Structured Notes According to

DERMATOLOGY

Revision friendly **Fully Colored Book/Structured Notes**

For Best results, watch the video lectures along with reading notes

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In case of any discrepancy between book and videos, Dr. Khushbu Mahajan's videos on PrepLadder should be considered.

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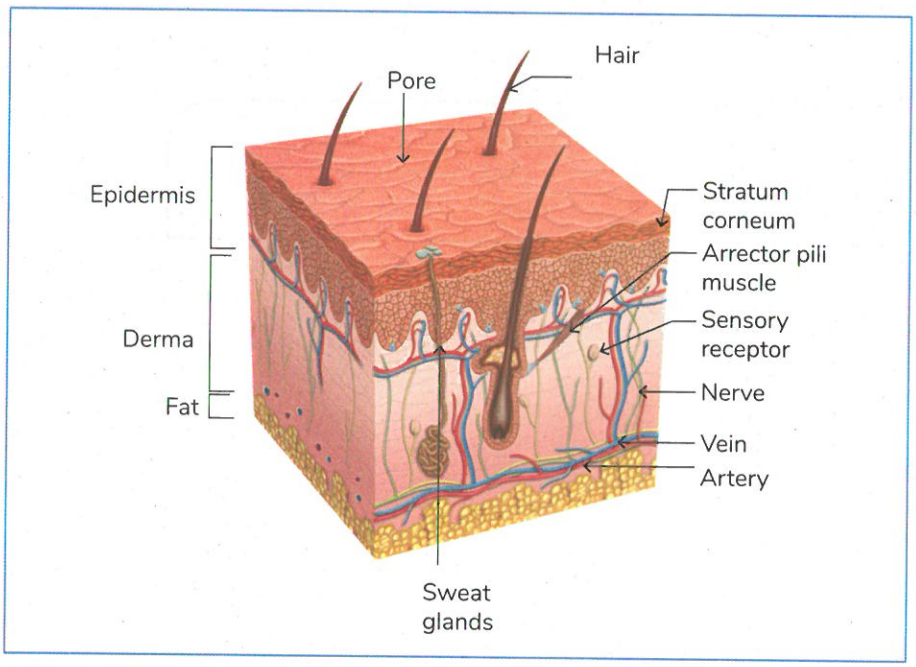
1 BASICS OF DERMATOLOGY

Skin and its Appendages

- Skin is the largest organ in the human body.
- Skin and its appendages are referred to as the Integumentary System. It consists of
  - Hair
  - Nails
  - Glands
- It weighs 4-5 kgs, and its BSA (body surface area) is 1.2-3 sq.m.
- Glabrous skin: non-hairy skin. Which is present in Palms and Soles.

Different Layers of Skin



Layers of skin

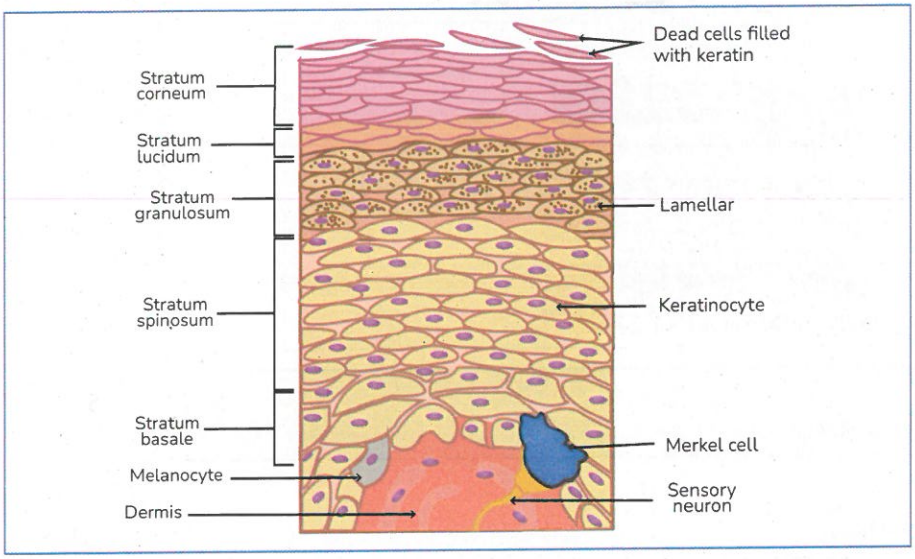
- Epidermis
- Dermis
- Hypodermis/ subcutaneous tissue:
  - Subcutaneous fat
  - Muscle

Epidermis

PYQ: AIIMS 2019

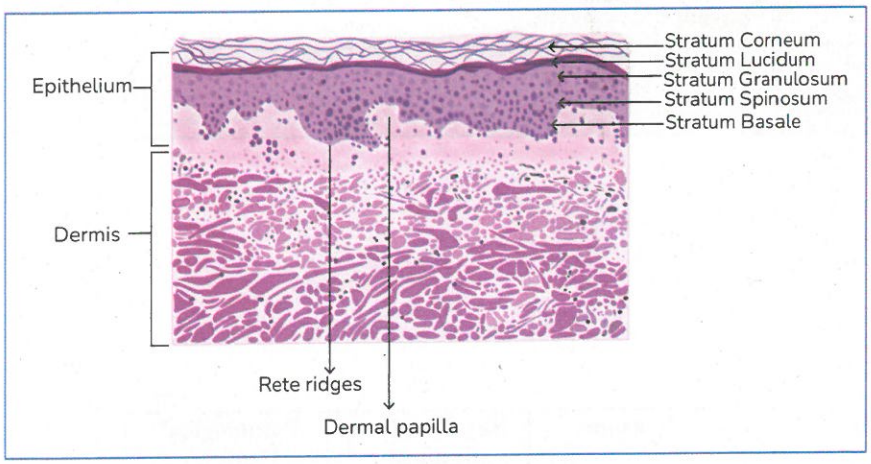
- The topmost layer of human skin.
- Thickness of 0.5 - 1 mm.
- Acts as a major barrier-forming layer.
- **Different layers of the Epidermis:**
  - Stratum corneum (come)
  - Stratum lucidum (let's)
  - Stratum granulosum (get)
  - Stratum spinosum (sun)
  - Stratum basale (burn)

Mnemonics - COME LET'S GET SUNBURN

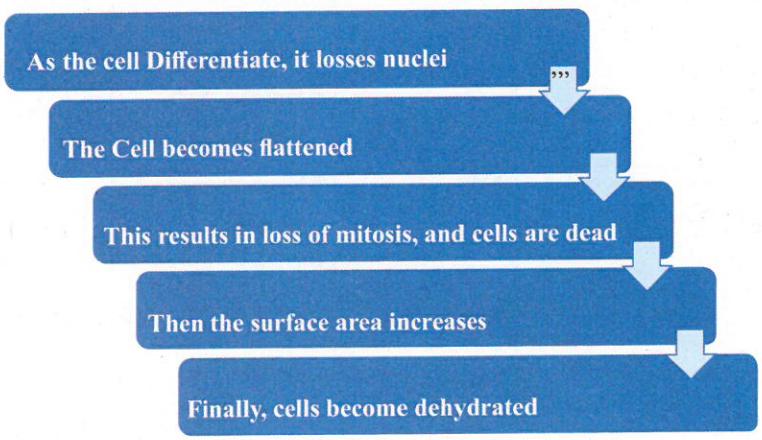


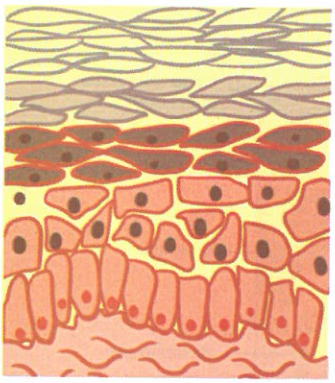
Important Information

- The layer Stratum Lucidum is only present in palms and soles.
- Since palms and soles are the thickest, they need an extra layer, Stratum Lucidum.



- In the human body, skin is formed from bottom to top Basale layer to Corneum layer
- The skin undergoes a process known as cell Differentiation.
- **Steps are as follows:-**





Important Information

In preterm baby Stratum Corneum is absent.

Cell Kinetics

- Cell cycle of Keratinocytes - 300 hours
- Epidermal Turnover time: 56 days (52-75 days).

Epidermal Turnover time is the time cells travel from the base layer to the top for differentiation.

- Cells take 14 days to reach stratum corneum and stay there for another 14 days.
- Skin cells undergo exfoliation, which appox. takes 28 days to complete.
- Skin is constantly renewing itself and shedding old skin cells.

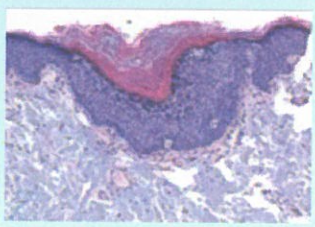
Important Information

In Psoriasis - Cell cycle of Keratinocytes - 36 hours and Epidermal Turnover time: 4 days.

Stratum Corneum

- Corneocytes / Keratinocytes
- Dead Corneocytes / Dead Keratinocytes
- No Nuclei/ No mitosis
- It acts as a most important barrier.

Pathological Findings:

Histopathology Findings	Reasons	Physiological findings	Pathological Findings
Parakeratosis 	Retention of Nuclei in Stratum Corneum	Mouth and Vagina	Psoriasis, Eczema (Mnemonic $PEAS_2$), Squamous Cell Carcinoma (SCC), Actinic Keratosis, Seb. Dermatitis
Hyperkeratosis 	Thickness of Stratum Corneum	NA	Lichen Planus, Psoriasis

Stratum Lucidum

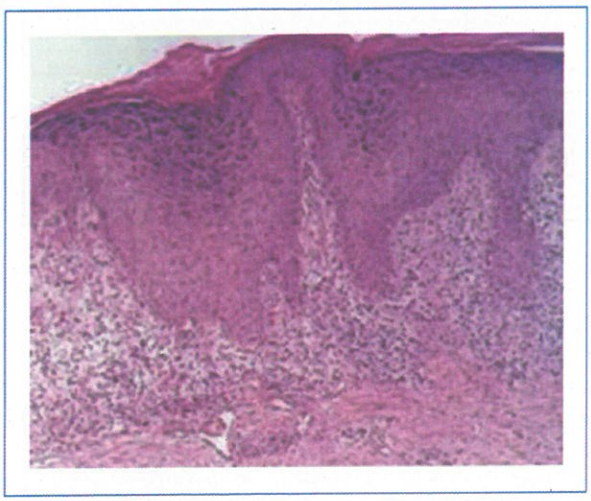
- Found in Palms and Soles only, skin is thick on these parts.
- This layer is also known as the clear cell layer because it has refractile granules of eleidin.

Stratum Granulosum

- This layer is made up of granules.
- This layer is 1-2 cell layer thick.
- The two most important granules in this layer are:-

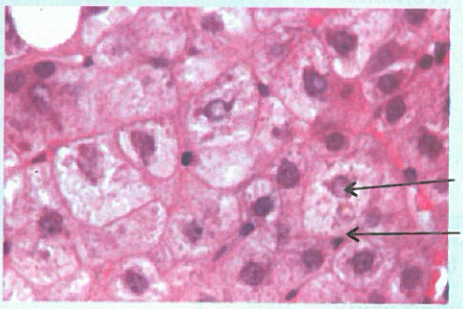
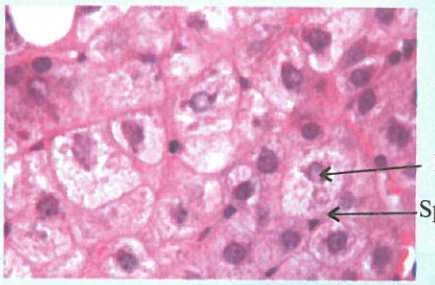
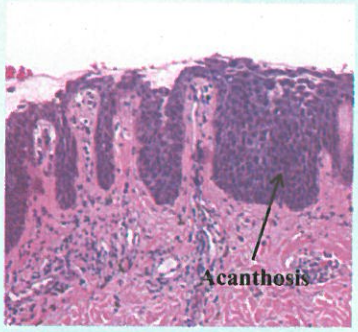
Keratohyalin Granules	Lipid Coating Granules/ Odland bodies/ lamellar bodies
• Responsible for forming Profilaggrin (Filament Aggregating Protein) in stratum granulosum • Profilaggrin forms Filaggrin in stratum corneum. • Filaggrin binds the keratocytes together. • Profilaggrin migrates to stratum corneaum and flaggrin present in S.C • Important role: Barrier Functioning. • Defect: cause ichthyosis vulgaris.	• Responsible for providing moisture. • Defect: cause Asteatotic dermatitis

Histopathological Findings	Definition	Seen in
Hyper granulosis:	• Increase thickness of granular layer.	• Lichen planus.
Agranulosis:	• Absent of granular layer.	• Psoriasis.
Dyskeratosis:	• Abnormal keratinization happens in the layers below stratum granulsum.	• **Benign:** Hailey hailey, dariers disease • **Malignant:** Bowens disease, pagets disease, squamous cell carcinoma.



Stratum Spinosum

- Prickle cell layer.
- Spines are Desmosomes uniform use of .
- Keratinocytes are loosely attached in this layer by desmosome
- Thickest layer of Epidermis

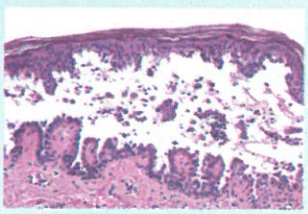
Histopathological Findings	Definition	Seen in
Spongiosis – 	Intercellular Edema that occurs between the cells	Acute eczema.
Ballooning – 	Intracellular Edema that occurs inside the cell	• Acute eczema.
Acanthosis – 	Increased thickness of Stratum Spinosum.	• Chronic eczema.

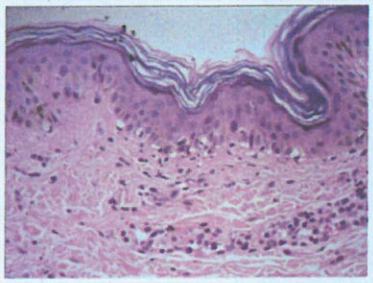
Important Information

Malpighian layer - mitotically active layer of epidermis. Found in Stratum Basal and Stratum Spinosum

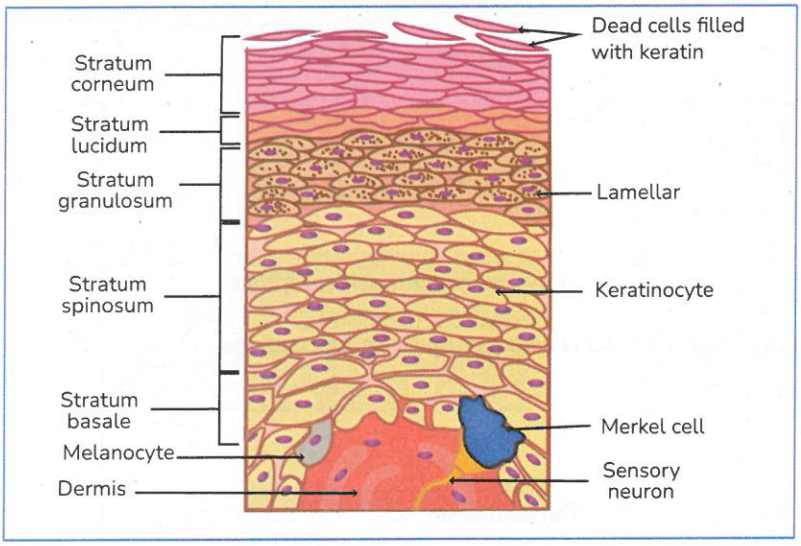
Stratum Basale

- Most Mitotically Active layer.
- One layer thickness.
- Very important layer.

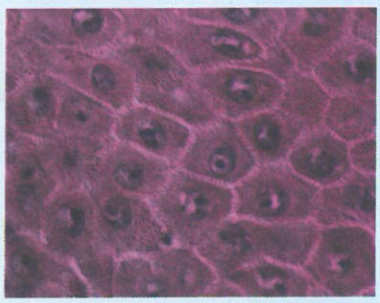
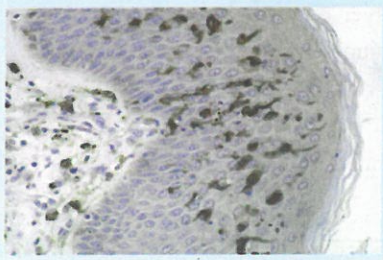
Histopathological Findings	Definition	Seen in
Acantholysis: 	Separation of keratinocytes	Pemphigus group

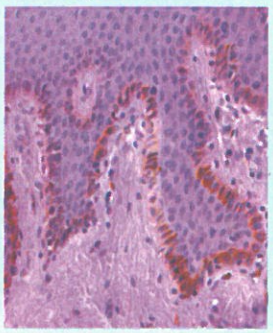
Basal cell Degeneration: 	Degeneration of basal layer.	Lichen planus.

Cells in Epidermis



Four types of cells:

Keratinocytes 	• Present in all layers. • 95% of Epidermis.
Langerhan Cells 	• Present in Stratum Spinosum. • Antigen Presenting cells. • Birbeck Granules are Racquet Shaped • Immunohistochemical markers - CDIA, CD207, Si00

Melanocytes 	• Present in Stratum Basale • Pigment forming cell • Dendritic cell • Ratio is 1:10 i.e., 1 melanocyte for 10 Keratinocytes. • Known as Epidermal Melanin Unit With Ratio of 1:36 . • These Epidermal Melanin Unit are responsible for uniform skin color.
Merkel Cells	• Present in Stratum Basale • Ectoderm > Neural Crest • Slow adapting touch receptors

Melansomes

- Light skin → Distributed as membrane- bound clusters.
- Dark skin → Be large and distributed individually.

Touch receptors

Slow adapting touch receptors	Fast adapting touch receptors
• E.g., Merkel cells, Ruffini nerve endings, free nerve endings	• E.g., Pacinian corpuscles, hair endings

Development of Epidermal Cells

Cells	Derived from
Keratinocytes	Ectoderm
Langerhans cells	Mesenchyme
Melanocytes	Neural crest cells
Merkel cells	Ectoderm > Neural crest cells

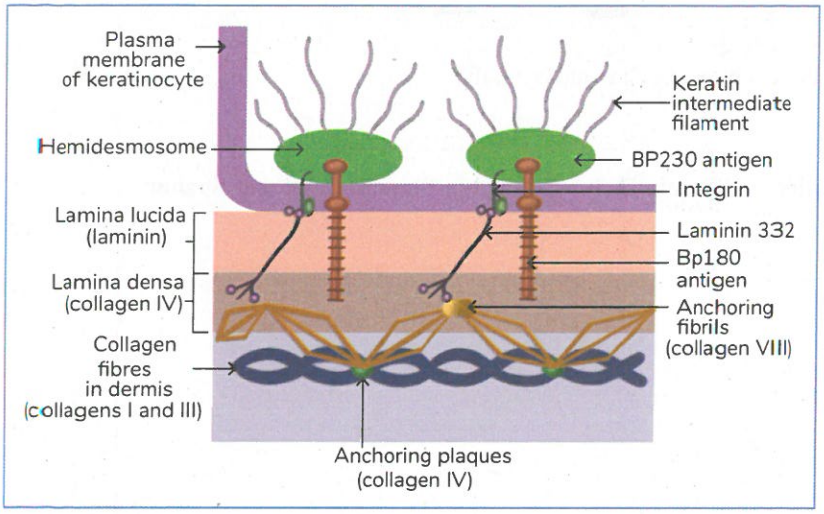
Nerve and Innervation

There are two types of sensory endings.

- Mechano-receptors : The corpuscles.
- Nociceptors : Free nerve endings.

Mechano-receptors	Nociceptors
• Light touch: Merkel cells of the epidermis, meissner's corpuscles in dermal papillae. • Pressure: Pacinian corpuscles in deep dermis or subcutaneous tissue	• Pain and itch: Transmitted through naked fine free nerve endings located in the basal layer of the epidermis close to the dermo epidermal junction. • Temperature: Kruse bulbs detect cold, ruffini end organs detect heat • Heat, cold and proprioception also located in the superficial dermis

Dermo Epidermal Junction



- A part of epidermis that invaginates into the dermis is called Rete Ridges.
- The part of the Dermis that invaginates into the epidermis is called Dermal Papilla.
- Junction between the epidermis and dermis: Dermo-epidermal junction/basement membrane zone.
- Predominantly formed by type IV collagen
- Main function of BMZ is to provide adhesion between the two layers and signalling.

Dermis

- Dermis is the layer next to the epidermis.

Two parts

Papillary Dermis	The part that is invaginating into the epidermis
Reticular Dermis	The part that contains all the fibers

Components of the Dermis are: -

- Cells
  - Fibroblast
  - Langerhan Cell
  - Mast cell
  - Lymphocytes
  - Phagocyte
- Fibre
  - Collagen (Predominant fibre)
  - Elastin
- Ground Substance
  - Hyaluronic Acid
  - Heparan Sulphate
- Nerves
- Vessels
- Hair Follicles
- Lymphatics.

Subcutaneous Fat

- It has blood and lymphatics.
- It provides cushioning where the skin is thick.
- Absent where the skin is very thin. For example, Eyelids and Genitalia.

Functions of Skin

- Most important function is formation of Vitamin D. It is formed in Stratum Basal and Stratum Spinosum.
- Other functions are: -
  - Temperature Control
  - Water Control
  - Cushioning

2 SKIN LESIONS IN DERMATOLOGY

Types of Skin Lesion

PYQ: AIIMS 2020

Primary skin lesion	Appear first in the disease.
Secondary skin lesion	Changes that develop over the primary lesions
Special skin lesion	Characteristics of a particular disease. (Specific to certain dermatological disorders)

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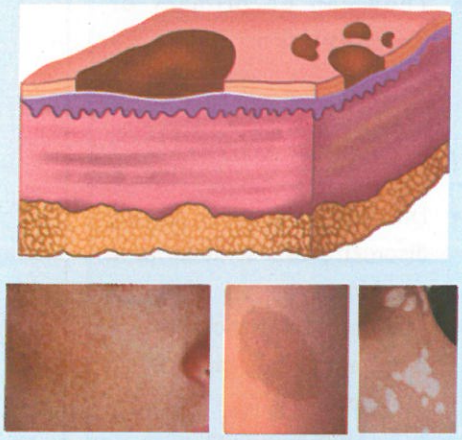
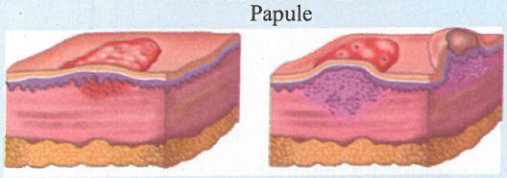
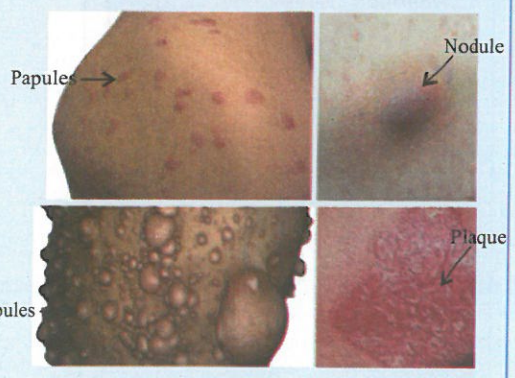
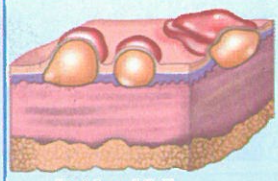
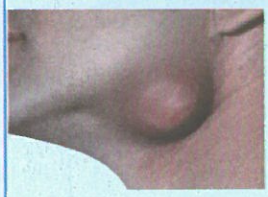
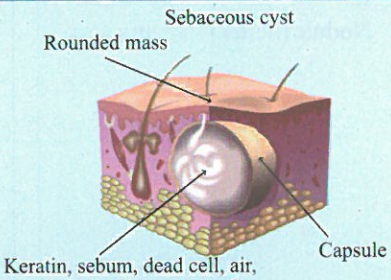
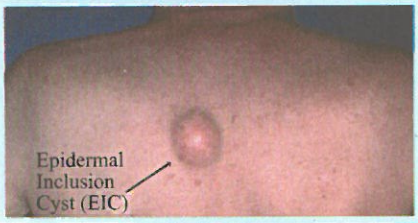
Primary Lesion

PYQ: NEET PG 2018

Primary Lesions	Image	Characteristic Features

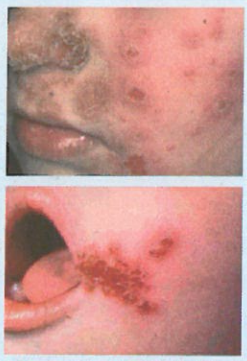
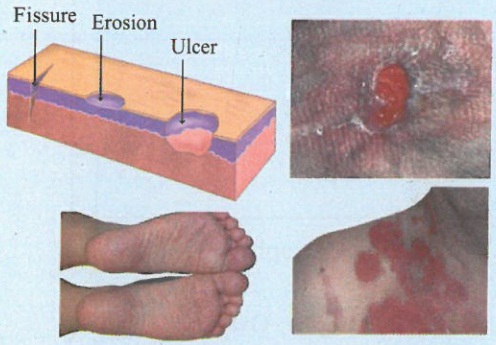
Macule And Patch		• Change in skin color.
		• Cannot be felt.
		• Better seen than felt.
		• Neither raised nor depressed
		  ○ If lesion < 0.5 cm = Macule
		  ○ If lesion > 0.5 cm = Patch
		• Change in skin color can be hyperpigmented (more color) or depigmented (absence of color)
		• Sometimes lesions can be hypopigmented (decreased color)
		• There is no change in textures

Papule	
	Papule
	 
	Plaque Nodule
	 
		• It is a circumscribed solid raised lesion.
		• Three types:
		  ○ If < 0.5 cm = papule
		  ○ If > 0.5 cm = plaque (there is a change in texture)
		  ○ If > 0.5 cm & more depth = Nodule (better felt than seen)

Vesicle and Bullae	 Vesicle and Bullae  	• These are fluid-filled lesions. ○ If lesion is < 0.5 cm = Vesicle ○ If lesion is > 0.5 cm = Bullae
Pustule	 pustule can be primary or secondary  	• They are pus-filled lesions. • The collection of pus in a cavity : Abscess. • They can be primary or secondary lesions.
Extravasation of RBCs in skin	 	• Due to any reason or clotting disorder, RBCs settle down in the skin. • These are non-Blanchable. ○ If these lesions are 1-2 mm = Petechiae. ○ > 3 mm = Purpura ○ If it is 1-2 cm = Ecchymosis
Urticaria And Angioedema	 	• Urticaria - referred to as wheals • Wheal is erythematous, edematous & evanescent.
Cyst	 	• It is an enclosed cavity with a lining filled with fluid or semisolid material. • Example - Epidermal Inclusion Cyst (EIC)

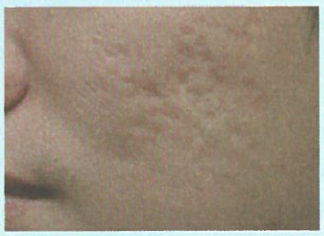
Secondary Skin Lesions

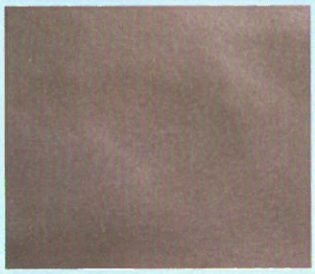
00:12:06

Secondary Skin Lesions	Image	Characteristic Features
Scale		• Visible exfoliation of the skin, involving the stratum corneum • Examples: o Silvery white scale o Fish-like scale o Greasy scales
Crust		• Dried-up exudate is called Crust • Exudate can be pus, serum & blood. • Honey-coloured crust is seen in Non-bullous impetigo.
Erosion, Ulcers, and Fissures		• Erosions: o Raw, moist area formed by denudation of part of epidermis. o Superficial & have no base → heals without a scar. • Ulcer: o Denudation + Involvement of part of dermis. o Can even extend up to subcutaneous tissue. • Fissure is a linear crack in the skin.
Excoriations		• They are surface excavations on the skin. • Mainly caused by itching.

Lichenification		• Occurs due to chronic itching.
		• Acanthosis will be seen here.
		• Features:
		  ○ Hyperpigmentation
		  ○ Increase in skin markings.
		  ○ Thickening of skin

Sinus		• Blind tract that connects skin to a deeper cavity.

Scars	
	 
		• Abnormal proliferation of fibrous tissue replaces normal collagen in the skin.
		• Two types of scaring:
		  ○ Hypertrophic: Increased scarring
		  ○ Atrophic: Decreased scarring.

Atrophy	 	• Epidermal atrophy: Wrinkled skin • Dermal atrophy: Overall skin is normal, but depression is seen

Special Lesions

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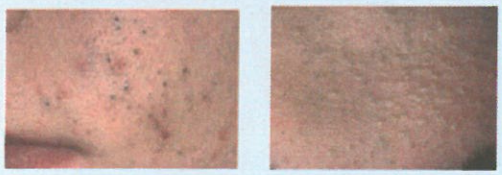
Special Lesions	Image	Characteristic Features
Burrow		• Mostly seen in Scabies.

Comedones		• They are blocked dilated Pilosebaceous glands.
		• Seen in Acne.
		• Comedones can be opened or closed.
		  ○ Closed comedones are white.
		  ○ Open comedones are black.

Telangiectasia		• Visible dilatation of dermal capillaries.
		• Seen in poikiloderma
		• Poikiloderma has three components:
		  ○ Telangiectasia
		  ○ Atrophy
		  ○ Skin pigmentation.

Sclerosis		• When the skin is bound down (underlying contractures). • Seen in Systemic Scleroderma.
Milia		• Keratin-filled cysts. • Appear as white lesions (asymptomatic)
Target lesion		• Seen in Erythema multiforme.

Lines in Dermatology

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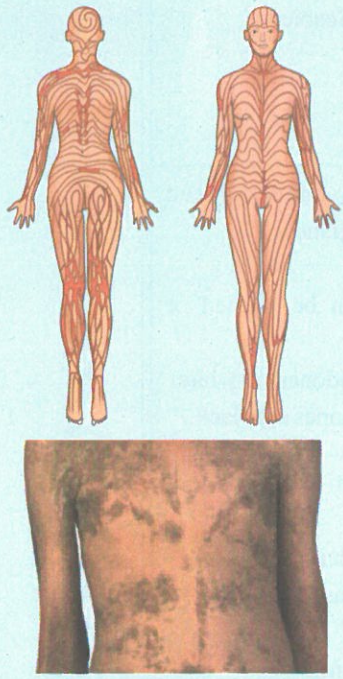
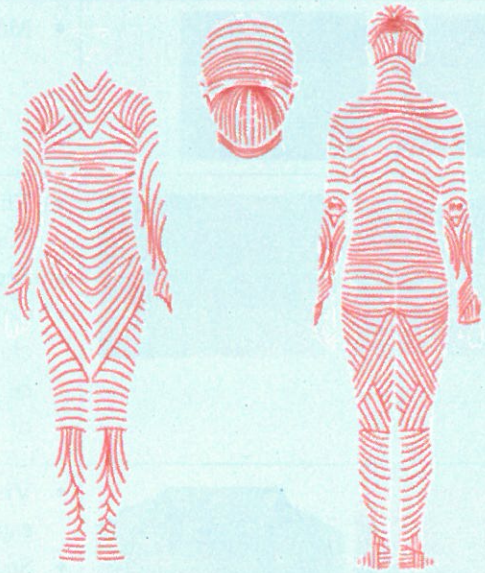
Blaschko's Lines	Langer's Lines
PYQ: FMGE 2018	
	
• TConstant, lines of embryonic development along which keratinocytes migrate. • They have a strict midline demarcation. • Spiral pattern of lines in the posterior part and the linear pattern on the limbs can be seen. • They are important because of a certain dermatosis, which presents along the Blaschko lines. • Some Examples - Verrucous epidermal nevus (VEN), Incontinentia pigmentation.	• Lines of the orientation of collagen and muscle fibers in our body. • Important to know at the time of making surgical incisions. • Helps dermatologists to determine how the incisions should be done in the skin. • If done correctly, the healing would be better as there will not be much damage to collagen and muscle fibers. • These lines are called the Relaxed Skin Tension Lines (RSTL). • Since these lines represent collagen and muscle fibers, they are not constant. • They do not have strict midline demarcation.