	• Hair follicle has the hair shaft, hair bulb and the bulge. • Pilosebaceous unit include: hair follicle + sebaceous gland+ arrector pili muscle. 
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 mid-portion of the distal Phalanx. • Fingernails grow 3mm/month. Toenails grow 1mm/month. • Nails can be affected in systemic and skin diseases. The doctor focus on 2,3 in the picture and other disorders that related to skin diseases.  

Part 2 (Dermatological Language)



◆ Approach to a dermatology patient:

1) **First start with basics:** **''Don't forget the basics'** 'Start with the patient:
   1. Age
   2. Race
   3. Sex
   4. Occupation and marital status

2) **History:**

- **How long** have skin lesions been present. Acute, subacute, chronic.
- **Where** did the problem first appeared? (does it change sites?)
- **Progression** of the problem. (constant or increasing in size)
- Associated symptoms Any other symptoms like pruritus.
- Aggravating relieving factors (Heat, cold, sun)
- **Treatment** history.
- Past medical history (general relevant medical history). (chronic diseases)
- **Occupational** and recreational history. (Jobs like painting)
- **Travel** and **Family** and **household** contact history (pets)
- Drug Hx and allergy Hx VERY IMPORTANT in dermatology

(some medications might cause autoimmune reactions ex penicillin thiazide lithium)

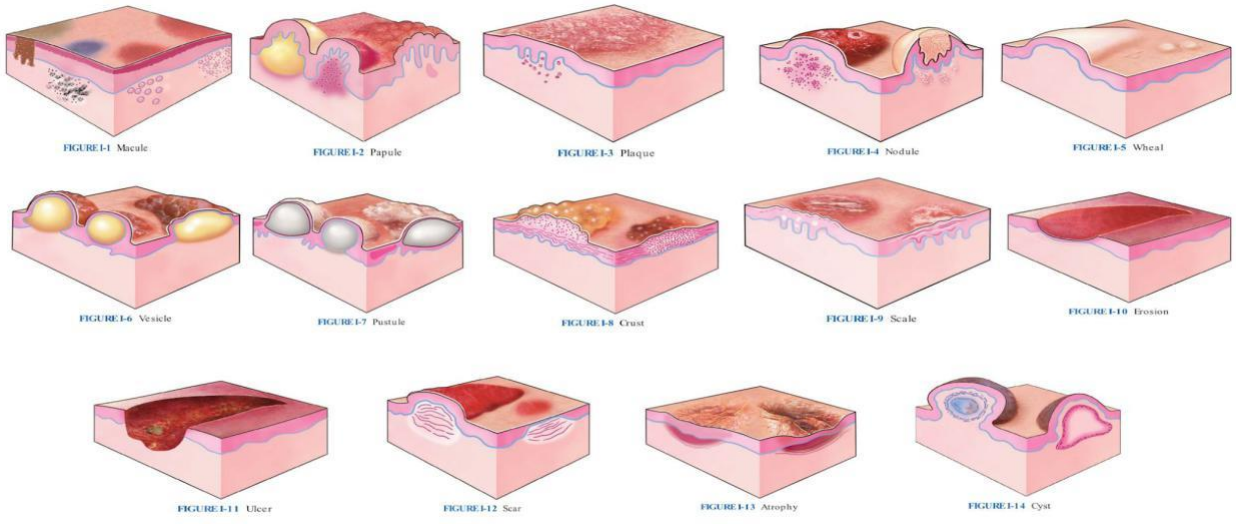
3) **Examination:** Don't forget the patient vital signs

- Full skin examination should be carried out to determine the full extent of the problem and possible unrelated conditions.
- The examination should be done in a good light, better natural sunlight.
- Skin, nails, hair, mucous membranes should all be examined.
- **Describe the General appearance of the patient.**
- **Look for distribution of lesion its color, size, shape, type, arrangements**
- **Palpate for consistency mobility depth and tenderness.**
- Lymph node exams in selected diseases like mycosis fungoides and skin cancers.

- Wood's lamp, dermoscope, photography and other office-based test like KOH preparation could help in diagnosis and follow up.
- Lesion distribution could be **generalized** or **localized:** certain diseases present with certain distribution

Generalized	Localized
-Symmetrical: either universal or bilateral in the same regions, the left side is affected in a similar way to the right side. -Asymmetrical: either diffuse or unilateral Wholly or predominantly on one side of the affected region	Acral peripheral body parts e.g. vitiligo Dermatomal following the dermatomes, e.g. Shingle Malar malar bone (cheeks). Sun exposed areas Trauma sites Extensors ex: extensor surfaces of the UL Flexures Specific part

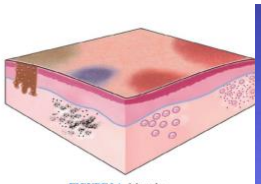
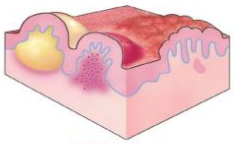
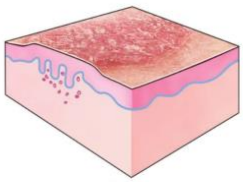
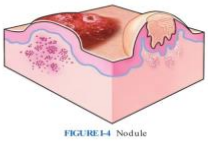
◆ Terms Used in Dermatology:

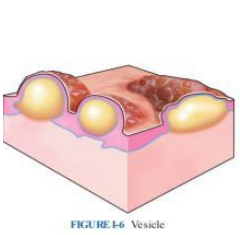
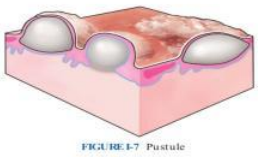
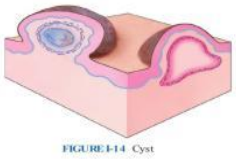


◆ Skin lesions: skin lesions are divided into primary & secondary lesions

1) Primary lesions= basic lesions:

- Macule/patch
- Papule/plaque
- Nodule
- Cyst
- Wheal
- Vesicle/bulla
- Pustule
- Purpura
  - Telangiectasia
  - Tumor

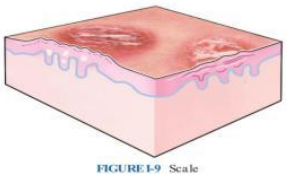
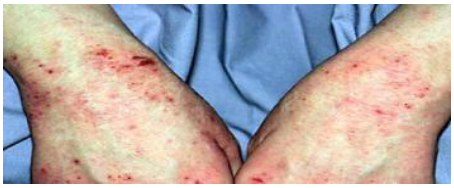
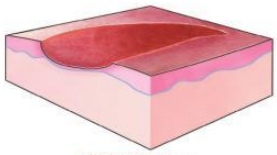
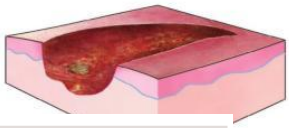
Primary skin lesion	Description	اضغط على الصور للحجم الكامل Picture
1) Macule	a flat circumscribed area of altered skin color **less than 1 cm** in size. It **Lacks surface elevation or depression**. (not palpable) e.g. freckle, vitiligo.	 FIGURE I-1 Macule 
2) Patch	Flat circumscribed skin discoloration; More than 1 Cm it **Lacks surface elevation or depression**). e.g Vitiligo, melasma.	
3) Papule	A papule is a superficial, elevated, solid lesion, generally considered <0.5 cm in diameter.	 FIGURE I-2 Papule 
4) Plaque	A flat-topped palpable lesion more than 0.5 cm in size. Confluence (group) of papules leads to the development of larger, usually flat-topped, circumscribed, plateau-like elevations known as Plaques **lacks a deep component** e.g. Plaque psoriasis	 FIGURE I-3 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)**	 FIGURE I-4 Nodule 
6) Wheal	A transient, edematous slightly raised lesion, characteristically with a pale center and a pink margin. Commonly seen in urticaria	 FIGURE I-5 Wheal 

7) Vesicle	Elevation that contains **clear** fluid < 0.5cm in diameter e.g. Dermatitis Herpetiformis. Vesicle is a smaller bulla	 
8) Bulla	Localized fluid collection. >0.5cm in diameter (bulla is A **large vesicle**).e.g. Bullous Pemphigoid.	
9) Pustule	Elevation that contains purulent material. –	 
10) Purpura	Extravasation of red blood cells giving non-blanchable erythema.e.g. Vacuities Small spots called petechiae while large ones called ecchymosis	
11) Cyst	AClosed sac-like lesion that contains **liquid or semi-solid** substance its Usually soft and has depth.	 
12) Telangiectasia	"not in the slides". Dilated capillaries visible on the skin surface. e.g. Rosacea.	
13) Tumor	"not in the slides". Solid elevation of the skin more than 2 cm in diameter and has depth. Like large nodule.	

2) Secondary skin lesions:

Lesions that Develop during the evolution of skin disease or created by scratching or infection.

- Scale
- Excoriations
- Fissure
- Erosion
- Ulcer
- Scar
- Lichenification
- Crust
- Atrophy
- Poikiloderma

Secondary skin lesion	Description	Picture
1) Scale	Thickened stratum corneum.	 FIGURE 1-9 Scale 
2)Excoriations	Linear erosion induced by **scratching**.	
3) Fissure	Vertical loss of epidermis and dermis with sharply defined walls, (crack in skin).	
4) Erosion	A partial focal loss of epidermis that **heals without scarring**. a moist, circumscribed, usually depressed lesion that results from loss of all or a portion of the epidermis. (433TEAM)	 FIGURE 1-10 Erosion 
5) Ulcer	A full thickness focal loss of epidermis and dermis; **heals with scarring**	 

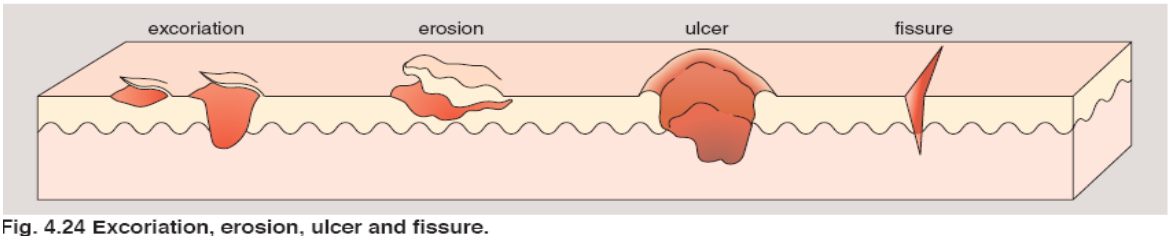
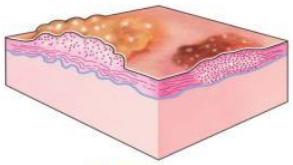
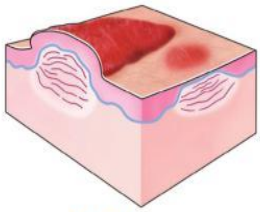
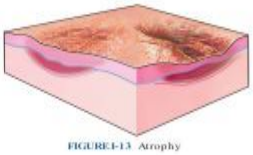


Fig. 4.24 Excoriation, erosion, ulcer and fissure.

6) Crust	A collection of cellular debris, dried serum and blood. Antecedent primary lesion usually a vesicle, bulla, or pustule.	 FIGURE I-8 Crust 

7) Scar	A collection of new connective tissue that May be Hypertrophic or Atrophic. Which Implies dermo-epidermal damage. A permanent lesion that results from the process of repair by replacement with fibrous tissue. Ex: Surgical scar.	 FIGURE I-12 Scar 
8) Lichenification	Increased skin markings secondary to scratching. Patches of increased epidermal thickening with accentuation of skin markings and pigmentation. Lichen simplex chronicus. Seen in Eczema	
9) Poikiloderma	not in the slides. A morphologic descriptive term, refer to the combination of atrophy, telangiectasia, and pigmentary changes (hypo or hyperpigmentation) e.g. Dermatomyositis.	
10) Atrophy	not in the slides	 FIGURE I-13 Atrophy 

◆ Other descriptive terms:

- **Photodistribution:**

•Lesions occurring over sun exposed skin.

•Protected areas remain free of lesions.

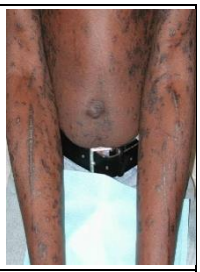
- **Linear:** Forms a line. **E.g. Shingles**
- **Dermatomal:**Occurring within the distribution of nerve.
- **Annular:**Ring like. **E.g. Eczema**
- **Herpetiform/Grouped:** Lesions grouped

In a manner similar to herpes simplex lesions.

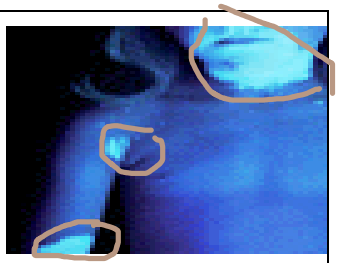
- **Reticular:** Netlike.
- **Verrucous, warty, papillomatous:** Surface consisting of finger like projections (in papilloma).
- **Nummular/discoid:**Coin like lesions **(Dermatomyositis).**
- **Guttate:** Drop-like,"en gouttes"**(guttate psoriasis).**
- **Targetoid:** Round-lesions with concentric border and a dark center. Irislike E.g. erythema multiforme.
- **Umbilication:** Round depression in the center (molluscum contagiosum).

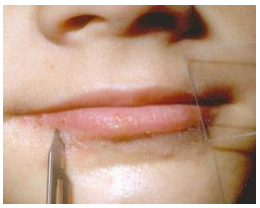
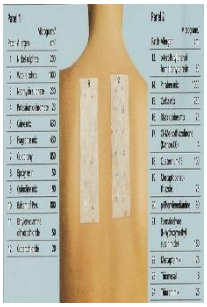
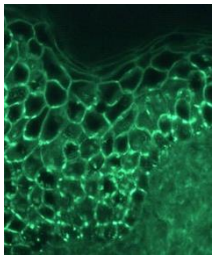
◆ Important Signs:

Nikolsky Sign	Rubbing of apparently normal skin induce blistering. Seen only in pemphigus vulgaris and toxic epidermal necrolysis (TEN).Video	
AUSPITZ SIGN	forceful removal of scale on top of a red papule produces bleeding points Seen in psoriasis. Video	

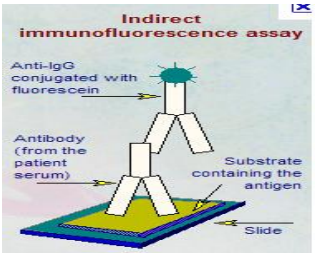
Koebner's phenomenon	Trauma to the skin reproduce certain diseases like Psoriasis, Vitiligo, Lichen planus and Warts these diseases are prone to koebnerization. Video مثلا لو تعرضوا لجرح أو خبطة، يصيرون معرضين لإن المرض اللي عندهم يمتد لمكان الجرح أو الخبطة. عشان كذا المرضى المصابين بالبهاق(Vitiligo) ماتنصحهم يسوون laser fractional لأن ممكن يطلع لهم بهاق في الوجه بعد الليزر (بينما كانت المنطقة سليمة قبل الليزر). المصابين بأحد الأمراض أعلاه نحرص على إننا ننبههم على إمكانية امتداد المرض للمنطقة المصابة في حال تعرضهم لأي جرح، خصوصاً لو بيسوون عمليات. 
Dermatographism	Firm stroking of the skin produces erythema and wheal. Seen in physical urticaria. In patient with atopy, stroking produces white dermatographism rather than red. 

◆ Investigations:

1-Wood's lamp:	Produces long wave UVL (360 nm) Useful in: • Tinea Versicolor Versicolor-yellowish green fluorescence. • Tinea Capitis yellow green fluorescence in M. canis, M. andouini. • Vitiligo (milky white) نفس الصوره الاولى • Erythrasma coral **red** fluorescence نفس الصوره الثانيه • 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. 

3- Tzanck smear:	• (used in vesicular lesions to diagnose): • Herpes simplex or VZV (multinucleated giant cells) • Pemphigus Vulgaris (acantholytic cells). • Stain with Giemsa stain. → Examine under microscope 
4-Prick test: يسوون على اليد	• Primary method for the diagnosis of IgE mediated allergies in most allergic diseases (type 1 hypersensitivity reaction). • Useful in the diagnosis of hay fever allergy, food allergy, latex allergy, drug allergy and bee and wasp venom allergy. • Put a drop of allergen containing solution. • A non bleeding prick is made through the drop • After 15-20 min the antigen is washed , the reaction is recorded • Positive test shows urticarial reaction at site of prick. • Emergency therapeutic measures should be available in case of anaphylaxis. 
5- Patch skin test يسوونه على الظهر	• Important in Allergic 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. • Positive patch test showing erythema and edema. • In severe positive reaction vesicles may be seen.  
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 Immunoflourescence put in normal saline. • Suture if 4 or 5 mm is used. 
7-Direct immunofluorescence:	• 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, while found the Basement membrane zone as in bullous pemphigoid. 

8- Indirect immunoFluorescence:	Detect auto antibodies in the serum. It is used: • To confirm a diagnosis. • To differentiate between bullous diseases. • To monitor disease activity



◆ **Topical treatment:** 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 theactive ingredient is dispersed.

Topical steroids side effects:

1) Atrophy and striae. Difficult to treat
2) Telangiectasia and purpura.
3) Masking the initial lesion.
4) Perioral dermatitis and rosacea or acne.
5) Systemic absorption.
6) Tachyphylaxis (sudden loss of response).

Guide lines regarding steroid use: **Doctor said read about it more**

● Avoid use for extended periods of time.

● Avoid high potency steroid on flexures and face ● Avoid high potency steroid in children.

Examples:

- Creams:are mixture of oils and water in which the active substance is dispersed.white in color useful in folds and are applied to wet lesions.
- Ointments are primarily grease ,useful in dry lesions and they 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.

★ **Fingertip unit:**The amount of cream/ointment expressed from 5mm nozzle. It weighs 0.5g→ It covers 2hand units.

Other therapeutic modalities:




1. Phototherapymachine/NBUVB.
2. Hand and feet narrow band UVB.
3. Liquid nitrogen gun (Cryotherapy) Used totreat warts.

* 1 & 2 are used to treat: vitiligo, psoriasis, lichen planus and atopic dermatitis