



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
كلية التقنيات الصحية والطبية / كوفة
قسم تقنيات التجميل والليزر



Skin anatomy & physiology

اعداد:

م.د. حسين حمود رشيد

Table of contents

- **Definitions**
- **Functions of the skin.**
- **The epidermis.**
- **Epidermal appendages.**
- **The Dermis.**

General Objectives

- **To Know the structure and function of the skin.**

Learning Objectives

By the end of this lecture students will be able to :

1. Define epidermis and enumerate basic cell types of epidermis.
2. Enumerate function of the skin.
3. Enumerate epidermal appendages and describe each components.
4. Explain Hair growth and How shedding occur.
5. Discuss the main cellular elements of dermis .

Skin Structure

- The skin is composed of three layers, the epidermis , dermis and hypodermis (subcutaneous fat).
- The epidermis, which is the outer layer, and its appendages (hair, nails, sebaceous glands and sweat glands), are derived from the embryonic ectoderm.
- The dermis is of mesodermal origin.

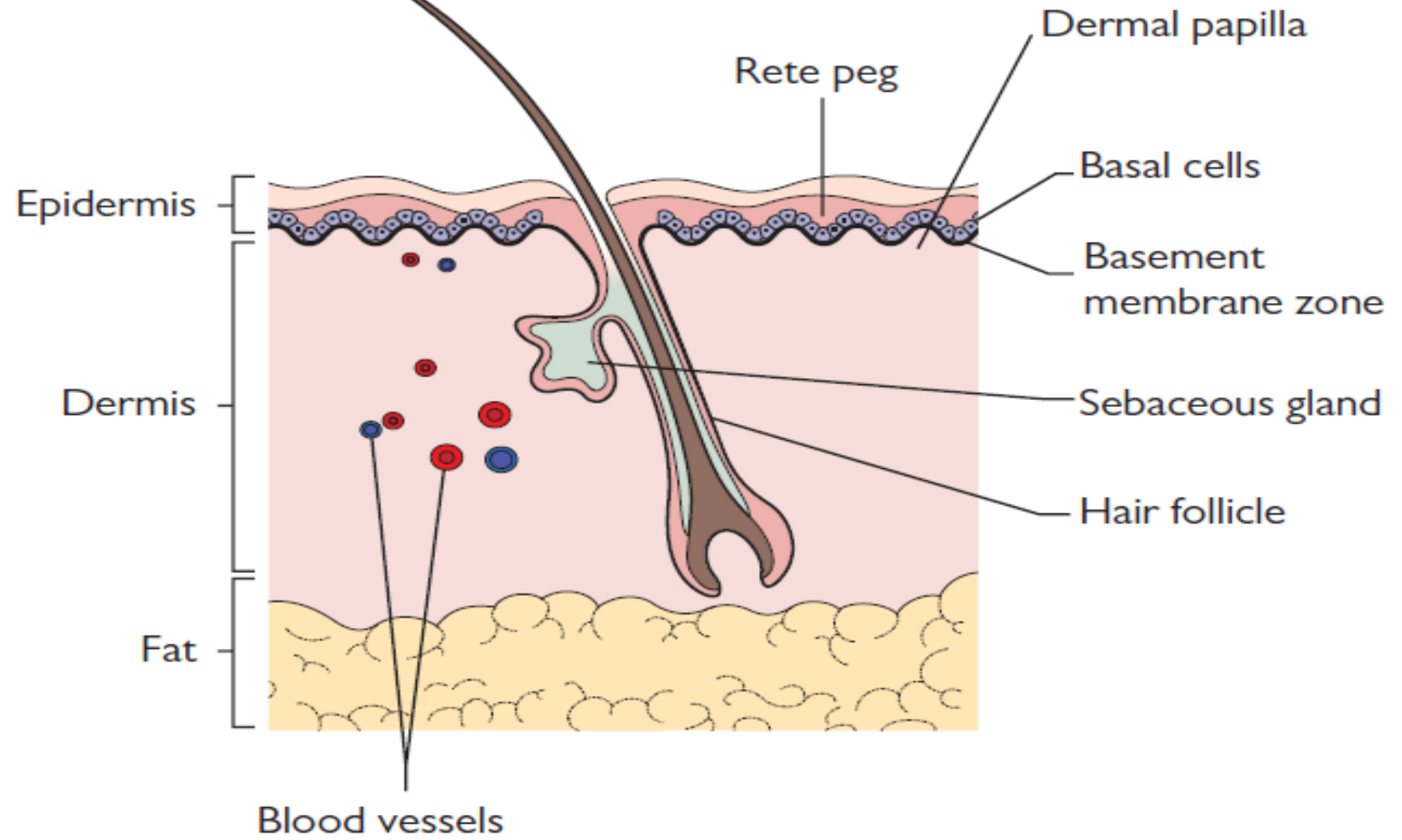


Fig. 1.1 Diagram of skin: epidermis, dermis, and fat.

Functions of the skin

1. Prevents loss of essential body fluids.
2. Protects against entry of toxic environmental chemicals & microorganisms
3. Immunological functions.
4. Protects against damage from UV radiation.
5. Regulates body temperature.
6. Synthesis of vitamin D.
7. Important in sexual attraction and social interaction.

The epidermis

- The epidermis is a stratified squamous epithelium, with several well-defined layers.
- The principal cell type is known as a **keratinocyte**.
- Keratinocytes, which are produced by cell division in the deepest layer of the epidermis (basal layer), move progressively towards the skin surface, and as they ascend, they undergo a process known as '**terminal differentiation**'(**keratinization**) to produce the surface layer of cells (stratum corneum).

The epidermis

- Stratum corneum or horny layer is the surface layer of tightly packed dead cells which are eventually shed.
- The stratum corneum serves as a physiologic barrier to chemical penetration and microbiologic invasion from the environment, as well as a barrier that prevents fluid and solute loss from within
- A cell takes approximately 8-10 weeks to pass from the basal layer to the surface of the epidermis (epidermal transit time), and loss of cells from the surface is matched by production in the basal layer.
- In health the rate of production of cells matches the rate of loss so that epidermal thickness is constant.

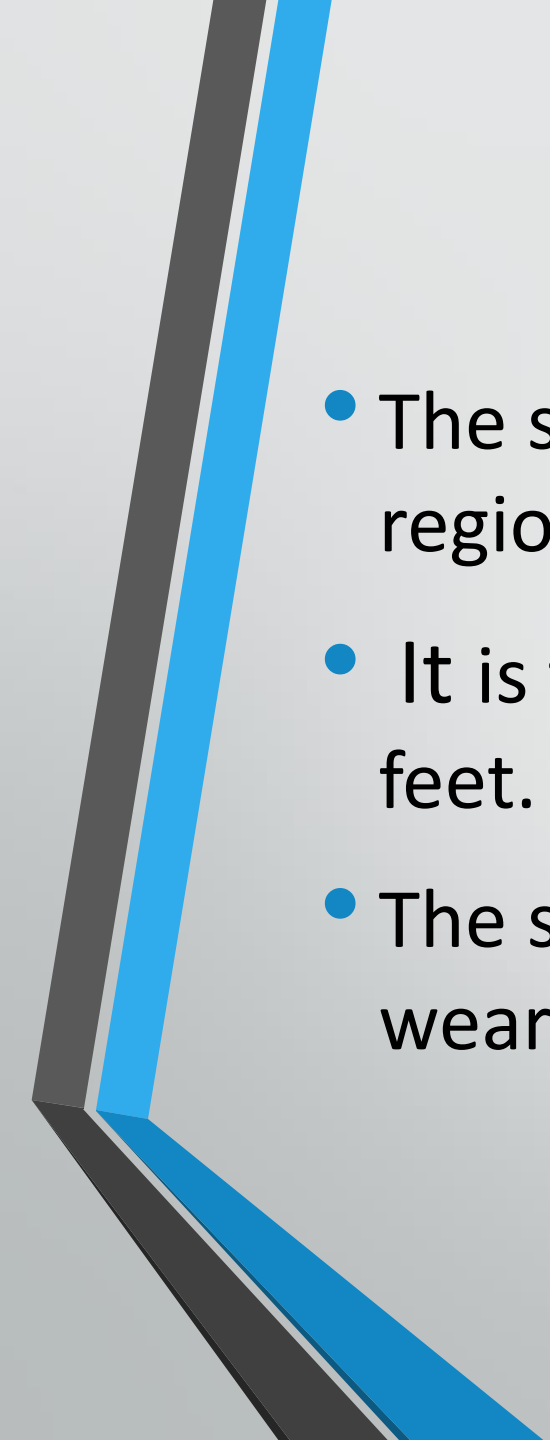
The epidermis

- The basal layer, which is one to three cells thick, is anchored to a basement membrane that lies between the epidermis and dermis.
- Interspersed among the basal cells are **melanocytes** – **large dendritic cells** derived from the neural crest which are responsible for melanin pigment production.

- 
- The main stimulus to melanin production is ultraviolet (UV) radiation.
 - Melanin protects the cell nuclei in the epidermis from the harmful effects of UV radiation.
 - Skin neoplasia is extremely uncommon in dark - skinned races because their skin is protected from UV damage by the large amounts of melanin that it contains.

The epidermis

- **The prickle cell layer** acquires its name from the spiky appearance produced by intercellular bridges (desmosomes) that connect adjacent cells.
- Scattered throughout the prickle cell layer are **Langerhans' cells**. These dendritic cells are probably modified macrophages, which originate in the bone marrow and migrate to the epidermis.
- They are the first line of immunological defense against environmental antigens

- 
- The stratum corneum varies in thickness according to the region of the body.
 - It is thickest on the palms of the hands and soles of the feet.
 - The stratum corneum cells are gradually abraded by daily wear and tear.

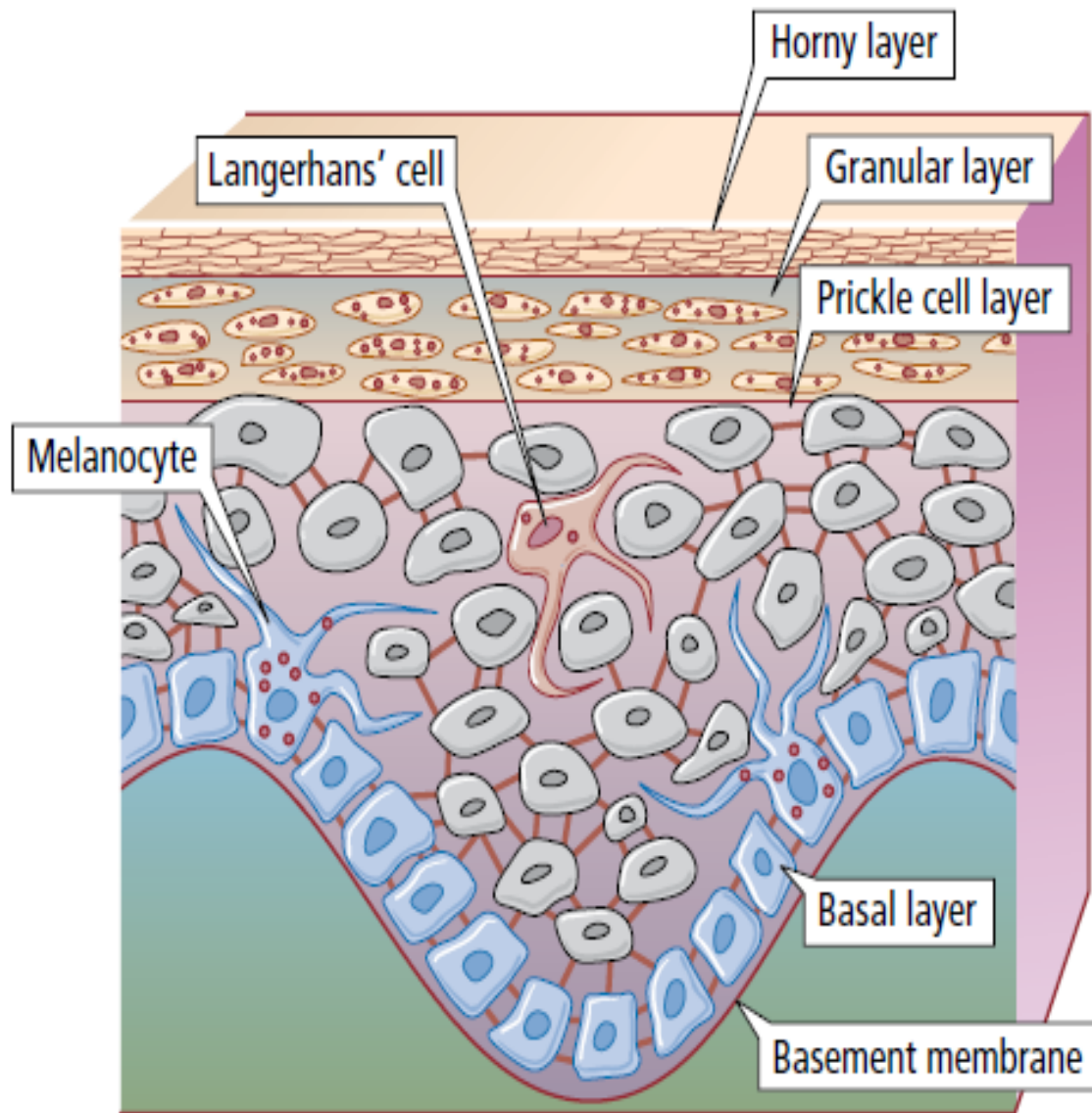


Figure 1.2 The epidermis.

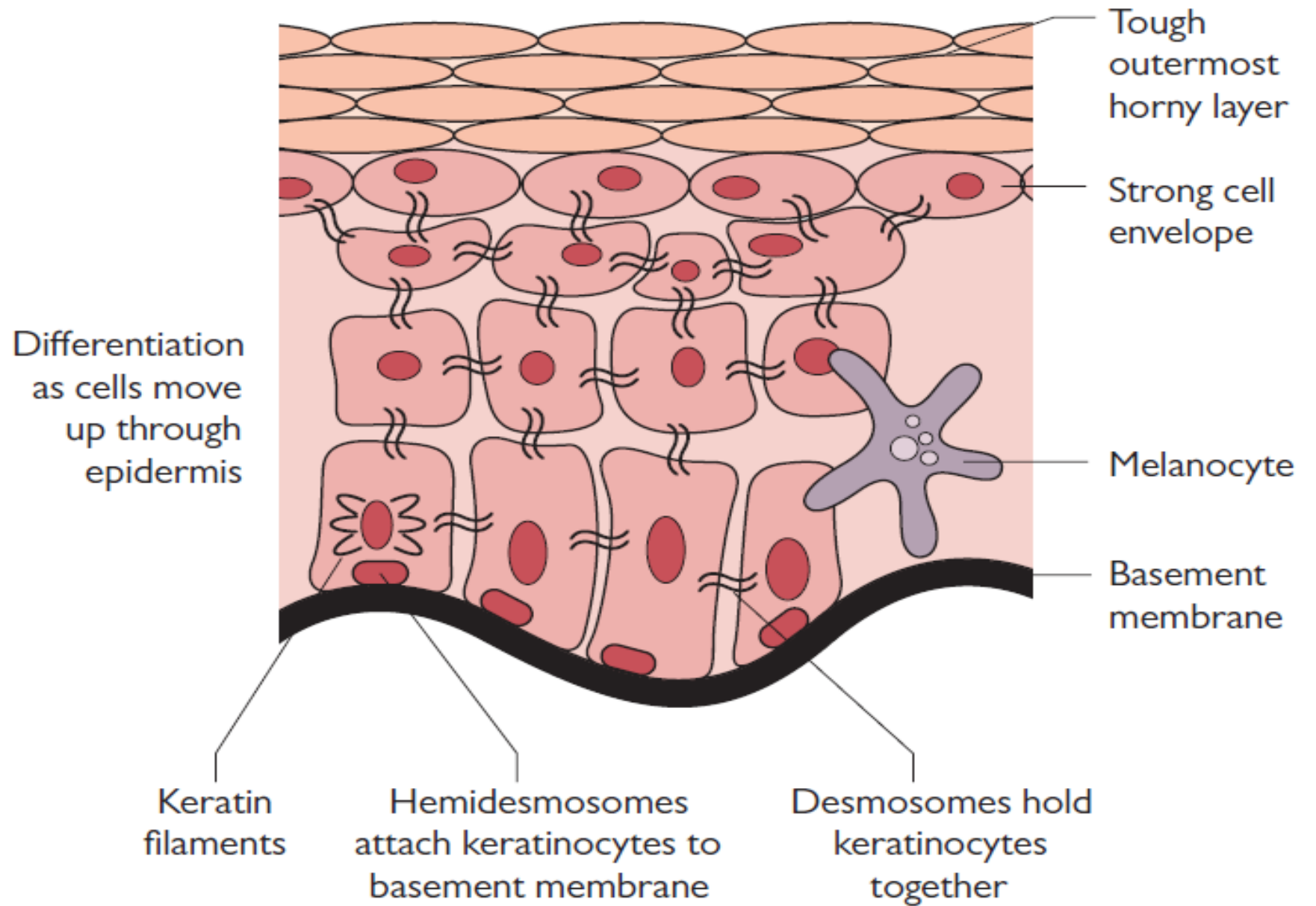
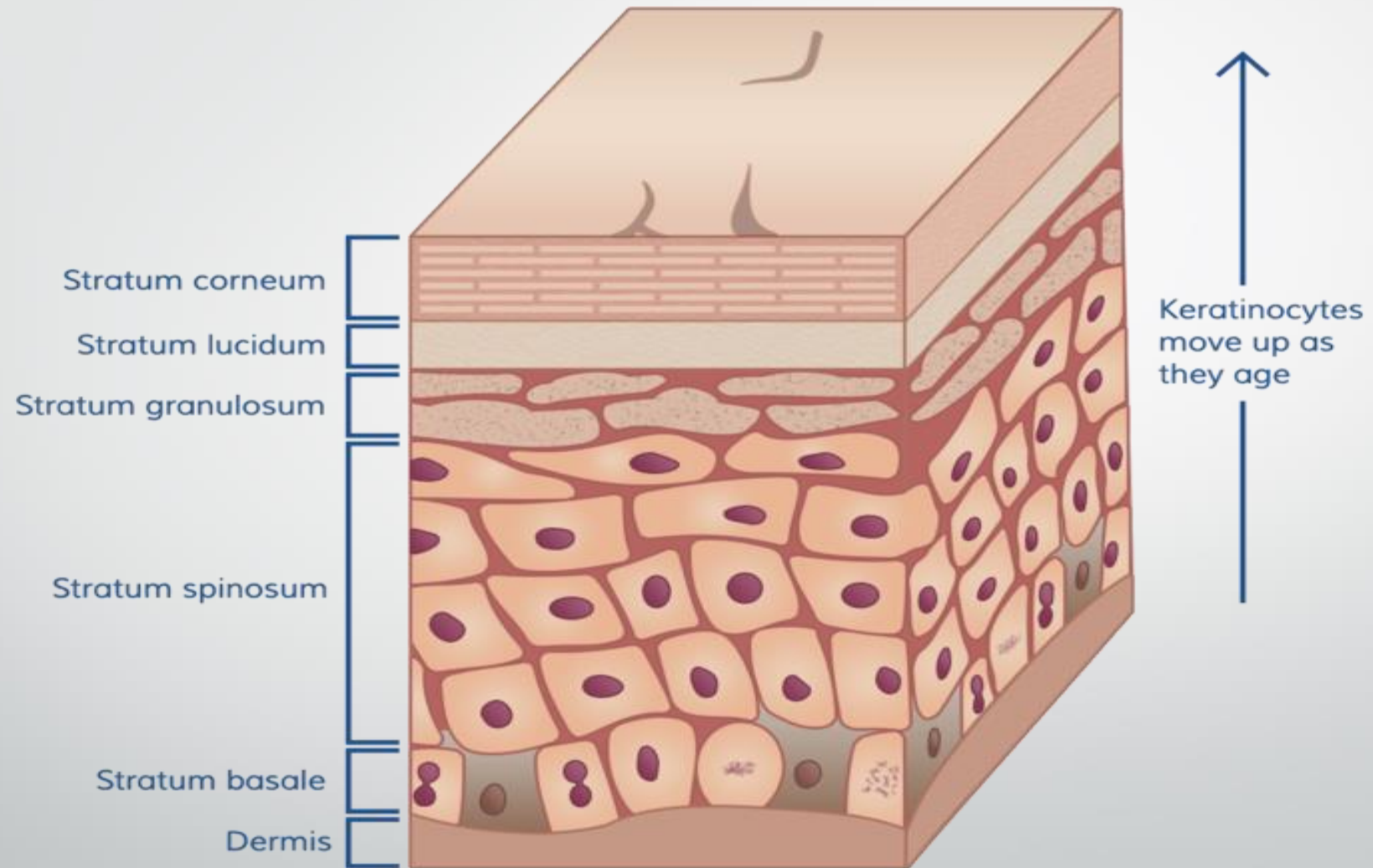


Fig. 1.2 Structure of epidermis.



Epidermal appendages

- The eccrine and apocrine sweat glands, the hair and sebaceous glands, and the nails, constitute the epidermal appendages.

Eccrine sweat glands

- Eccrine sweat glands are important in body temperature regulation. A human has between two and three million eccrine sweat glands covering almost all the body surface.
- They are particularly numerous on the palms of the hands and soles of the feet.

Eccrine sweat glands

- Each consists of a secretory coil deep in the dermis, and a duct that conveys the sweat to the surface.
- Eccrine glands secrete water, electrolytes, lactate, urea and ammonia.
- The secretory coil produces isotonic sweat, but sodium chloride is reabsorbed in the duct so that sweat reaching the surface is hypotonic.
- Eccrine sweat glands are innervated by the sympathetic nervous system, but the neurotransmitter is acetylcholine.

Apocrine sweat glands

- Apocrine sweat glands are found principally in the axillae and anogenital region.
- Apocrine glands are also composed of a secretory coil and a duct, but the duct opens into a hair follicle, not directly onto the surface of the skin.

Apocrine sweat glands

- Apocrine glands produce an oily secretion containing protein, carbohydrate, ammonia and lipid.
- These glands become active at puberty, and secretion is controlled by adrenergic nerve fibers
- Pungent axillary body odour (axillary bromhidrosis) is the result of the action of bacteria on apocrine secretions

Hair

- Hairs grow out of tubular invaginations of the epidermis known as follicles, and a hair follicle and its associated sebaceous glands are referred to as a 'pilosebaceous unit.'

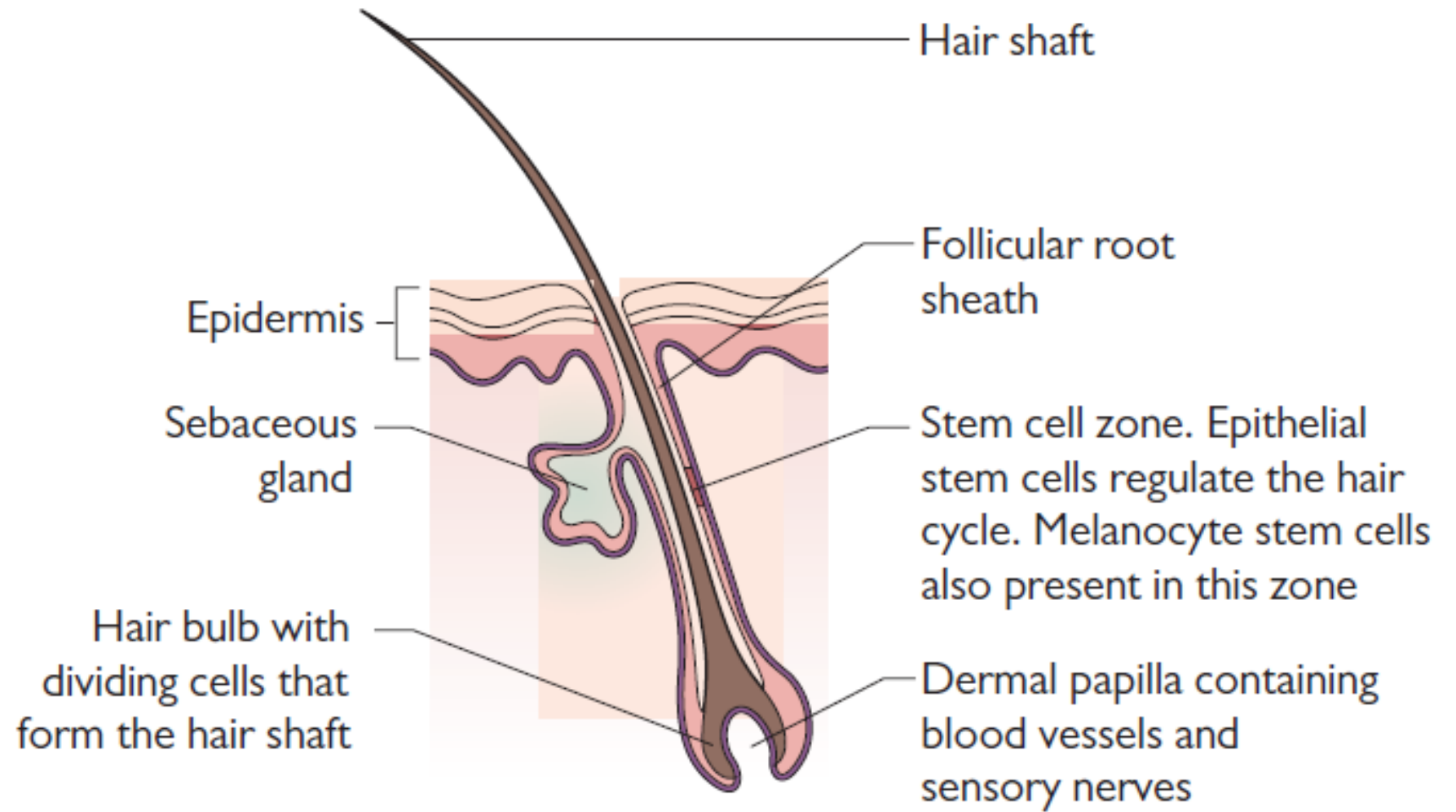
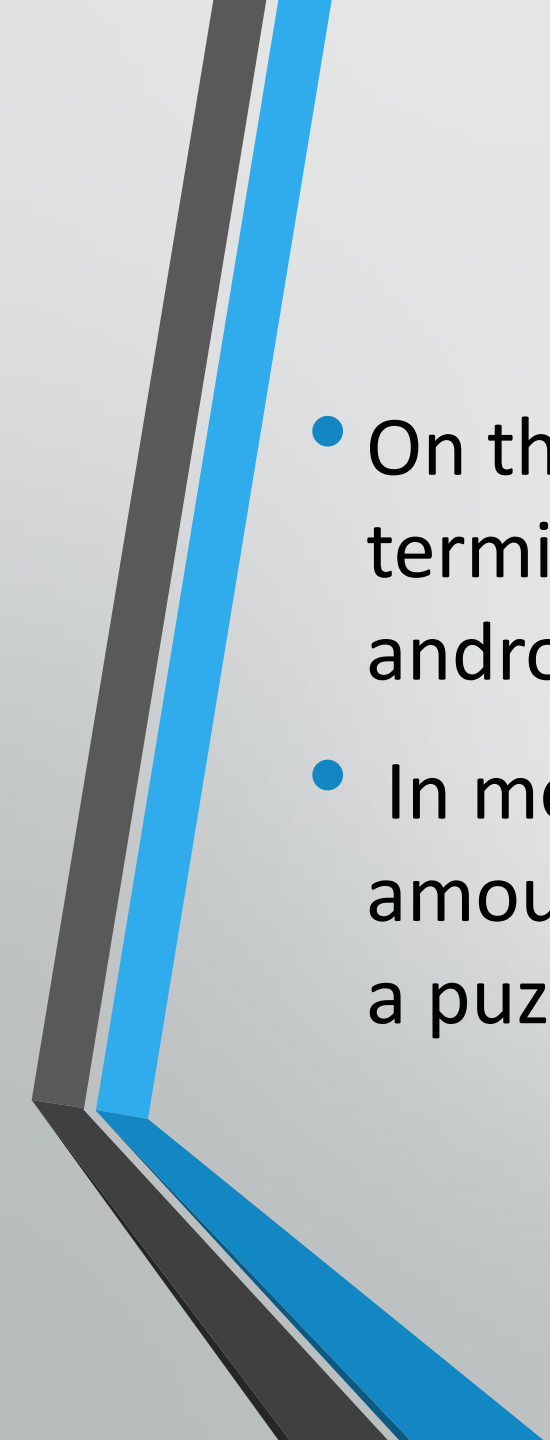
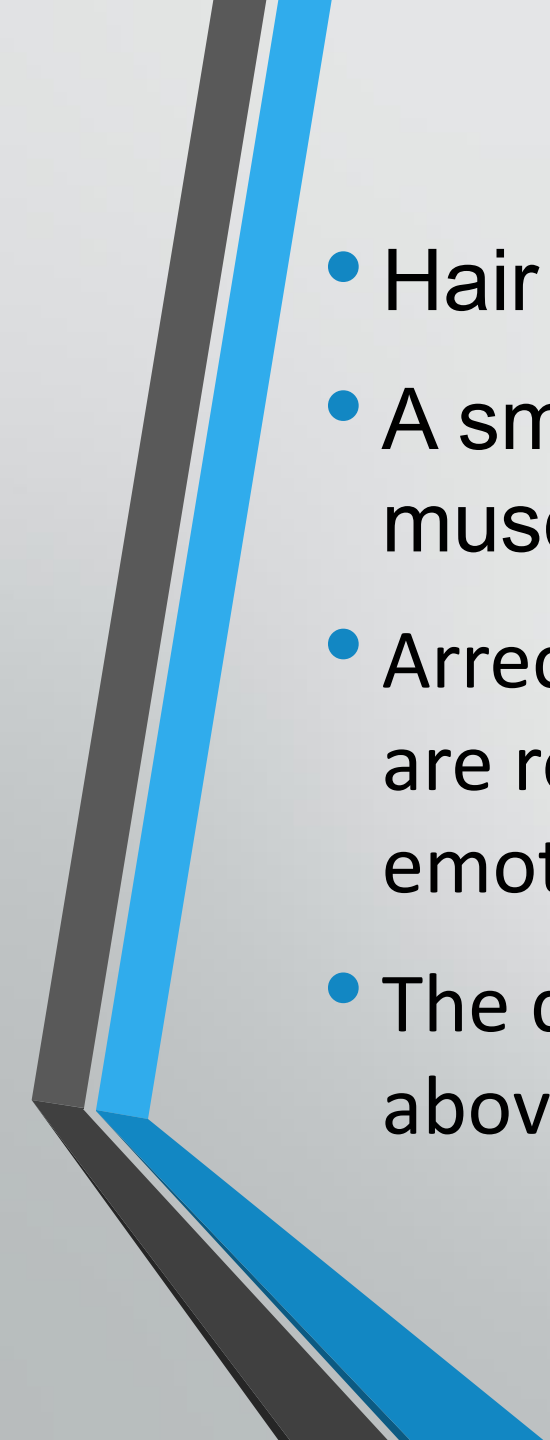


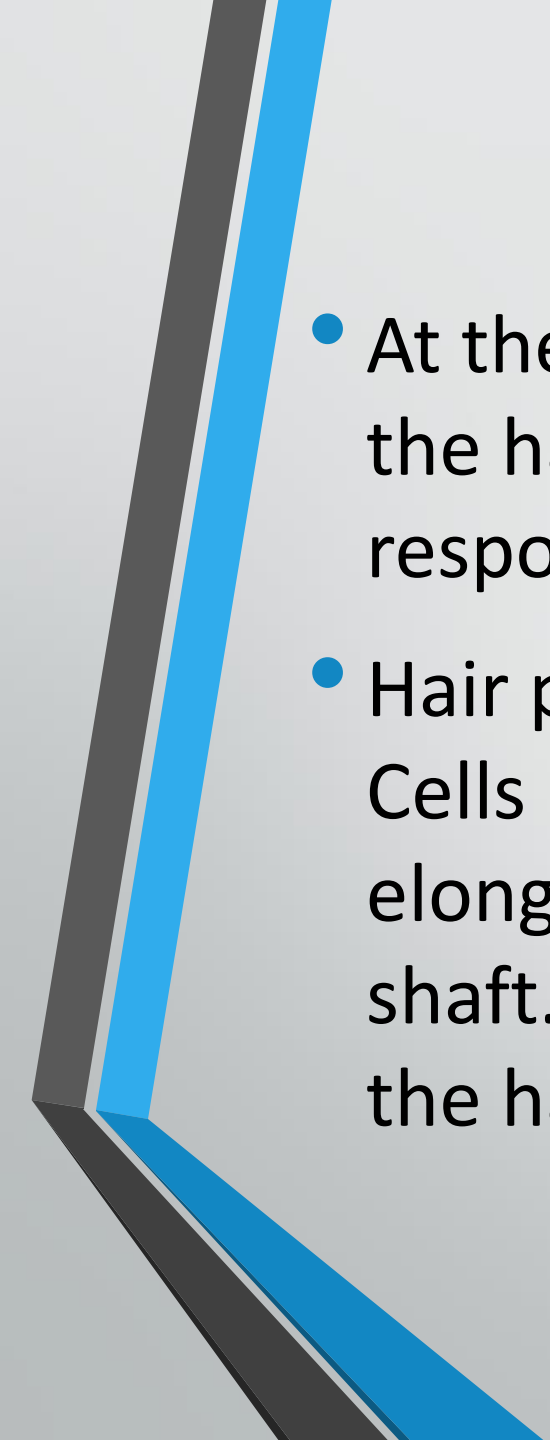
Fig. 1.3 Structure of a hair follicle. The arrector pili muscle (not shown) attaches to the mid portion of the follicle.

Hair

- There are three types of hair:
- **Fine, soft lanugo hair** is present in utero and is shed by the eighth month of fetal life;
- **Vellus hair** is the fine downy hair which covers most of the body except those areas occupied by terminal hair;
- **Thick and pigmented terminal hair** occurs on the scalp, eyebrows and eyelashes before puberty-after puberty, under the influence of androgens, secondary sexual terminal hair develops from vellus hair in the axillae and pubic region, and on the trunk and limbs in men.

- 
- On the scalp, the reverse occurs in male-pattern balding-terminal hair becomes vellus hair under the influence of androgens.
 - In men, terminal hair on the body usually increases in amount as middle age arrives, and hairy ears and nostrils are a puzzling accompaniment of advancing years.

- 
- Hair follicles extend into the dermis at an angle.
 - A small bundle of smooth muscle fibers, the arrector pili muscle, is attached to the side of the follicle.
 - Arrector pili muscles are supplied by adrenergic nerves, and are responsible for the erection of hairs in the cold or during emotional stress ('goose flesh').
 - The duct of the sebaceous gland enters the follicle just above the point of attachment of the arrector pili muscle.

- 
- At the lower end of the follicle is the hair bulb, part of which, the hair matrix, is a zone of rapidly dividing cells which is responsible for the formation of the hair shaft.
 - Hair pigment is produced by melanocytes in the hair bulb. Cells produced in the hair bulb become densely packed, elongated and arranged parallel to the long axis of the hair shaft. They gradually become keratinized as they ascend in the hair follicle.

- 
- The main part of each hair fiber is the cortex, which is composed of keratinized spindle shaped cells .
 - Terminal hairs have a central core known as the medulla, consisting of specialized cells which contain air spaces.
 - Covering the cortex is the cuticle, a thin layer of cells which overlap like the tiles on a roof, with the free margins of the cells pointing towards the tip of the hair.

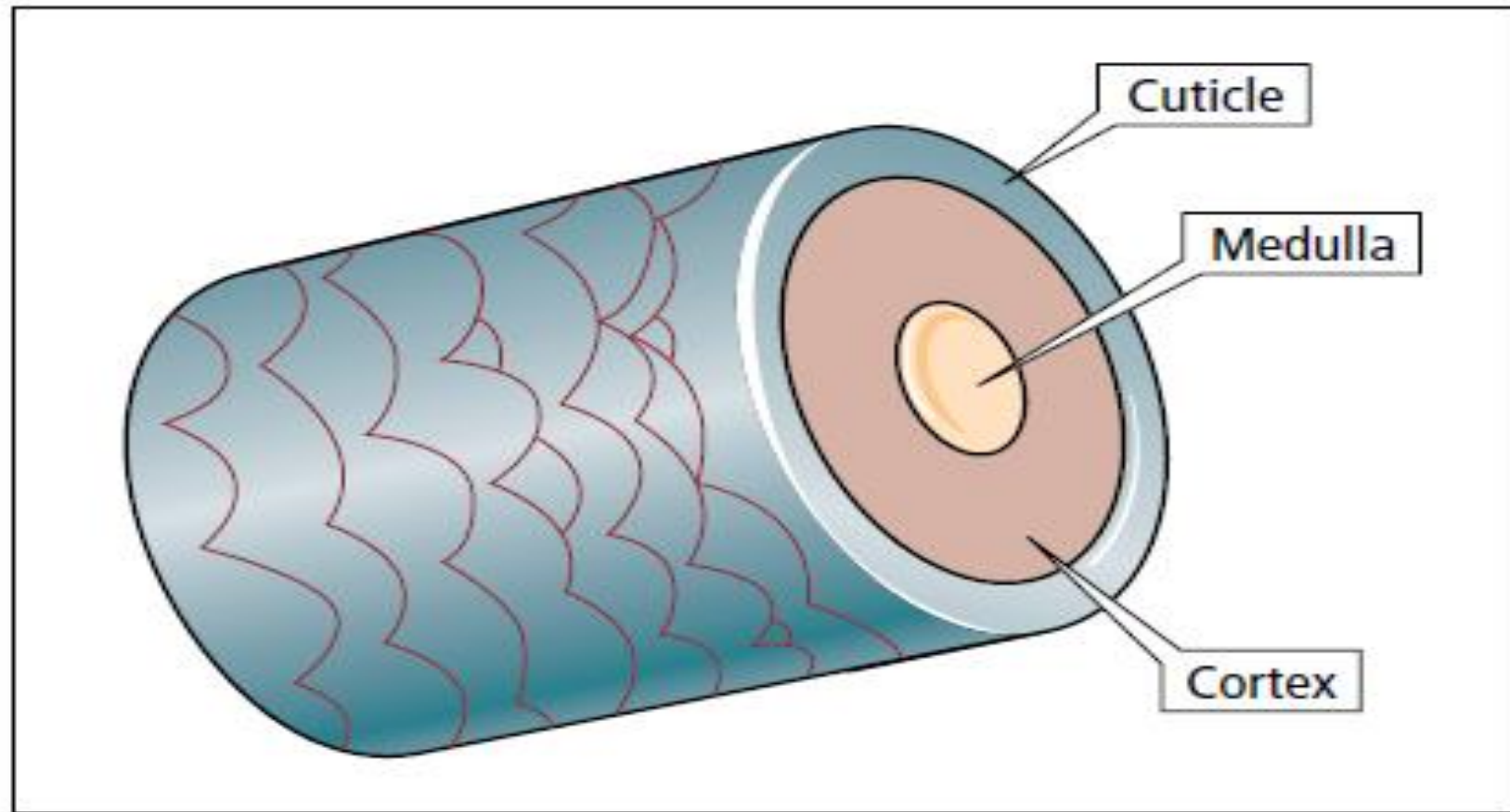
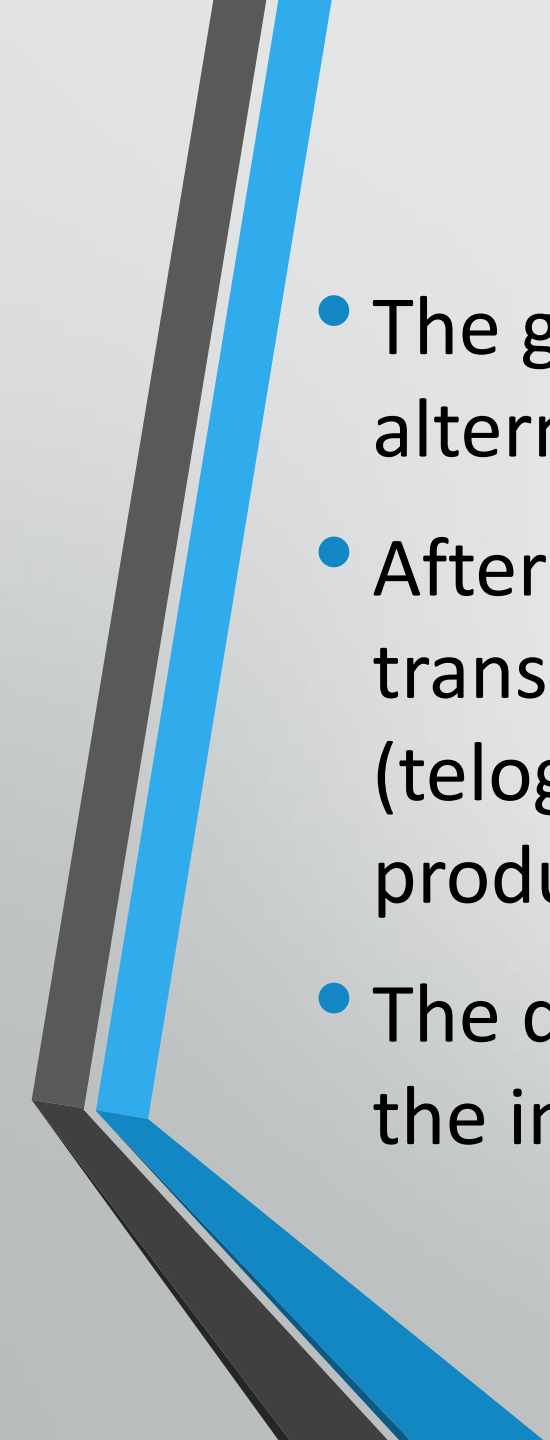
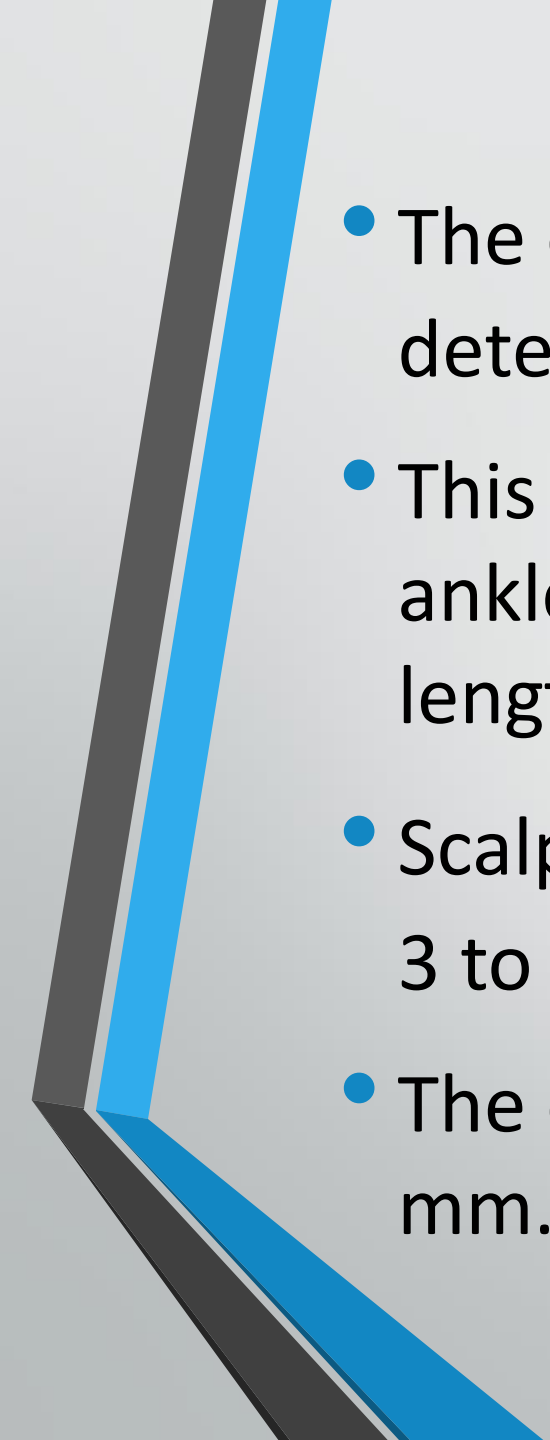
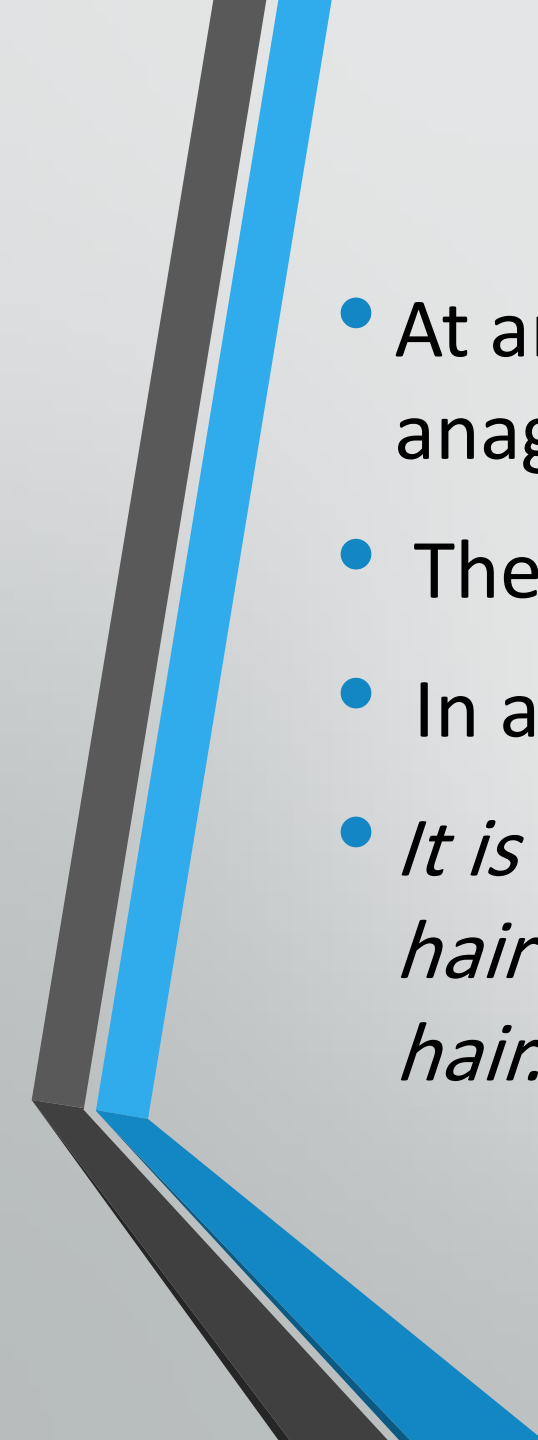


Figure 1.5 The structure of hair.

- 
- The growth of each hair is cyclical –periods of active growth alternate with resting phases.
 - After each period of active growth (anagen) there is a short transitional phase (catagen), followed by a resting phase (telogen), after which the follicle reactivates, a new hair is produced, and the old hair is shed.
 - The duration of these cyclical phases depends on the age of the individual and the location of the follicle on the body.

- 
- The duration of anagen in a scalp follicle is genetically determined, and ranges from 2 to more than 5 years.
 - This is why some women can grow hair down to their ankles, whereas most have a much shorter maximum length.
 - Scalp hair catagen lasts about 2 weeks and telogen from 3 to 4 months.
 - The daily growth rate of scalp hair is approximately 0.45 mm.

- 
- At any one time approximately 85% of scalp hairs are in anagen, 1 % in catagen and 14% in telogen.
 - The average number of hairs shed daily is 100.
 - In areas other than the scalp anagen is relatively short.
 - *It is a myth that shaving increases the rate of growth of hair and that it encourages the development of 'thicker' hair.*

Color of Hair

- Human hair color is produced by two types of melanin- eumelanins in black and brown hair, and phaeomelanins in auburn and blond hair.
- Greying of hair is the result of a decrease in tyrosinase activity in the melanocytes of the hair bulb. The age of onset of greying is genetically determined, but other factors may be involved such as autoimmunity — premature greying of the hair is a recognized association of pernicious anemia.

Sebaceous glands

- Sebaceous glands are found everywhere on the skin apart from the hands and feet.
- They are particularly numerous and prominent on the head and neck, the chest, and the back.
- Sebaceous glands are part of the pilosebaceous unit, and their lipid-rich product (sebum) flows through a duct into the hair follicle.

Sebaceous glands

- They are holocrine glands -sebum is produced by disintegration of glandular cells rather than an active secretory process.
- Modified sebaceous glands which open directly on the surface are found on the eyelids, lips, nipples, glans penis and prepuce, and the buccal mucosa.

Sebaceous glands

- Sebaceous glands are prominent at birth, under the influence of maternal hormones, but atrophy soon after, and do not enlarge again until puberty.
- Enlargement of the glands and sebum production at puberty are stimulated by androgens.
- Growth hormone and thyroid hormones also affect sebum production.

Nails

- is a transparent plate of keratin derived from an invagination of epidermis on the dorsum of the terminal phalanx of a digit .
- The nail plate is the product of cell division in the nail matrix, which lies deep to the proximal nail fold, but is partly visible as the pale 'half-moon' (lunula) at the base of the nail.
- The nail plate is firmly adherent to the underlying nail bed

Nails

- The cuticle is an extension of the horny layer of the proximal nail fold onto the nail plate.
- It forms a seal between the nail plate and proximal nail fold, preventing penetration of extraneous material.

Nails

- Nail growth is continuous throughout life, but is more rapid in youth than in old age. The average rate of growth of finger nails is approximately 1 mm per week, and the time taken for a fingernail to grow from matrix to free edge is about 6 months.
- Nails on the dominant hand grow slightly more rapidly than those on the non-dominant hand. Toe nails grow at one-third the rate of finger nails, and take about 18 months to grow from matrix to free edge.

Nails

- Many factors affect nail growth rate. It is increased in psoriasis, and may be speeded up in the presence of inflammatory change around the nail.
- A severe systemic upset can produce a sudden slowing of nail growth, causing a transverse groove in each nail plate. These grooves, known as **Beau's lines**, subsequently become visible as the nails grow out.
- Nail growth may also be considerably slowed in the digits of a limb immobilized in plaster.

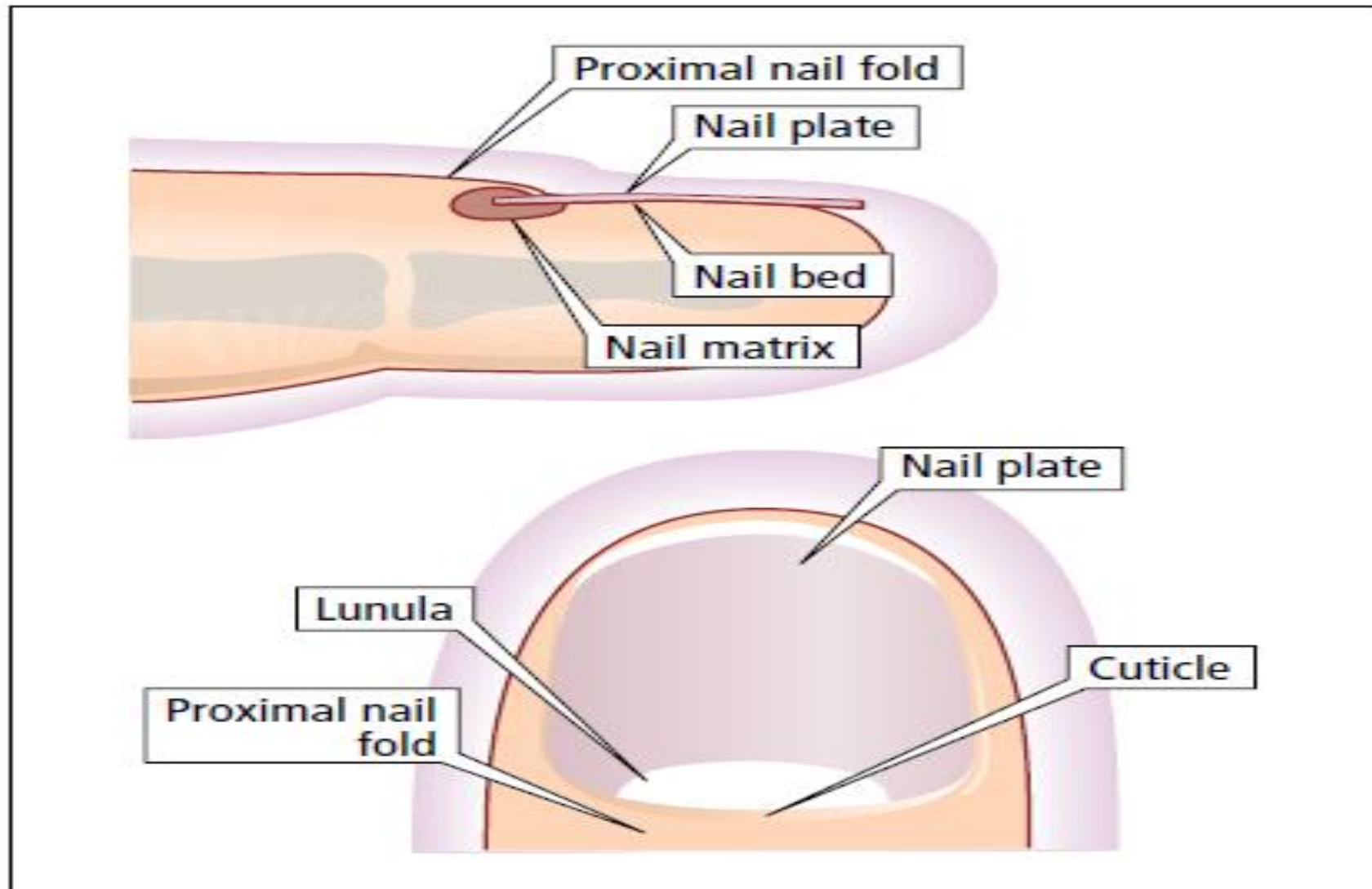


Figure 1.6 The nail.

Beau's Lines

Beau's Lines

 NailKnowledge

C



The dermis

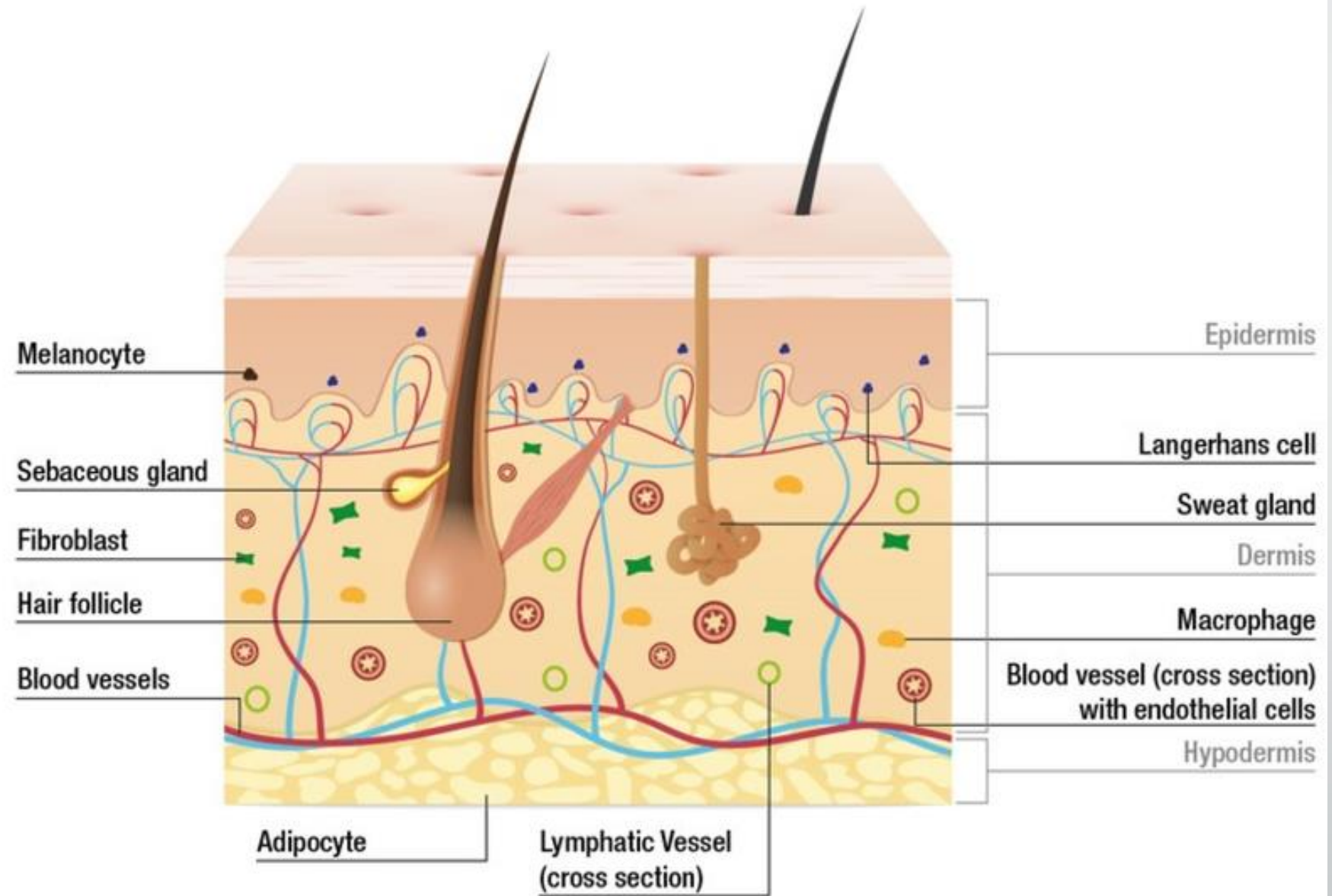
- The dermis is a layer of connective tissue lying beneath the epidermis, and forms the bulk of the skin.
- The dermis and epidermis interdigitate via downward epidermal projections (rete ridges), and upward dermal projections (dermal papillae) .
- The main feature of the dermis is a network of interlacing fibers, mostly collagen, but with some elastin. These fibers give the dermis great strength and elasticity.
- The collagen and elastin fibers, which are protein, are embedded in a ground substance of mucopolysaccharides (glycosaminoglycans).

The dermis

- **The main cellular elements of the dermis are fibroblasts, mast cells and macrophages.**
- Fibroblasts synthesize the connective tissue matrix of the dermis, and are usually found in close proximity to collagen and elastin fibers.
- Mast cells are specialized secretory cells present throughout the dermis, but they are more numerous around blood vessels and appendages.
- Macrophages are phagocytic cells that originate in the bone marrow, and they act as scavengers of cell debris and extracellular material.

The dermis and hypodermis

- The dermis is also richly supplied with blood vessels, lymphatics, nerves and sensory receptors.
- Beneath the dermis, a layer of subcutaneous fat separates the skin from underlying fascia and muscle.



Task

5 min

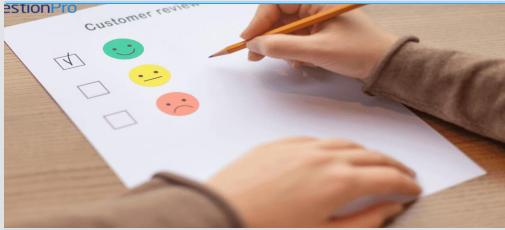
- **What are the difference between skin of Black people and white people ?**

Summary

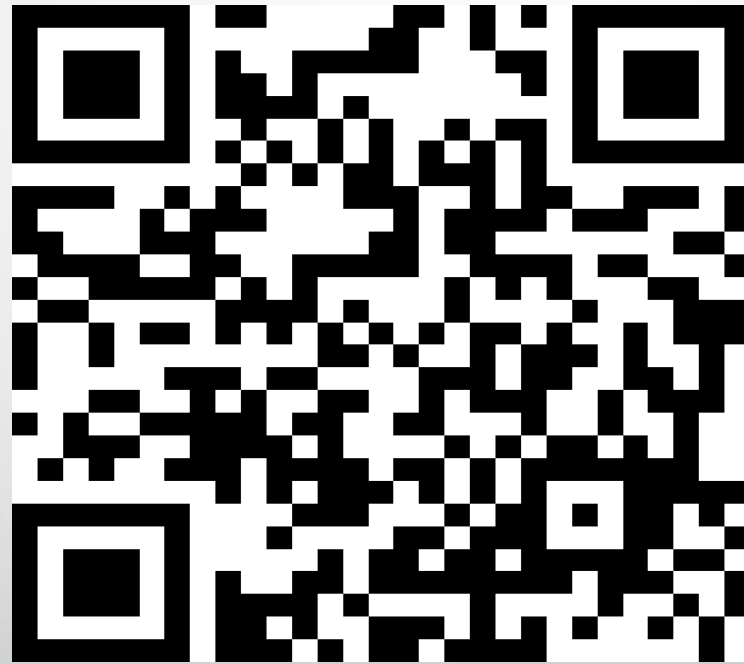
- The skin is composed of two layers, the epidermis and the dermis.
- The epidermis is a stratified squamous epithelium, with several well-defined layers.
- The eccrine and apocrine sweat glands, the hair and sebaceous glands, and the nails, constitute the epidermal appendages.
- The dermis is a layer of connective tissue lying beneath the epidermis, and forms the bulk of the skin.
- Beneath the dermis, a layer of subcutaneous fat separates the skin from underlying fascia and muscle.

References

- Lecture Notes on Dermatology 10th edition 2011.
- Bologna 5th edition 2024.
- Oxford Handbook of Medical Dermatology 2nd edition 2016.



Survey





hussein.rasheed@atu.edu.iq

@HusseinHamood



Thank you



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
كلية التقنيات الصحية والطبية / كوفة
قسم تقنيات التجميل والليزر



Basic skin care principles

Learning Objectives

- Understand the role of the skin barrier and hydration in dermatological health.
- Compare different cleansing agents and their effect on skin physiology.
- Identify classes of moisturizers and their mechanisms.
- Apply evidence-based methods of sun protection and daily prevention.

Introduction

- **Healthy skin relies on a strong barrier and proper hydration. The skin barrier protects the body from external irritants, microbes, and water loss, while hydration keeps the skin soft, elastic, and resilient.**
- **Daily care through gentle cleansing, effective moisturizing, and consistent protection helps maintain this balance, preventing dryness, sensitivity, and long-term damage.**

Skin Barrier

- The skin barrier, located in the stratum corneum, acts as the body's first defense against irritants and water loss.
- It is built from corneocytes and a lipid matrix (ceramides, cholesterol, fatty acids) in a “brick-and-mortar” structure that maintains integrity and controls transepidermal water loss (TEWL).

Cleansing in Skin Care

- Cleansing is the first step of any skin care routine.
- Its main role is to remove dirt, excess sebum, sweat, and environmental pollutants without damaging the natural skin barrier.
- When done incorrectly, cleansing can strip the skin, leading to dryness, irritation, or sensitivity.
- The skin surface has a natural acid mantle (pH ~4.5–5.5).



Types of Cleansers

- Cleansers in dermatology aren't just "soap."
- They're medical formulations designed to clean while protecting or treating skin.
- Dermatologists usually classify them by their composition, pH, and therapeutic use.

Types of Cleansers

1. Soap (Traditional):

- Alkaline (high pH , 9-10).
- Remove oils effectively, but Can disrupt the natural acidic environment of the skin (acid mantle).
- Often causes dryness and irritation, especially in sensitive skin.



2.Syndet Cleansers (Synthetic Detergents):

- Formulated closer to the skin's natural PH.
- Milder, less irritating, and more barrier-friendly.
- Commonly used in sensitive skin, eczema, acne, or rosacea.
- Available as gels, creams, or foams.



3. Lipid-free cleansers

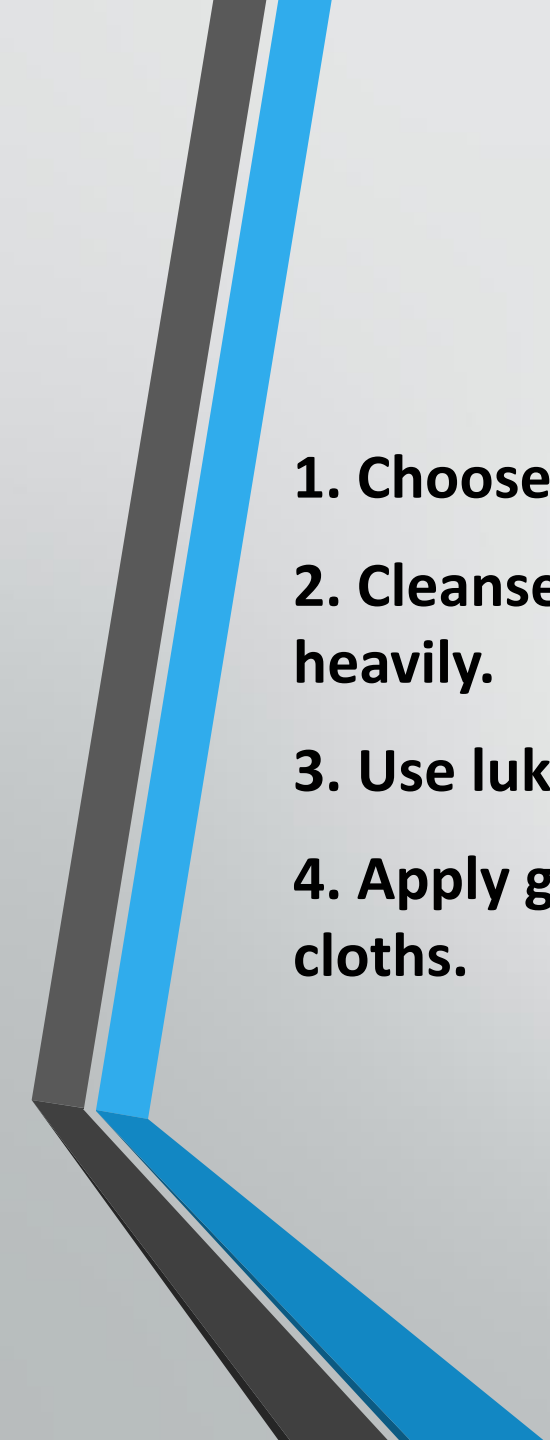
- **Do not contain fats, soaps, or detergents.**
- **Mild formulas, often water-soluble.**
- **Suitable for very dry, sensitive, or inflamed skin (e.g., eczema, dermatitis).**
- **Example: Aquanil cleanser.**

4. Antibacterial / Antiseptic cleansers

- **Contain agents like chlorhexidine, triclosan, povidone-iodine, or benzoyl peroxide.**
- **Used in acne, surgical prep, or infected skin.**
- **Risk: may alter normal flora or cause irritation with prolonged use.**

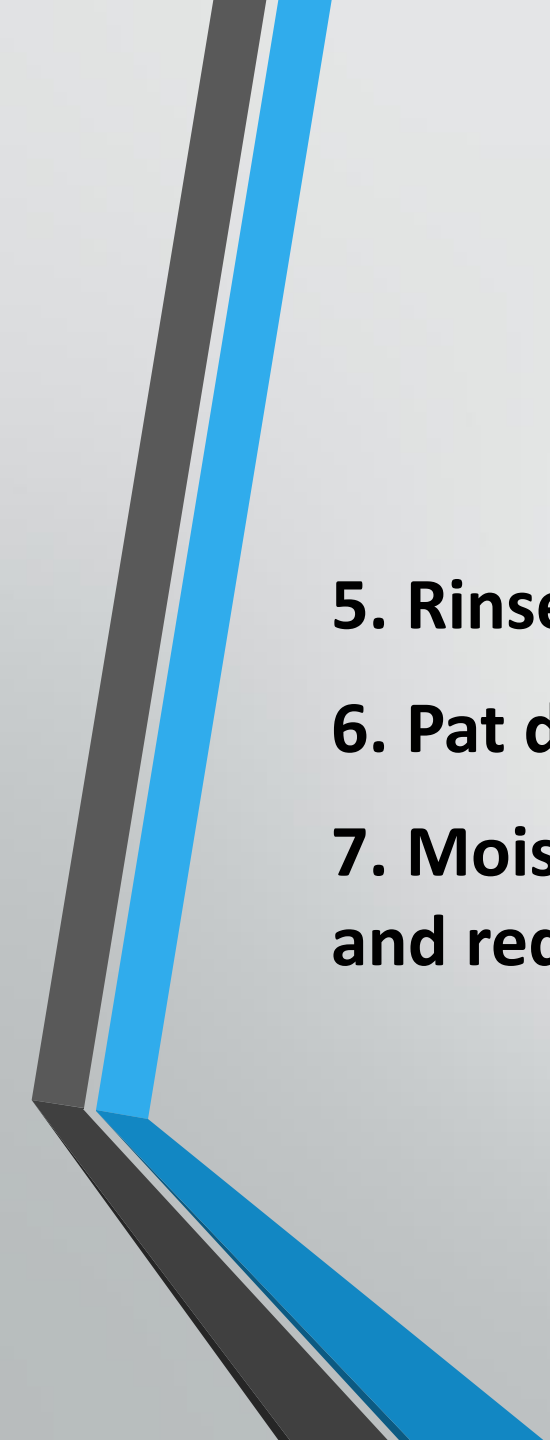
5.Emollient or moisturizing cleansers

- **Combine cleansing agents with moisturizing ingredients (glycerin, ceramides, oils).**
- **Designed for dry, atopic, or elderly skin.**
- **Examples: CeraVe Hydrating Cleanser, Eucerin Wash.**



Best Practices (Step by Step)

- 1. Choose a mild cleanser: Prefer fragrance-free and low-PH formulas.**
- 2. Cleanse once or twice daily: Morning and evening, or after sweating heavily.**
- 3. Use lukewarm water: Hot water increases dryness and barrier damage.**
- 4. Apply gently: Massage with fingertips; avoid harsh scrubs or rough cloths.**



Best Practices (Step by Step)

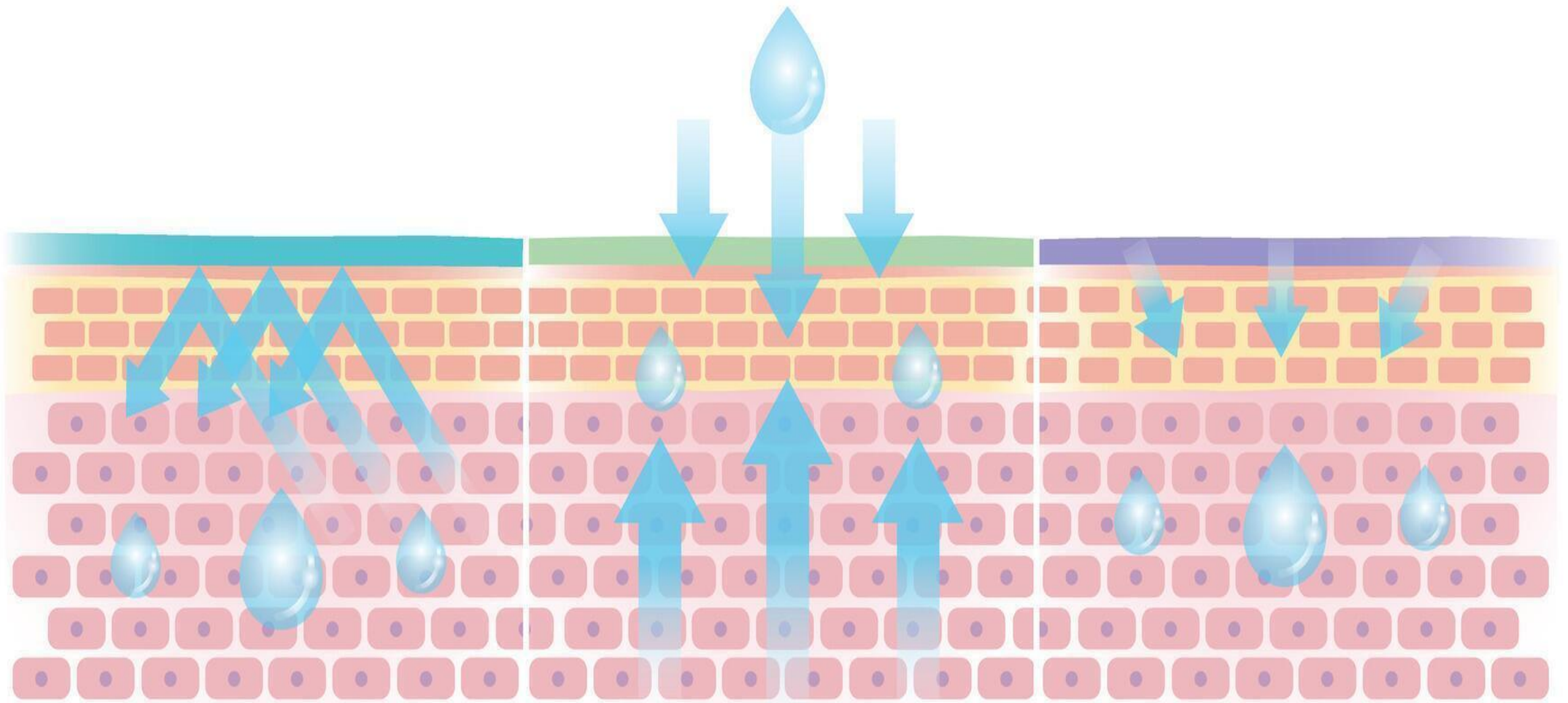
- 5. Rinse thoroughly: Remove all residue to prevent irritation.**
- 6. Pat dry, don't rub: Use a soft towel with gentle patting.**
- 7. Moisturize immediately after cleansing: Helps lock in hydration and reduce transepidermal water loss (TEWL).**

Moisturizing

- **Moisturizing is the process of applying products to the skin that add water, restore lipids, maintain elasticity and lock in hydration to prevent dryness and keep the skin barrier healthy.**

Key Ingredients of moisturizing

- 1. Humectants (glycerin, hyaluronic acid, urea)**
 - Attract and bind water from deeper layers or the environment.
- 2. Emollients (fatty acids, squalane, shea butter)**
 - Fill gaps between cells, smooth rough skin, improve texture.
- 3. Occlusives (petrolatum, dimethicone, lanolin)**
 - Form a thin film on the skin surface to trap moisture and block evaporation.



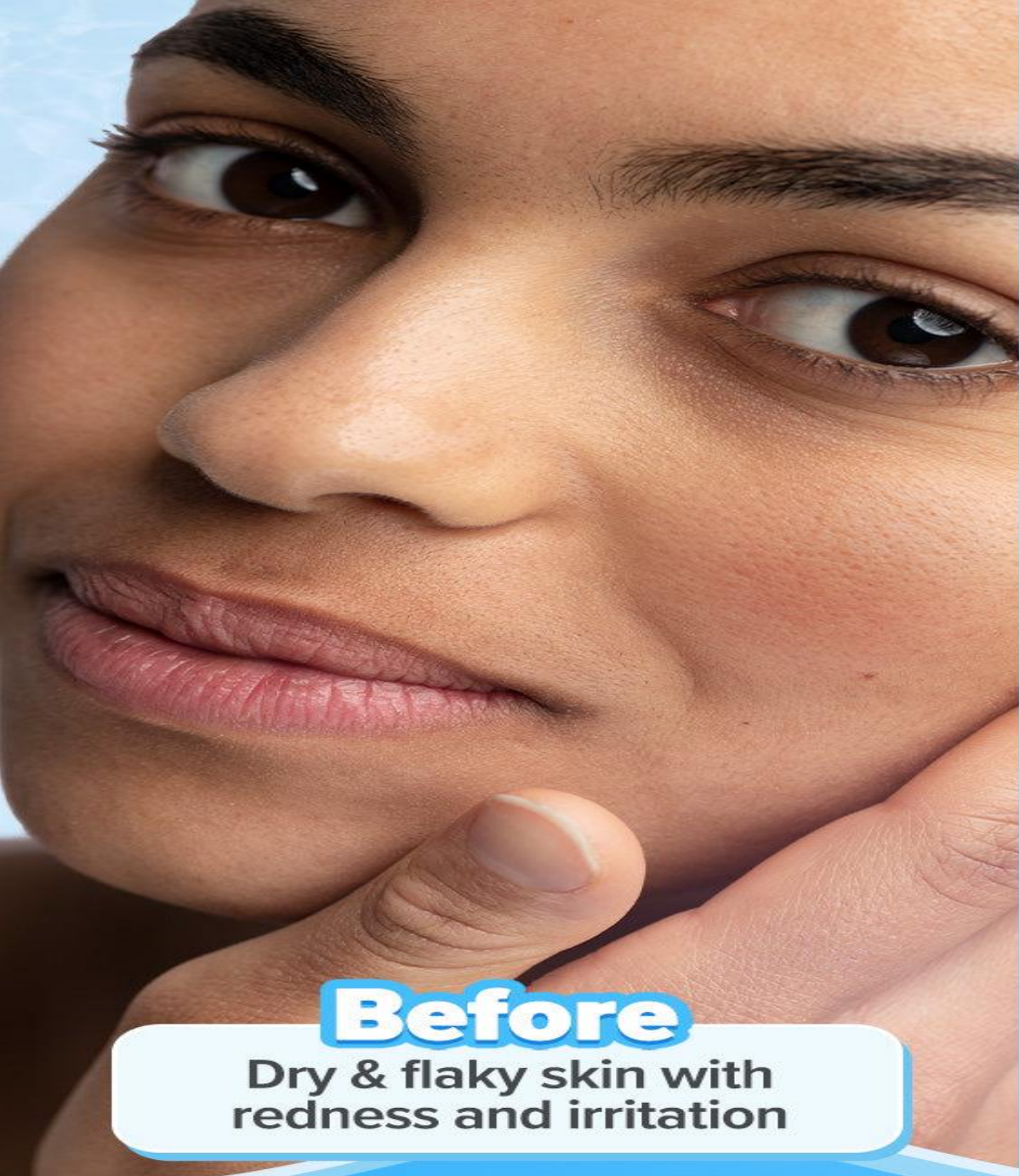
Occlusives

Humectants

Emollients

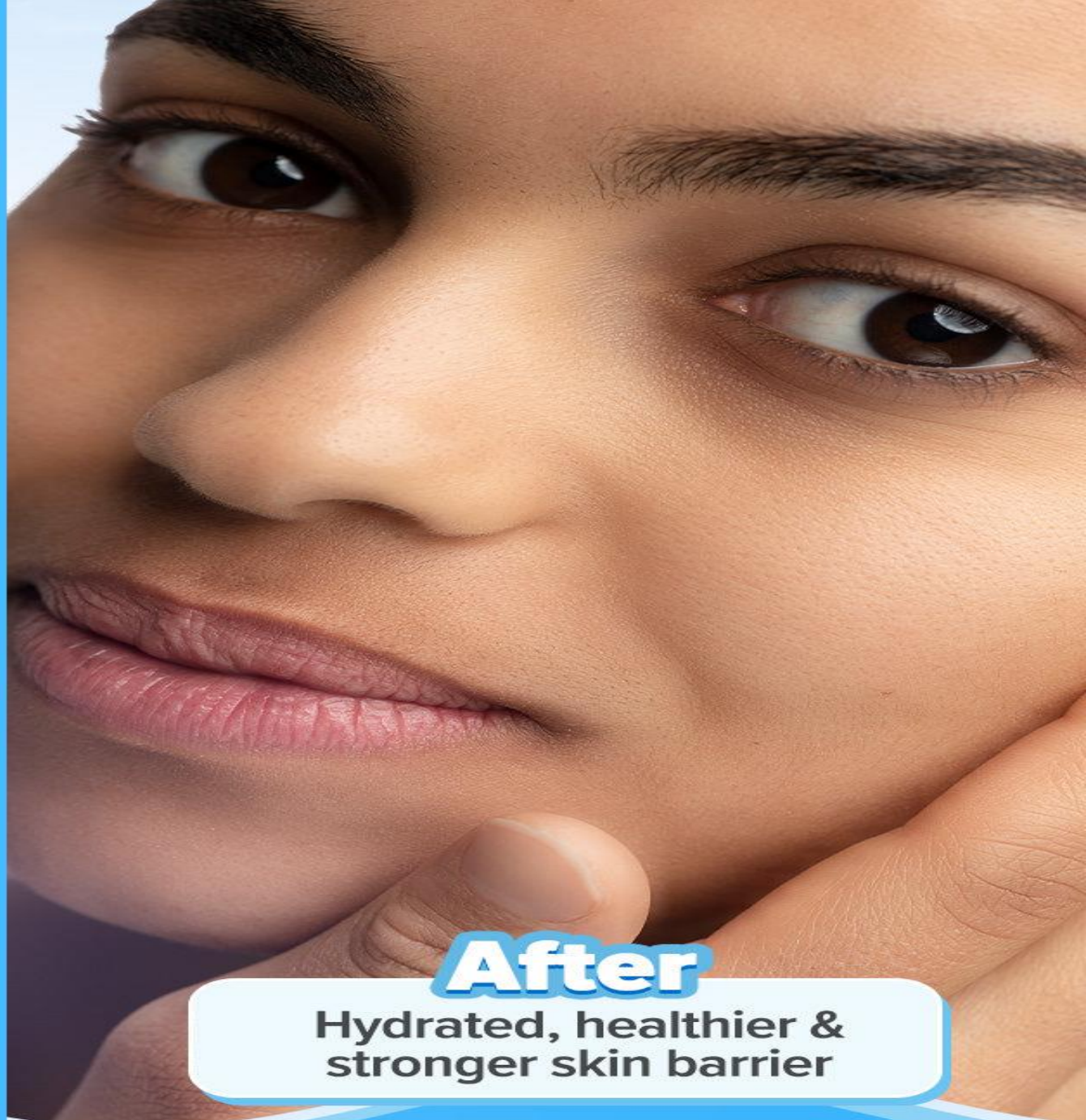
Barrier Repair

- Barrier repair is the process of restoring the skin's outer layer (stratum corneum) when it is weakened by dryness, harsh cleansing, or disease.
- A healthy barrier reduces transepidermal water loss (TEWL) and protects against irritants and microbes.
- Moisturizers containing ceramides, cholesterol, and fatty acids mimic the skin's natural lipids, helping rebuild its “brick-and-mortar” structure. This not only improves hydration but also decreases sensitivity and supports healing in conditions such as eczema and dry skin.



Before

Dry & flaky skin with
redness and irritation



After

Hydrated, healthier &
stronger skin barrier

Best Practices (Step by Step)

1. Apply right after cleansing: Within 3 minutes while the skin is still slightly damp (“soak and seal”).
2. Choose the right formula for skin type:
 - Dry/eczema-prone → thick creams or ointments with ceramides or urea.
 - Oily/acne-prone → light lotions or gels labeled non-comedogenic.
 - Sensitive/rosacea → fragrance-free, short ingredient list.
 - Use twice daily or more in dry climates or cold weather.
3. Cover all exposed areas, especially hands and face.
4. Reapply as needed after handwashing or long water exposure.

Protection (Photoprotection and Daily Defense)

- The skin is constantly exposed to ultraviolet (UV) radiation, visible light, and environmental pollutants.
- UV exposure is the primary cause of photoaging (wrinkles, pigmentation, loss of elasticity) and increases the risk of skin cancers.
- Consistent photoprotection preserves the skin barrier, prevents DNA damage, and maintains long-term dermatological health.

Core Protective Strategies

- 1. Seek Shade:** Limit outdoor exposure during peak UV hours (10 AM–4 PM).
- 2. Protective Clothing:** Wear long sleeves, wide-brimmed hats, and sunglasses; look for garments with a UV Protection Factor (UPF $\geq$ 50).
- 3. Sunscreen:** Apply a broad-spectrum sunscreen with SPF 30 or higher to all exposed areas.
- 4. Reapply every 2 hours,** and immediately after swimming, sweating, or towel-drying.
- 5. Don't forget often-missed areas:** ears, neck, scalp, hands, and lips.
- 6. Daily Defense Habits:** Even on cloudy days or indoors near windows, UV rays can penetrate. Regular sunscreen use prevents cumulative damage.

Practical Steps (Easy to Follow)

Step 1: Apply sunscreen as the last step of the morning routine (about 2 fingers' length for the face and neck).

Step 2: Carry sunscreen for reapplication when outdoors.

Step 3: Combine methods—shade, clothing, and sunscreen—since no single measure is fully protective.

Step 4: Check the UV Index (UVI) daily; if $UVI \geq 3$, protection is strongly recommended.

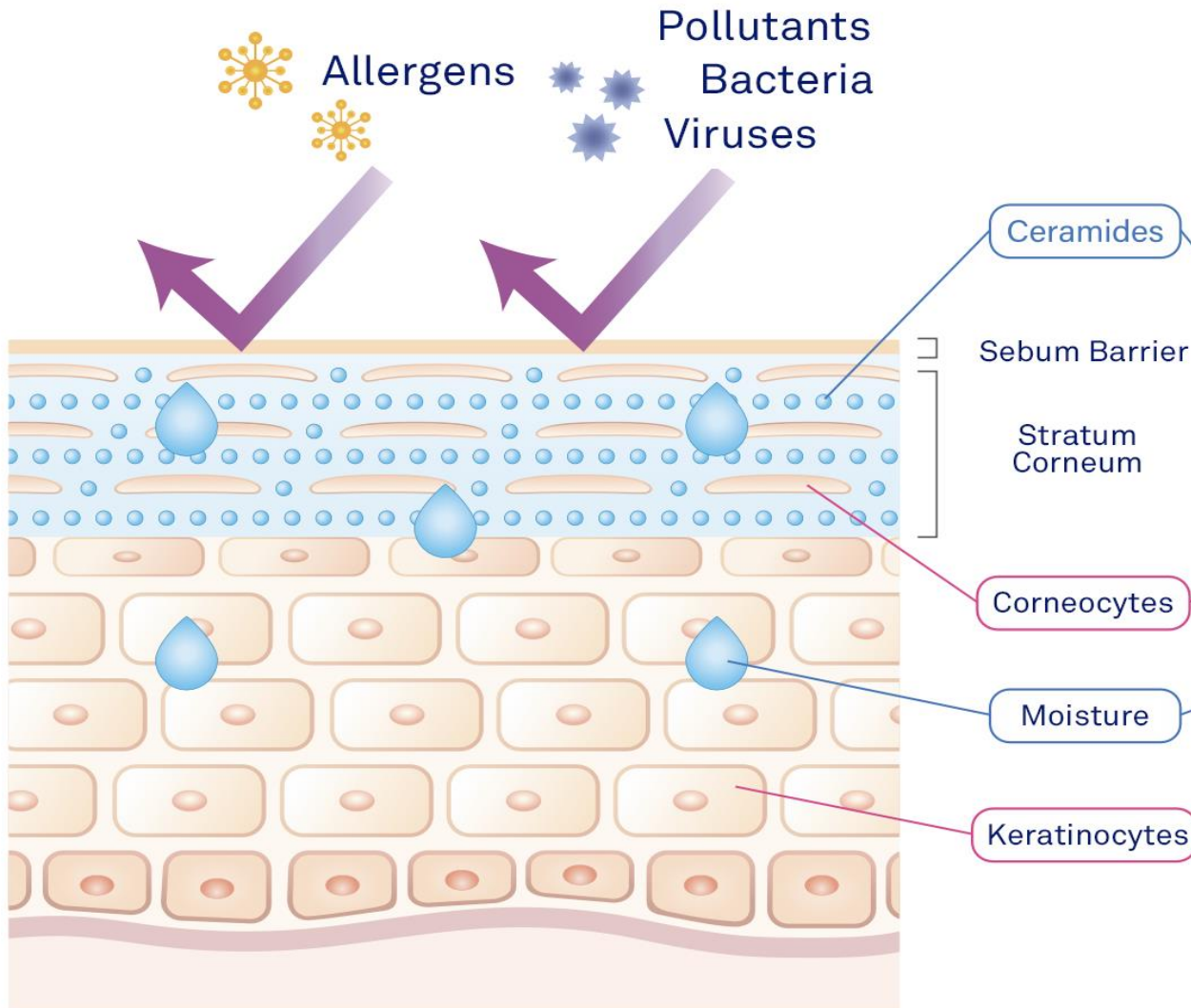


lemon8 the amount of sunscreen should be
@ayraaah_ equivalent to 2 fingers

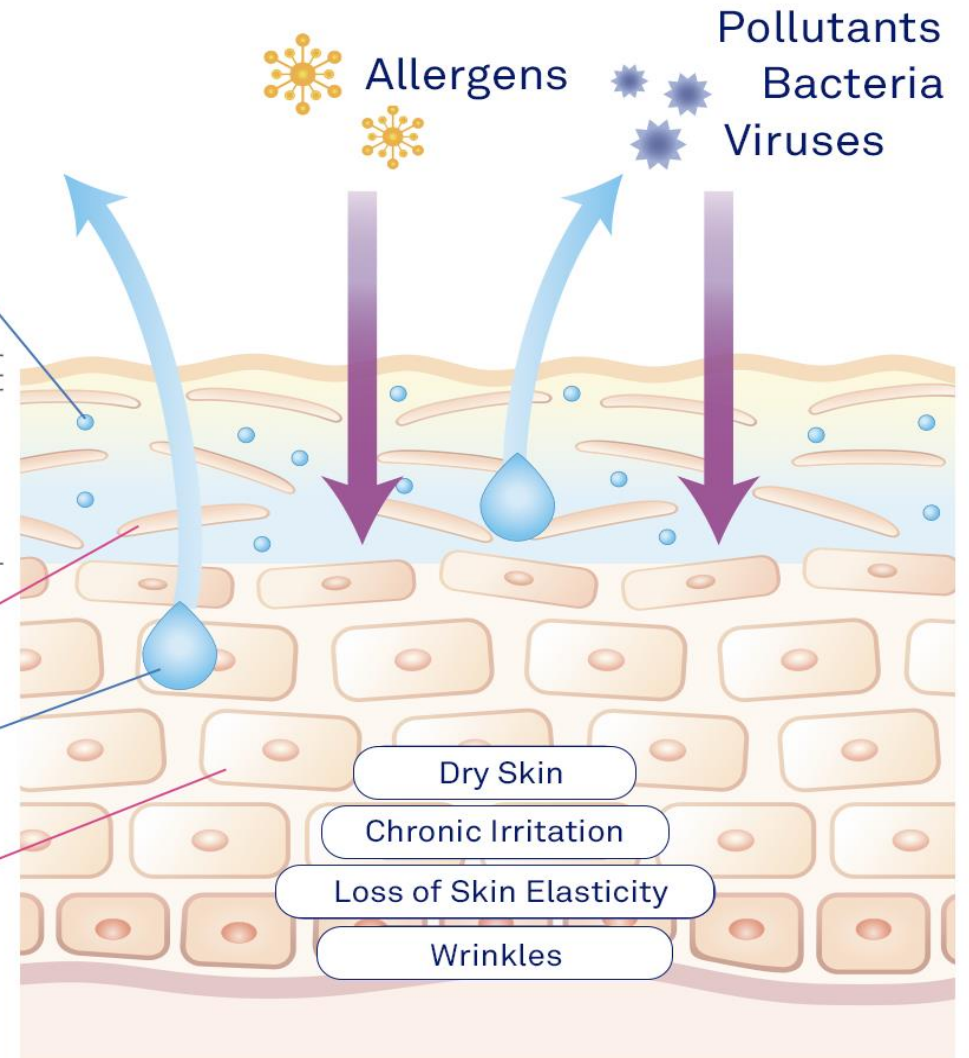
Skin Barrier Disorders

- **Atopic Dermatitis** (eczema) is a **chronic inflammatory skin disorder** primarily associated with **defects in the epidermal barrier** result in **increased transepidermal water loss**, leading to **dry** and **fragile skin**, as well as enhanced penetration of environmental allergens and irritants. Clinically, the condition is characterized by **intense itching**, **erythema**, and **recurrent skin infections**, reflecting both barrier dysfunction and immune dysregulation.

INTACT SKIN BARRIER



DAMAGED SKIN BARRIER





Skin Barrier Disorders

- **Ichthyosis** refers to a heterogeneous group of **inherited skin disorders** characterized by **abnormal keratinization**. These conditions result in **impaired barrier function**, leading to **scaling, dryness**, and **thickening** of the skin.
- The severity can range from mild, fine scaling to severe, plate-like scales, depending on the genetic subtype. The defective barrier also increases susceptibility to irritation and secondary infections, highlighting the importance of normal keratinization in maintaining skin integrity.



Skin Barrier Disorders

- **Psoriasis** is a **chronic, immune-mediated skin disease characterized by abnormally accelerated keratinocyte turnover and persistent inflammation.** Although its pathogenesis is primarily immune-driven, barrier dysfunction plays a key role by contributing to the formation of **thick, scaly plaques** and **increasing the skin's susceptibility to irritation and secondary complications.**



Skin Barrier Disorders

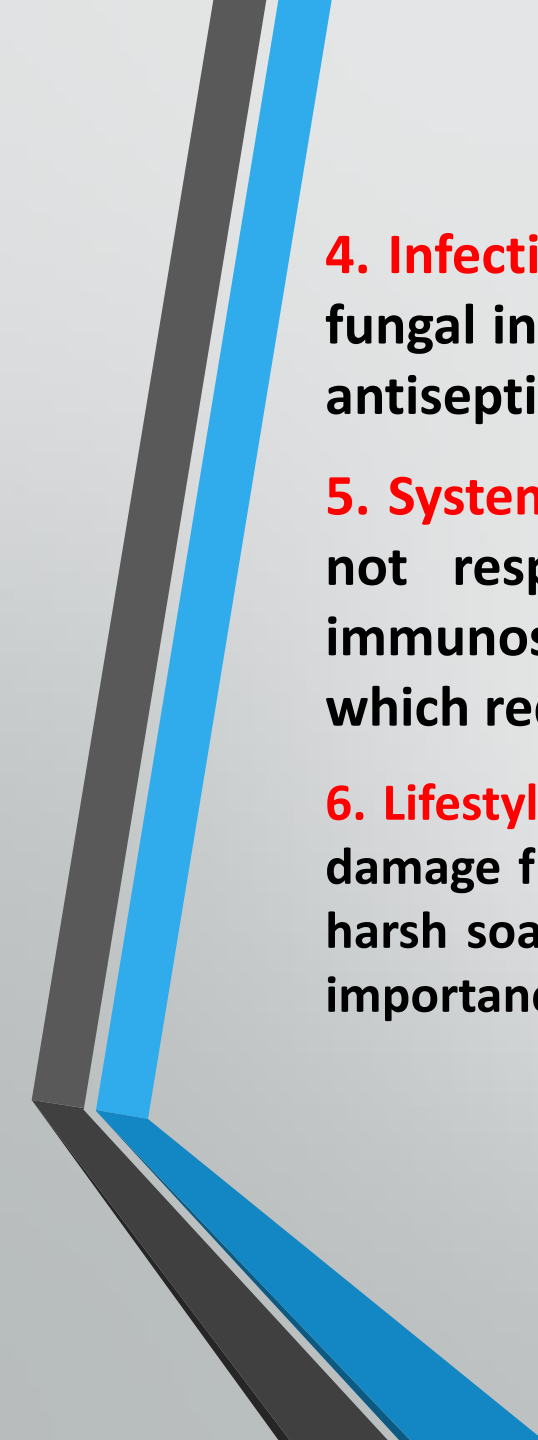
- **Contact Dermatitis** is an inflammatory skin condition that occurs when **barrier disruption permits irritants or allergens to penetrate the epidermis**, thereby **triggering an immune response**. It is classified into two major types: **irritant contact dermatitis**, caused by direct toxic effects of chemicals or physical agents on the skin, and **allergic contact dermatitis**, which represents a delayed hypersensitivity reaction to specific allergens. In both cases, barrier impairment contributes to inflammation, erythema, and pruritus.





General Management of Skin Barrier Disorders

- 1.Skin hydration and barrier repair** rely on regular use of emollients and moisturizers, preferably fragrance-free and hypoallergenic, with barrier creams or ointments used in severe cases.
- 2.Trigger avoidance** involves identifying and avoiding irritants such as soaps, detergents, and chemicals, as well as allergens that may worsen symptoms. In occupational settings, protective clothing and gloves are recommended to reduce exposure.
- 3.Topical therapy** includes corticosteroids to reduce inflammation, calcineurin inhibitors (tacrolimus, pimecrolimus) as steroid-sparing agents, and keratolytics (urea, lactic acid, salicylic acid) in ichthyosis to decrease scaling.

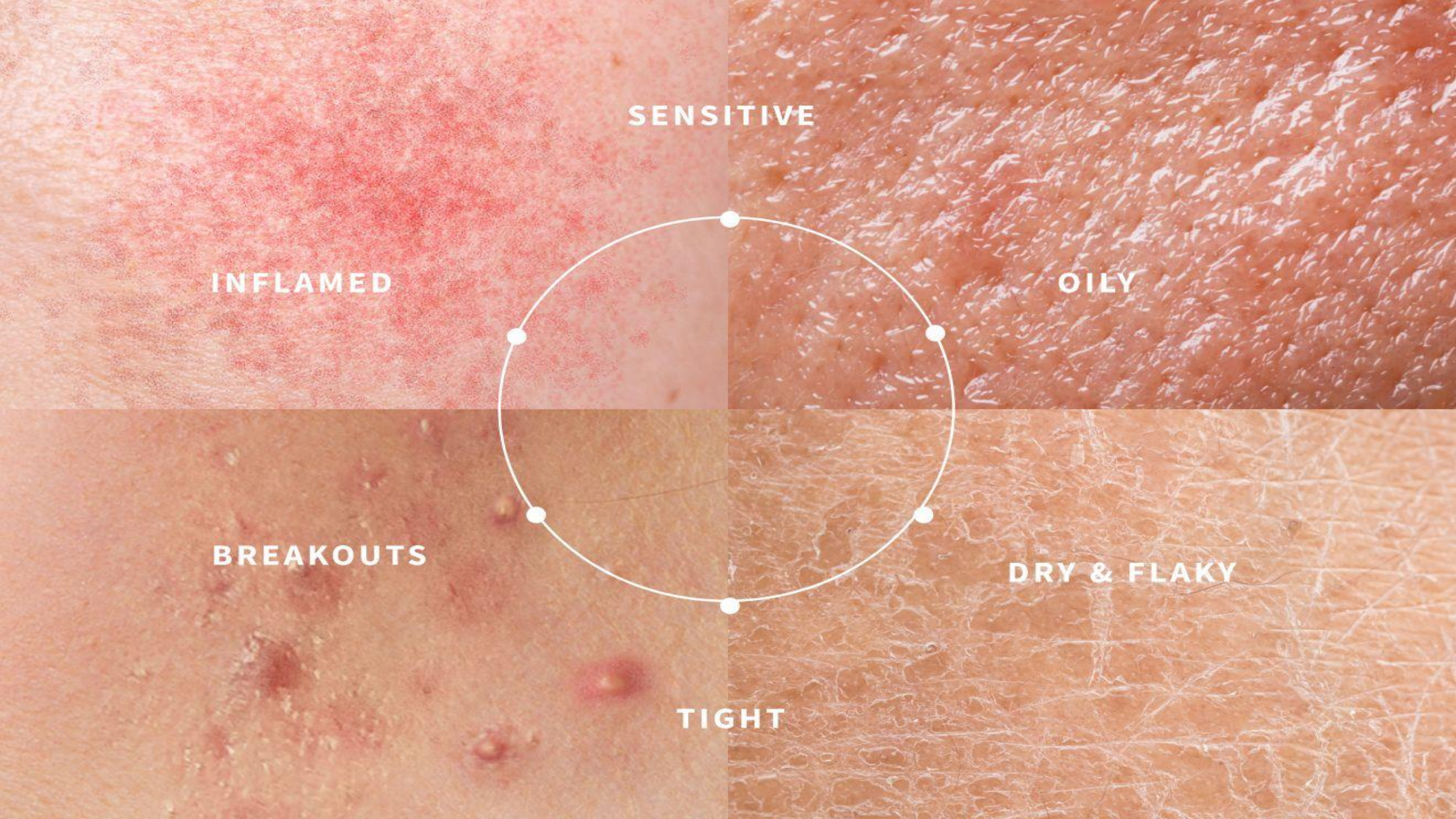


4. Infection control focuses on the prompt treatment of secondary bacterial, viral, or fungal infections to prevent complications. In cases of recurrent infections, the use of antiseptic washes may provide additional benefit.

5. Systemic therapy is reserved for moderate to severe skin barrier disorders that do not respond adequately to topical treatment. It often involves the use of immunosuppressive agents, such as methotrexate, cyclosporine, or azathioprine, which reduce immune activity and control inflammation.

6. Lifestyle and supportive measures include keeping the nails short and clean to reduce skin damage from scratching, using lukewarm baths with mild cleansers instead of hot water and harsh soaps, and providing patient education about the chronic nature of the condition, the importance of treatment adherence, and the need for psychosocial support.





SENSITIVE

INFLAMED

OILY

BREAKOUTS

DRY & FLAKY

TIGHT













جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
كلية التقنيات الصحية والطبية / كوفة
قسم تقنيات التجميل والليزر



Skin Assessment Techniques

Table of contents

- **The dermatological history.**
- **Clinical Skin Assessment.**
- **Normal and abnormal skin finding .**
- **Lesion Assessment.**
- **Examination Aids.**
- **Diagnostic Methods.**

General Objectives

- **To Know how to perform a systematic skin assessment.**

Learning Objectives

- **Describe normal and abnormal skin findings.**
- **Categorize primary and secondary skin lesions.**
- **Perform a systematic skin assessment.**
- **Use skin assessment techniques.**

The dermatological History

- **Chief complaint:** (itching, dryness, rashes, lesions, lumps, ecchymosis & masses).
- **History of present illness :** (onset , course, intermittent or contagious-always present or does it come and go ?).
- **Past Medical & Surgical History :** (medications ,allergies, previous surgeries)
- **Family History :** ex- (psoriasis, infestations ,infections).
- **Psycho-social History :(**personal habits , exposures, health-related behaviors).
- **Social and Personal History :**travel, hobbies and occupation.
- **Review of Systems :** involves performing a brief screen for symptoms in other body systems.

The dermatological History

1. When did it start?
2. Does it itch, burn or hurt?
3. Associated symptoms?
4. Is this the first episode?
5. Where on the body did it start (location)?
6. How has it spread ?
7. How have individual lesions changed?
8. Provoking /aggravating factors?
9. Previous treatments and response?

Clinical Skin Assessment

- Clinical skin assessment provides critical information not only about dermatologic conditions but also about systemic diseases.
- A complete skin assessment involves inspection, palpation, and sometimes diagnostic tools such as dermoscopy, diascopy, or Wood's lamp examination.

Preparation for Skin Examination

- Ensure good lighting (preferably natural light).
- The room should be warm to prevent vasoconstriction.
- Ask for patient consent and explain each step.
- The patient should undress appropriately, covered modestly with a drape.
- Always perform hand hygiene before and after the examination.

Regional Examination (Head to Toe)

- **Systematic assessment includes:**

- Scalp and hair.
- Face and neck.
- Trunk and limbs.
- Hands, nails, and feet.
- Mucous membranes (mouth , eye , anus and genital).

Each region should be inspected for **color, lesions, texture, and integrity.**

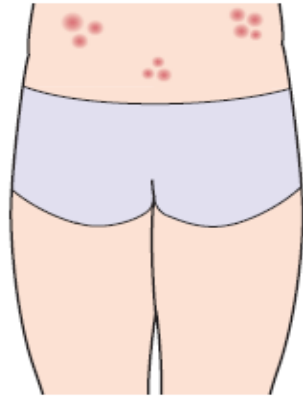


General Inspection

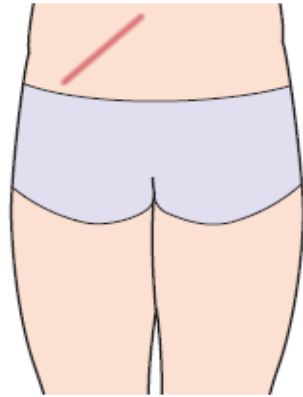
- **Begin with a general overview of the patient's :**
 - **Color:** Look for pallor, cyanosis, jaundice, erythema, or hyperpigmentation.
 - **Dry or Moisture:** Note dryness, oiliness, or sweating.
 - **Odor:** Foul smell may indicate infection or poor hygiene.
 - **Distribution:** Observe whether lesions are localized, generalized, symmetrical, or in dermatomal patterns.

Inspection of the lesion

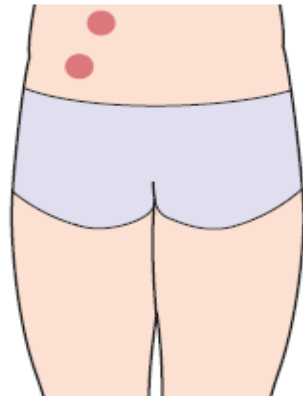
- **Color** : dark purple (purpura).
- **Distribution** :(symmetry) suggesting an external cause i.e. Infection, trauma etc.
- Do lesions leave **pigment change** (increased or decreased) or **scars**?
- **Shape and size.**
- **Border**: well demarcated or indistinct.
- ✓ Ask the patient to indicate early and late lesions.
- ✓ Decide what is primary or secondary & how lesions evolves or spread.
- **Any particular pattern** –diffuse,linear,grouped or scattered.



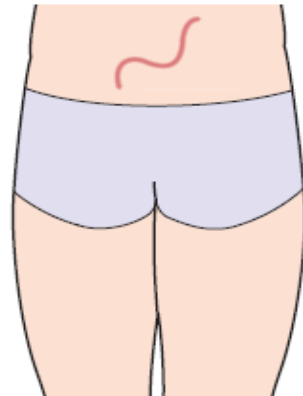
Grouped



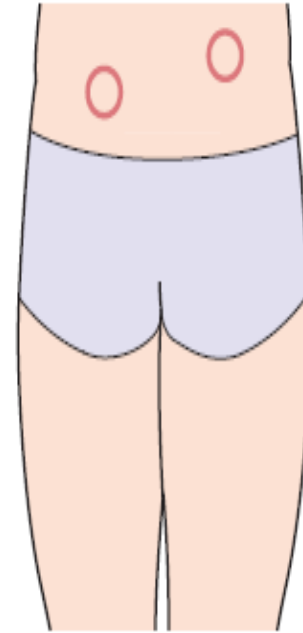
Linear



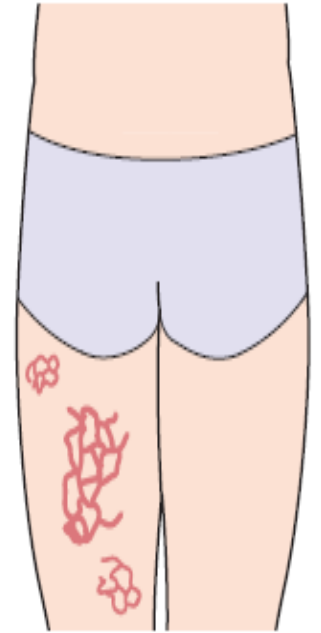
Discoid (coin-like)



Serpiginous
(snake-like)



Annular (ring)



Reticulate
(net-like with spaces)

Fig. 3.2 Diagram of signs in the skin and patterns.

Palpation Techniques

- **Use gloved hands and assess:**
 - **Temperature:** Using the dorsum (back) of the hand.
 - ✓ inflamed skin-cellulitis –hot skin
 - ✓ poorly perfused-cold skin
 - **Surface Texture:** can be assessed by running a finger over the top of a lesion to feel if the skin is smooth or rough.
 - **Moisture :** Dryness or roughness may indicate eczema or hypothyroidism.
 - **Thickness and turgor:** Decreased turgor can indicate dehydration or aging.
 - **Mobility:** Reduced mobility may occur in scleroderma.
 - **Tenderness or pain:** May suggest infection or inflammation.

Palpation Techniques

- **Elevation: Palpable/flat.**
- **Tethering:** Gently pinch the skin or try to pick up lumps between finger and thumb to assess depth .Is there any tethering to lying tissue?
- **Skin thickness and depth of involvement :**atrophy (tissue loss) with wrinkling or dimpling (loss of fat).
- **Scaling :** If scaling is not easily visible, lightly scraps a lesion with your fingernail scaling.
- **Edema**

Normal Skin Findings

- Even tone.
- Smooth, intact texture.
- No lesions or edema.
- Warm, dry to touch.

Abnormal Skin Findings

- Pallor, cyanosis, erythema, jaundice.
- Rashes, ulcers, nodules.
- Cool or hot temperature.
- Dry or excessively moist.

Lesion Assessment

- When a lesion is identified, it should be described using standard dermatologic terminology.
- **Primary Lesions:** Macule, papule, plaque, nodule, vesicle, pustule, wheal, cyst, comedo, petechiae , purpura , echymosis .
- **Secondary Lesions:** Scale, crust, fissure, erosion, ulcer, sinus ,scar, keloid lichenification, atrophy, stria .

Table 2.1 Types and characteristics of lesions (see Figure 2.1)

للاطلاع

Lesion characteristics

- Macule: a flat, circumscribed area of skin discoloration
- Papule: a circumscribed elevation of the skin <0.5 cm in diameter
- Nodule: a circumscribed visible or palpable lump, >0.5 cm
- Plaque: a circumscribed, disc-shaped, elevated area of skin:
 'small' <2 cm in diameter
 'large' >2 cm in diameter
- Vesicle: a small visible collection of fluid (≤ 0.5 cm in diameter)
- Bulla: a large visible collection of fluid (≥ 0.5 cm)
- Pustule: a visible accumulation of pus
- Ulcer: a loss of epidermis (often with loss of underlying dermis and subcutis as well)
- Weal: a circumscribed, elevated area of cutaneous oedema

Surface characteristics

- Scale: visible and palpable flakes due to aggregation and/or abnormalities of shed epidermal cells
- Crust: accumulated dried exudate, e.g. serum
- Horn: an elevated projection of keratin
- Excoriation: a secondary, superficial ulceration, due to scratching
- Maceration: an appearance of surface softening due to constant wetting
- Lichenification: a flat-topped thickening of the skin often secondary to scratching



nodule



cyst



bullae



macule



plaque



wheal



vesicle



pustule



Labial melanotic macule



Papule



Vesicle



Vesicle



Pustule



Bulla



Bullae



Pustule



Urticaria



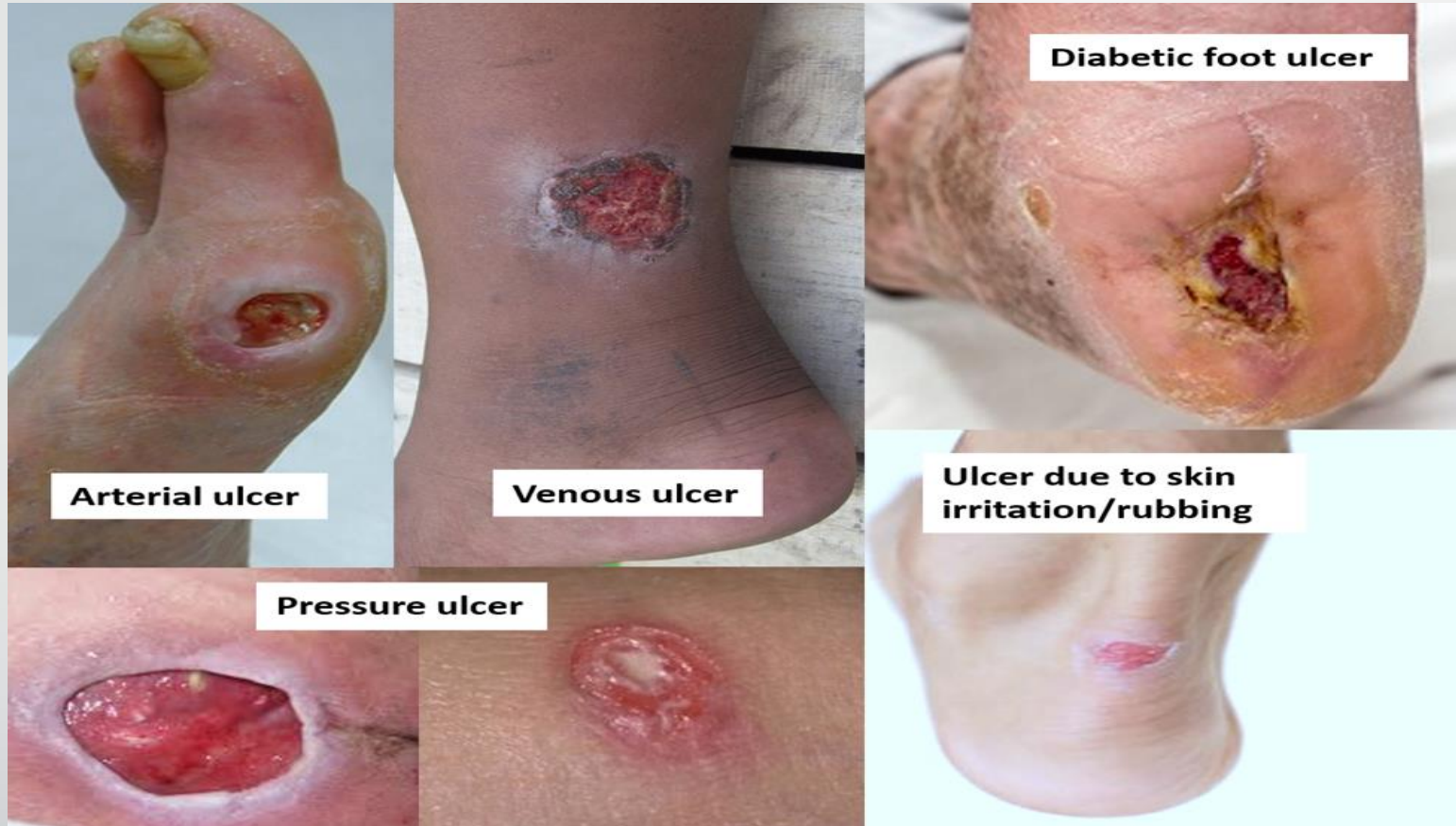
Psoriasis Plaque



Scales



Crust



Ulcer



Fissure



Keloid

Lesion Assessment

■ Mnemonic for Describing Lesions: S-C-A-L-D :

1. Size and shape.
2. Color and configuration.
3. Anatomical location.
4. Lesion type (primary/secondary).
5. Distribution and arrangement.

Nail and Hair Assessment

- **Nails:** Observe color, shape, thickness, and any deformities (clubbing, pitting, onycholysis).
- ✓ Nutrition deficiency : ex-iron- deficiency [spoon nails] , Zinc-deficiency [beau's line] .
- **Hair:** Assess distribution, density, texture, and any alopecia or hirsutism

Examination Aides /essential elements for the skin exam

- **Ruler** : Accurately records the size of a lesion on successive examination.
- **Gloves.**
- **Lighting.**
- **Magnifying glass.**
- **Wood's lamp .**

Examination Aides /essential elements for the skin exam

- **Dermatoscope.**
- **Penlight :**
 - ✓ Is used for slide lighting.
 - ✓ Detects atrophy & fine wrinkling.
 - ✓ Distinguishes flat from raised lesions whether lesions are solid or fluid filled.
- **Diascopy.**

Diagnostic Methods

- **Blood tests** :(systemic abnormality or genetic analysis).
- **Swabs and other samples:** for infections.
- **Skin scrapes or nail clippings:** microscopy and mycological culture.
- **Biopsies:** ex-for tumors.
- **Prick tests:** occasionally helpful in elucidating type I allergies .
- **Patch tests:** for evidence of contact allergy.

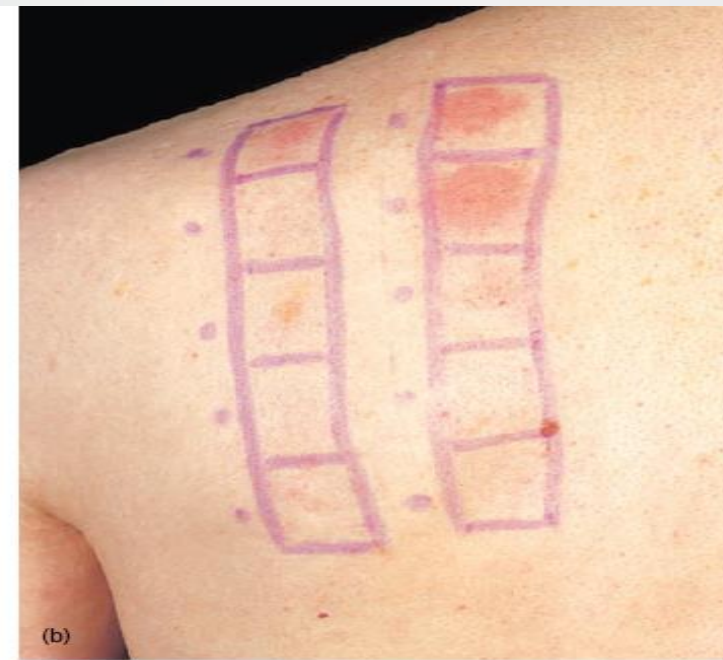
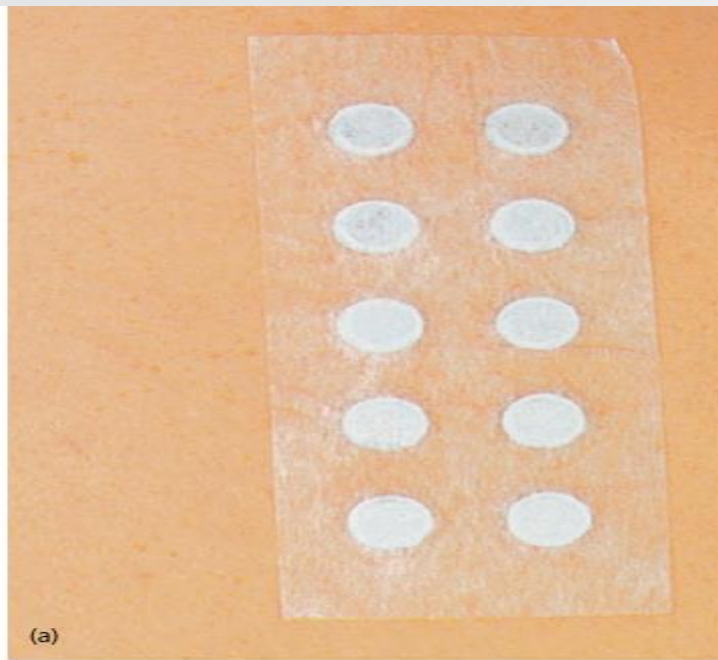


Figure 2.6 Patch testing: (a) metal cups containing allergens; (b) positive patch test reactions.

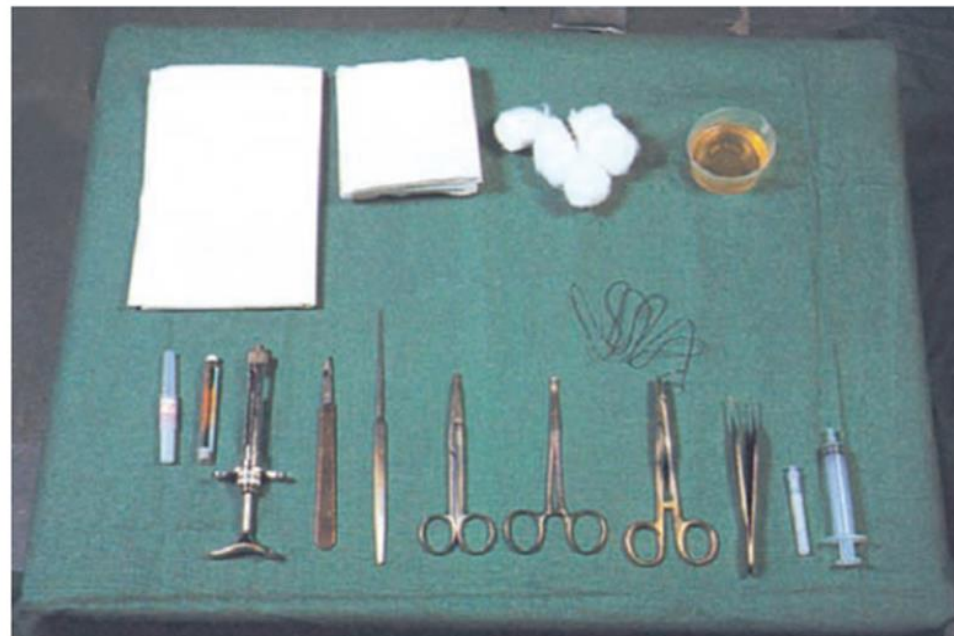


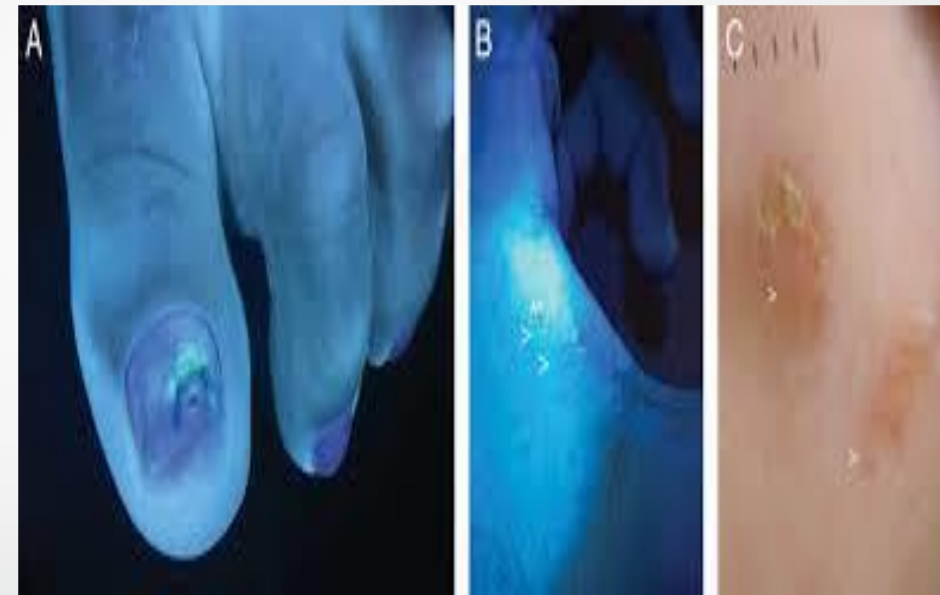
Figure 2.3 Equipment needed for an incisional/excisional biopsy: sterile towel; gauze squares; cotton-wool balls; galley pot containing antiseptic; needle; cartridge of lidocaine and dental syringe; scalpel; skin hook; scissors; small artery forceps; needle holder and suture; fine-toothed forceps; needle and syringe (alternative to dental syringe).

Wood's Lamp Examination

- A diagnostic test that uses long-wave ultraviolet (UV) light to observe the skin, hair, and scalp .
- Use to examine if a lesion is hypo or depigmented or to see if a fungal infection fluoresces , certain bacteria, fungi, and changes in pigmentation can cause the affected areas to fluoresce (glow) in distinct colors, which helps a healthcare provider diagnose various conditions, Uses ultraviolet (UV) light (365 nm wavelength).
- **Coral-red fluorescence:** *Corynebacterium minutissimum* (erythrasma).
- **Green fluorescence:** Microsporum infection.
- **Yellow fluorescence:** Tinea versicolor.



Wood's lamp

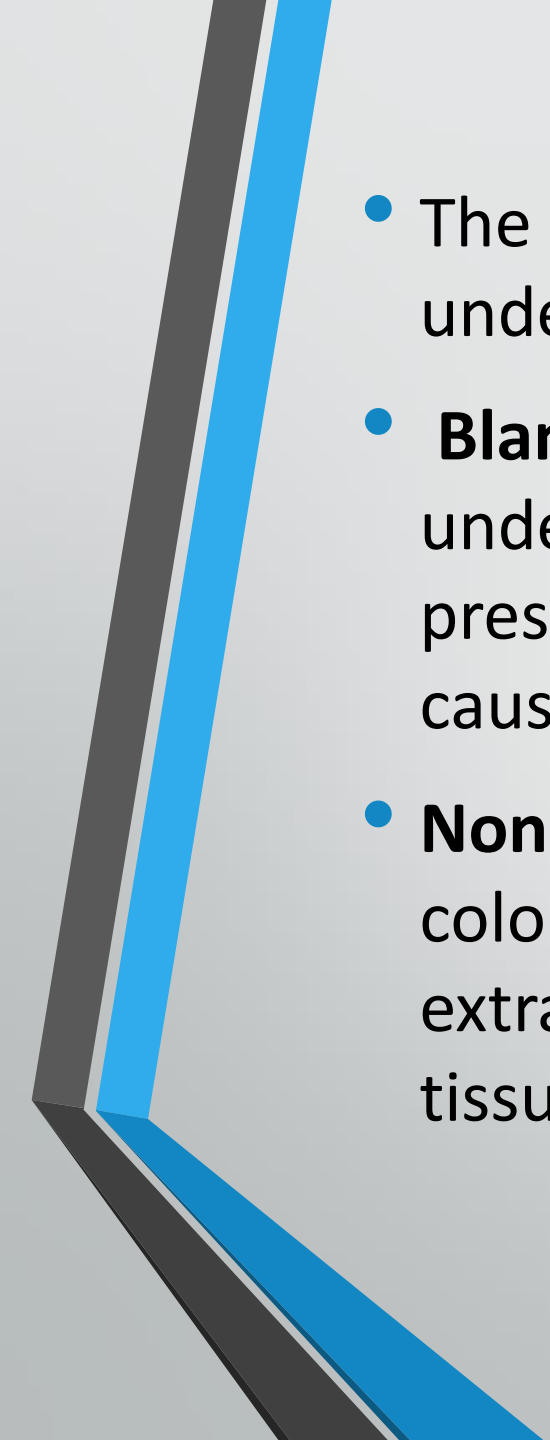


Fungal infection detection by woods lamp

Diascopy

- A glass slide is pressed against the skin to observe blanching.
- The diascopy test is a simple, non-invasive bedside procedure used to determine the cause of skin redness or discoloration.
- A healthcare provider presses a transparent object, such as a glass slide, against a skin lesion to see if it blanches (turns white).
- The result indicates whether the redness is caused by blood within vessels or from blood that has already bled into the surrounding tissue.



- 
- The principle of diascopy is based on the displacement of blood under pressure .
 - **Blanching (positive result):** If the lesion turns pale or white under pressure, it is caused by dilated blood vessels. When pressure is applied, the blood is pushed out of these vessels, causing the area to lose its red color temporarily.
 - **Non-blanching (negative result):** If the lesion's red or purple color persists under pressure, it indicates that blood has extravasated (leaked) from the vessels into the surrounding skin tissue.



Useful to differentiate erythema (blanchable) from purpura (non-blanchable)

Dermoscopy

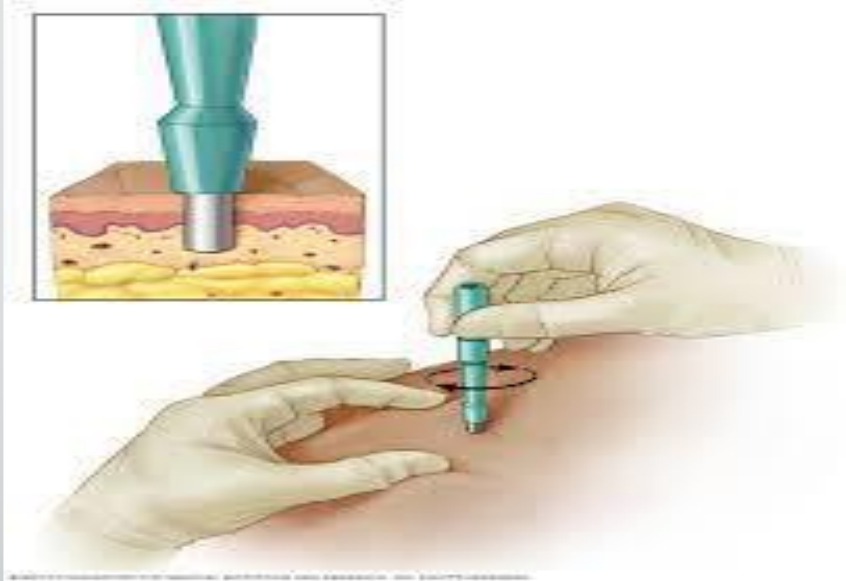
- A non-invasive skin imaging technique that uses a handheld instrument called a dermatoscope to examine skin lesions with higher magnification and clarity than the naked eye.
- It helps visualize subsurface skin structures in the epidermis, dermoepidermal junction, and upper dermis, allowing for improved diagnosis of both benign and malignant skin lesions, including melanoma and other skin cancers.
- Magnified examination using a dermatoscope to evaluate pigmented lesions and vascular structures and other skin diseases also differentiate benign nevi from melanoma.



Skin Scraping and Biopsy

- Used for microscopic evaluation in suspected fungal, bacterial, or parasitic infections.
- **Skin biopsy** : a procedure to remove a sample of skin tissue for microscopic examination by a pathologist to diagnose various skin conditions, including cancer, psoriasis, or autoimmune disorders. The type of biopsy (punch, shave, or excisional) depends on the lesion's size and location.





Skin Analyzer Machines

- Use advanced imaging, AI, and sensor technology to provide detailed assessments of skin health.
- They can measure surface and subsurface conditions, including UV damage, pigmentation, moisture levels, pores, and wrinkles.
- These devices are available for both professional and at-home use.



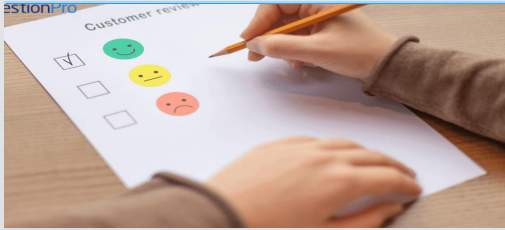
Task

(5 min)

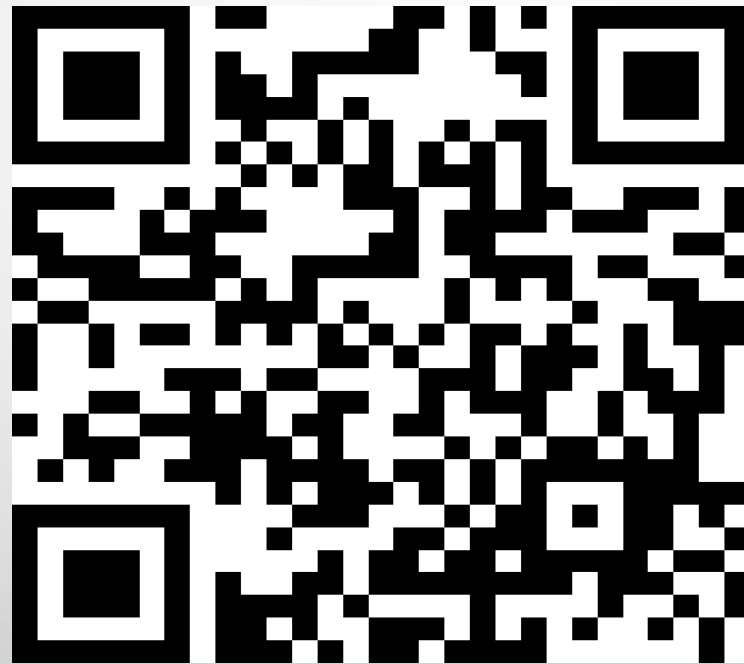
- Enumerate normal and abnormal skin findings ?

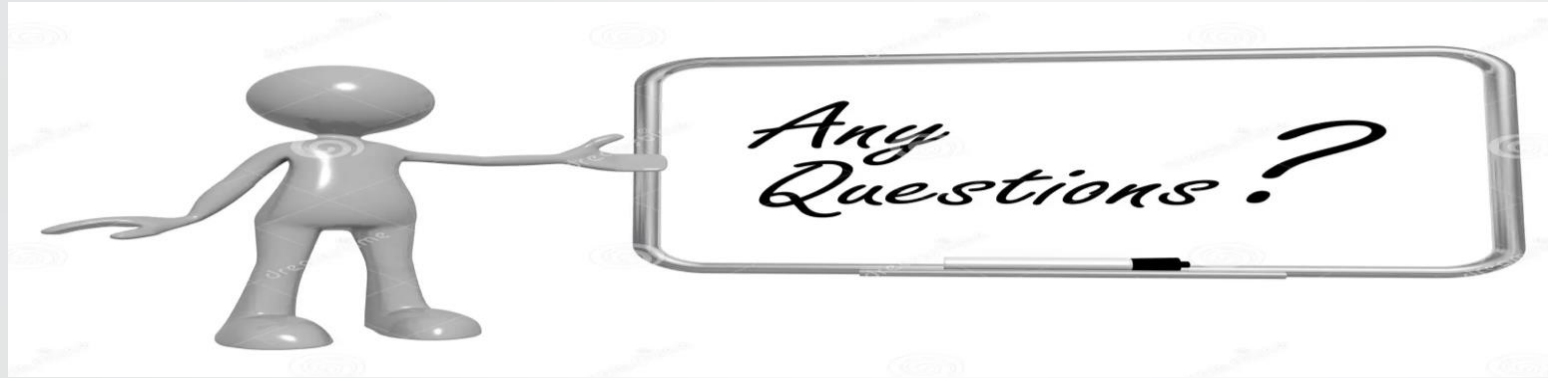
References

- Lecture Notes on Dermatology 10th edition 2011.
- Oxford Handbook of Medical Dermatology 2nd edition 2016.
- Bologna, J. L., Schaffer, J. V., & Cerroni, L. (2024). Dermatology (5th ed.). Elsevier.
- Habif, T. P. (2021). Clinical Dermatology: A Color Guide to Diagnosis and Therapy (7th ed.). Elsevier.
- Fitzpatrick, T. B. et al. (2020). Fitzpatrick's Dermatology in General Medicine (9th ed.). McGraw-Hill.
- Burns, T., Breathnach, S., Cox, N., & Griffiths, C. (2023). Rook's Textbook of Dermatology (10th ed.). Wiley-Blackwell.



Survey





hussein.rasheed@atu.edu.iq

@HusseinHamood



Thank you



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
كلية التقنيات الصحية والطبية / كوفة
قسم تقنيات التجميل والليزر



Acne , Pigmentation and Dryness

Table of contents

- **Acne Vulgaris.**
- **Disorders of pigmentation.**
 - Hyperpigmentation Disorders.
 - Hypopigmentation Disorders.
- **Dryness (Xeroderma,Xerosis).**

General Objectives

- **To know acne vulgaris and its psychological impact.**
- **To classify disorders of pigmentation.**
- **To define dryness and its main causes.**

Learning Objectives

- **By the end of this lecture student will be able to :**
 - **Define the Acne vulgaris.**
 - **Identify pathological factors .**
 - **Describe and identify morphology of different acne lesions .**
 - **Classify acne severity.**
 - **Formulate and implement an evidence –based treatment plan tailored to the patient .**

Learning Objectives

- Define hyper , hypo and de pigmentation .
- Enumerate the causes of hyper-hypo pigmentation.
- Employ diagnostic tools .
- Formulate evidence-based treatment regimens based on type and severity of pigmentary disorder.

Learning Objectives

- **Understand the causes and consequences of dryness.**
- **Identify regions prone to dryness.**
- **Recognize the clinical signs and underlying causes of various types of body dryness.**
- **Educate patients on lifestyle and medical intervention to manage and prevent dryness.**

Acne Vulgaris

- **Acne vulgaris** is a common **chronic inflammatory disease** of the **pilosebaceous unit**.
- characterized by appearance of comedones, papules, pustules, nodules, and sometimes cysts according to the severity of the condition.
- It predominantly affects **adolescents** but can persist into adulthood.
- Despite its benign nature, acne significantly impacts **psychosocial wellbeing** and **quality of life**.

The individual lesions of acne

- A **cardinal feature** is that there are **several different types** of lesion at **any one time**.
- Lesions of acne vary considerably over time, most patients noticing fluctuations in the number and severity of spots.

Acne vulgaris lesions

- Comedones:
 - closed ('whiteheads')
 - open ('blackheads')
- Papules
- Pustules
- Nodules
- Cysts
- Scars





Figure 6.1 This girl's face shows the typical greasy skin of the acne sufferer, in addition to papules and pustules.

Epidemiology

- Affects nearly **85% of adolescents** aged 12–24 years.
- It can affect all ages from age 1 day to old age but mostly in adolescent due to hormonal effects.
- Equal prevalence in both sexes, though males tend to have more severe disease.
- Often resolves by the mid-20s, but may persist adults, especially women.

Sites of Predilection

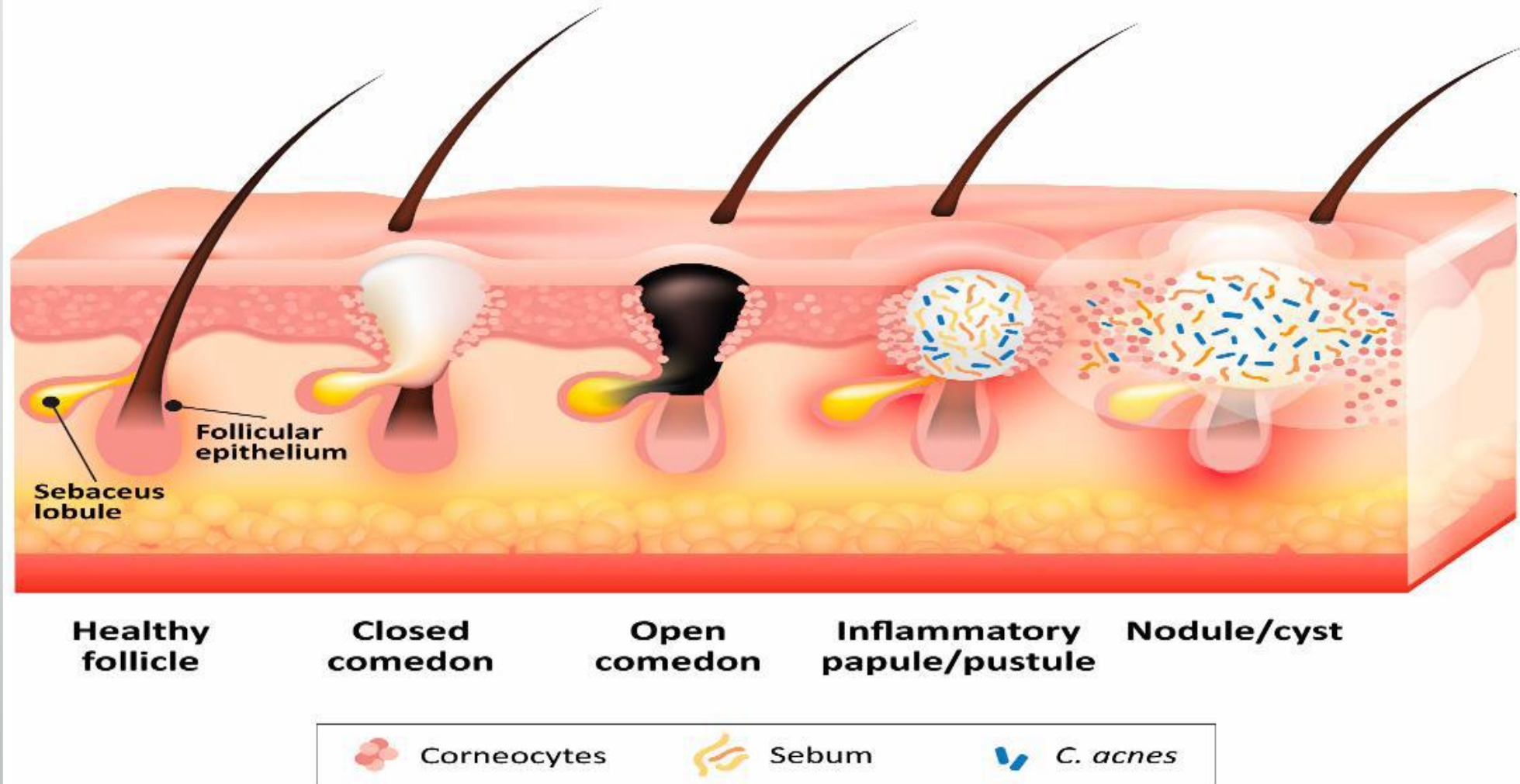
- **Acne has a characteristic distribution.**
 1. Face (99 %).
 2. Chest.
 3. Upper Back.
 4. Shoulders.

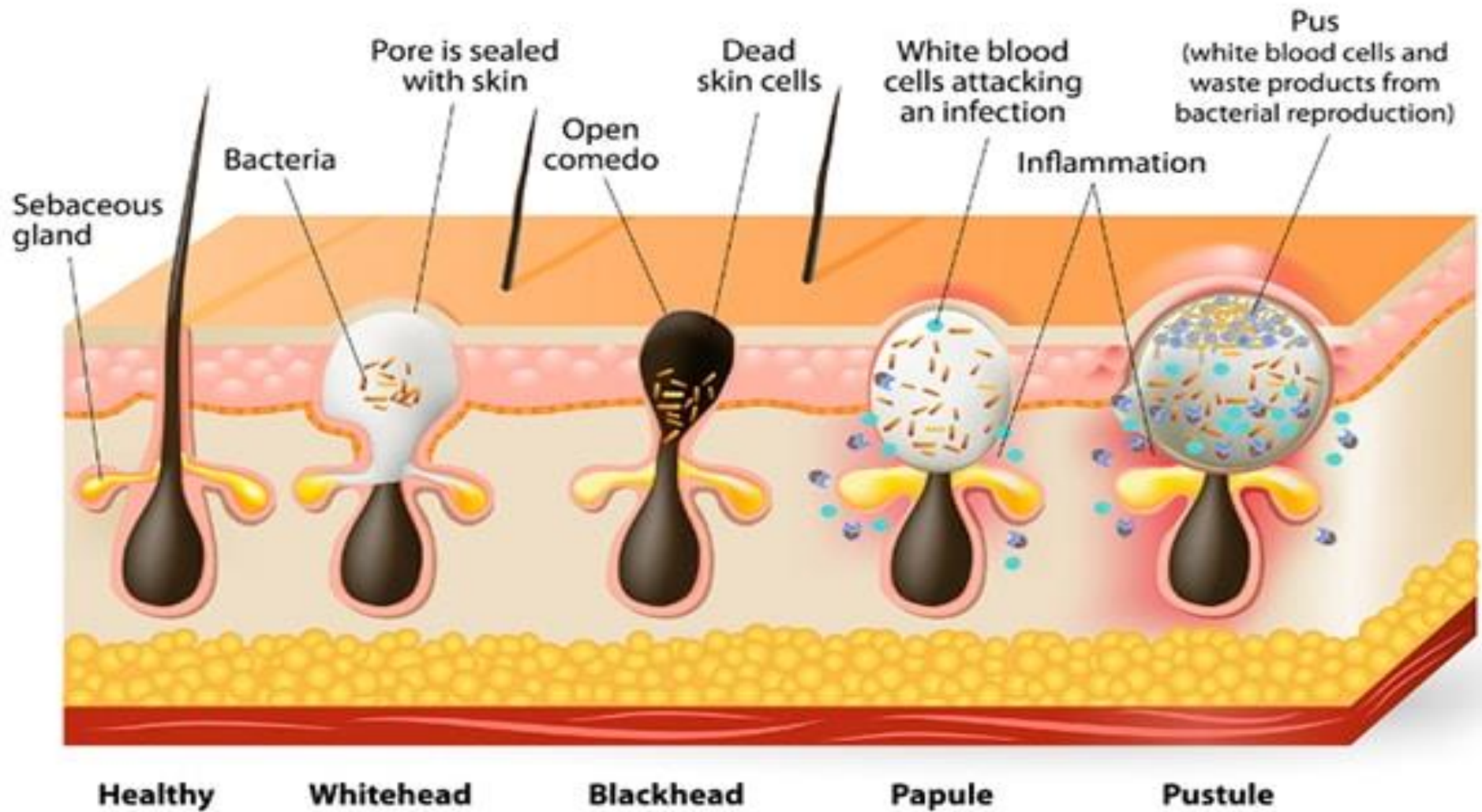


Pathophysiology

- Acne results from **multifactorial interactions** involving four key mechanisms:
 - **1. Increased Sebum Production:** Stimulated by **androgens** (especially dihydrotestosterone), sebaceous glands enlarge and overproduce sebum.
 - **2. Follicular Hyperkeratinization:** Abnormal desquamation leads to obstruction of the follicular canal, forming **microcomedones** (white or black) .
 - **3. Cutibacterium acnes (C. acnes) Proliferation:** This anaerobic bacterium colonizes sebum-rich follicles, producing inflammatory mediators and enzymes that degrade follicular walls.
 - **4. Inflammation:** Immune response bacterial antigens and ruptured follicle contents leads to papules, pustules, and nodules.

Pathogenesis of Acne vulgaris





Morphological Types

1. Non-inflammatory lesions:

- **Open comedones (blackheads):** dilated follicular openings filled with keratin and lipid; melanin oxidation gives black color.
- **Closed comedones (whiteheads):** small, skin-colored papules with closed follicular orifices.





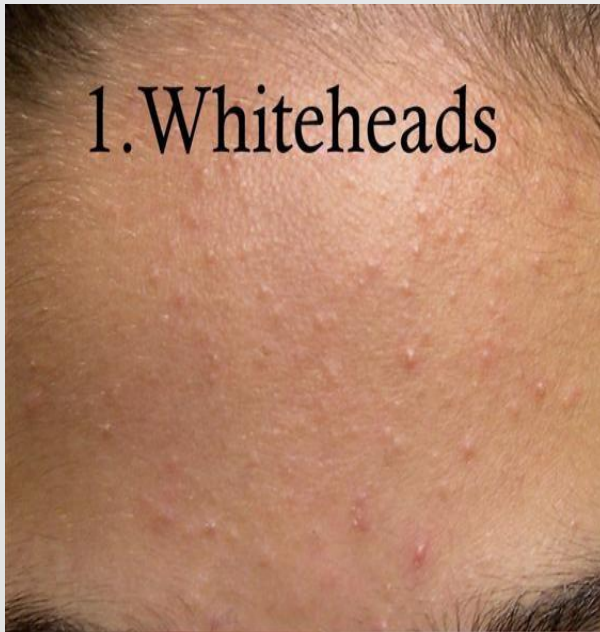
Morphological Types

2. Inflammatory lesions:

- With increasing severity, and as the inflammation extends deeper, the size of visible and palpable lesions increases, resulting in deep - seated nodules and cysts .
- **Papules:** small, erythematous, raised lesions.
- **Pustules:** papules containing visible purulent material.
- **Nodules:** large, painful, solid lesions extending into deeper dermis.
- **Cysts:** fluctuant, pus-filled lesions; may lead to scarring.



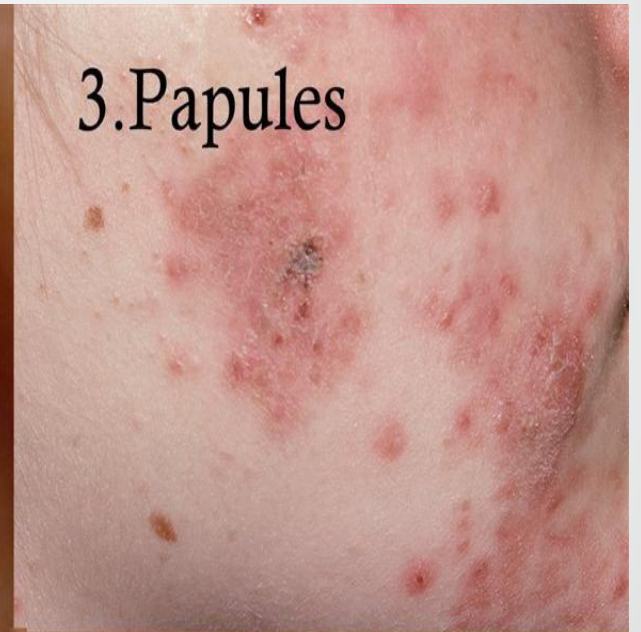
1. Whiteheads



2. Blackheads



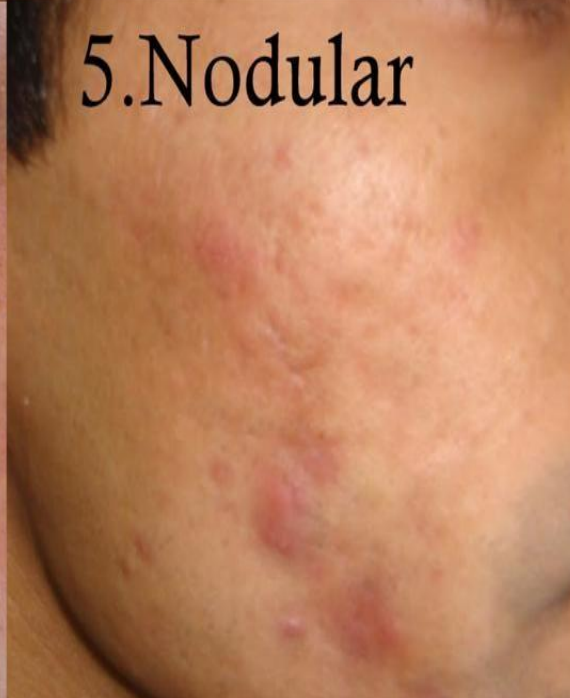
3. Papules



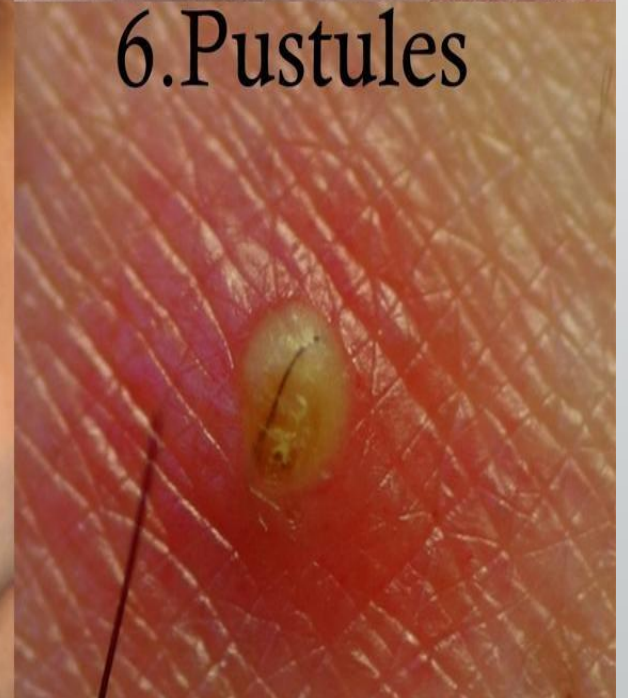
4. Cysts



5. Nodular



6. Pustules



Clinical Classification (Severity)

- **Mild:** Few comedones and papules, minimal inflammation.
- **Moderate:** Noticeable inflammatory papules and pustules, some nodules.
- **Severe:** Extensive inflammatory lesions, nodulocystic acne, scarring present.

Complications

1. **Post-inflammatory hyperpigmentation.**
2. **Scarring:** atrophic (ice pick, boxcar, rolling) or hypertrophic/keloidal.
3. **Psychological impact:** anxiety, depression, social withdrawal.

**Types of Acne Scars
treatable with Dermadart**



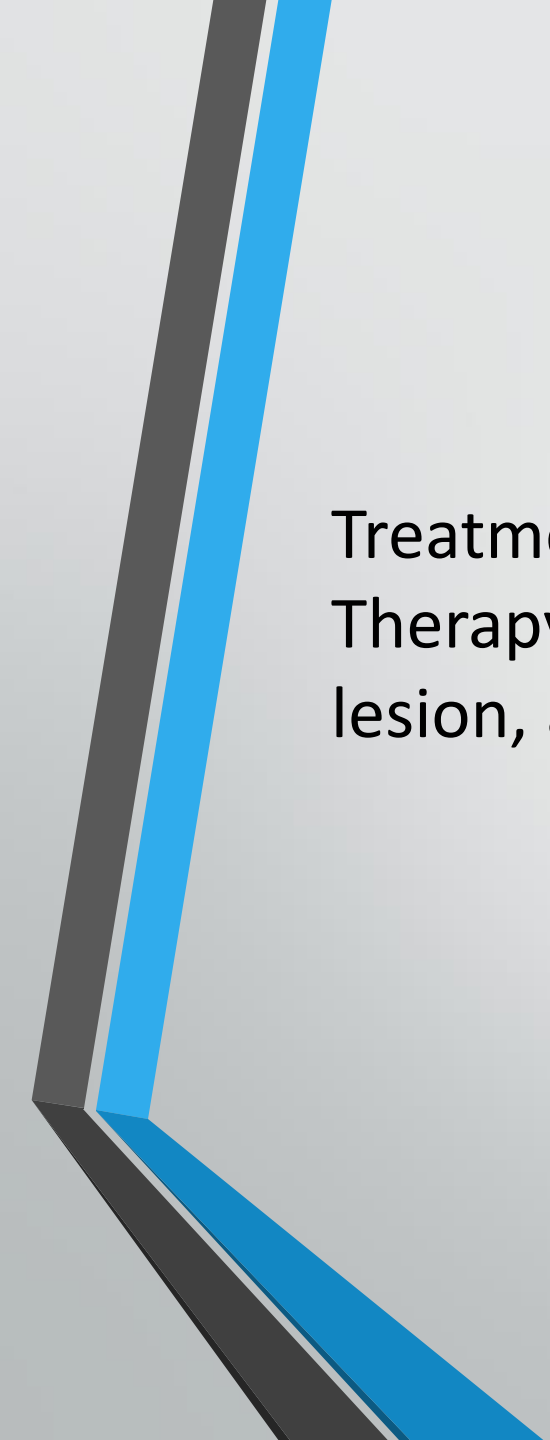
Rolling Scars



Ice-Pick Scars



Boxcar Scars



Treatment

Treatment is **multimodal**, targeting the key pathogenic factors. Therapy should be **individualized** according to severity, type of lesion, and patient tolerance.

Treatment

1. Topical Therapy (first-line for mild acne)

- **Retinoids:** (tretinoin, adapalene, tazarotene) normalize follicular keratinization, comedolytic.
- **Benzoyl peroxide:** antibacterial, comedolytic, reduces antibiotic resistance.
- start with a weaker preparation, applied once daily, and gradually progress to higher strengths.
- **Topical antibiotics:** clindamycin or erythromycin—should always be combined with benzoyl peroxide to prevent resistance.
- **Azelaic acid:** anti-inflammatory, useful for PIH.



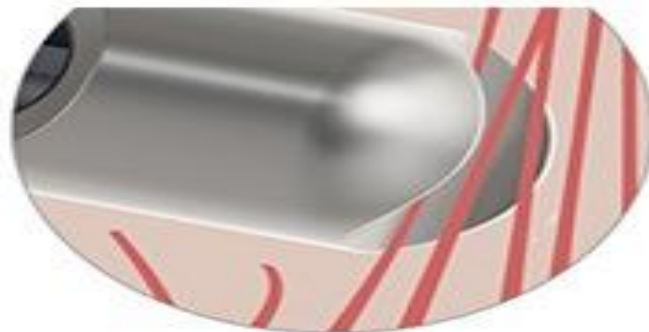
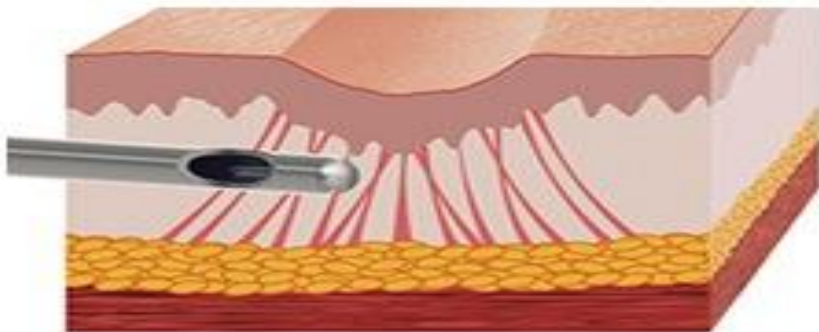
2. Systemic Therapy (for moderate to severe cases)

- **Oral antibiotics:** are the mainstay of the treatment of papulopustular acne .
 - They reduce bacterial counts, at least initially, but also have direct anti-inflammatory effects ex: doxycycline, minocycline, Azithromycin.
- **Hormonal therapy (in females):**
 - Combined oral contraceptives (COCs) reduce androgen activity.
 - Spironolactone (antiandrogenic effect).
- **Oral isotretinoin:** for severe nodulocystic or resistant acne; reduces sebum, normalizes keratinization, and exerts anti-inflammatory effects.
 - **Monitor:** liver function, lipids, pregnancy status (teratogenic).

3. Adjunctive Therapies

- **Chemical peels** (salicylic acid, glycolic acid).
- **Light and laser therapy.**
- **Intralesional corticosteroids** for nodules or keloids.
- **Acne surgical intervention .**
 - Simple measure such as a **comedone extractor** on multiple comedones, may improve the appearance.
 - Large, residual cysts may need to be **excised**.
 - **Scar management:** microneedling, laser resurfacing, subcision.

SUBCISION ACNE SCARS



Patient Education and Counseling

- Acne is **not due to poor hygiene or diet alone**.
- Encourage **gentle cleansing**, avoid harsh scrubbing.
- Use **non-comedogenic cosmetics**.
- Adherence is key—treatment effects may take **6–8 weeks** to appear.
- Discuss **side effects** and **teratogenic risks** of isotretinoin clearly.

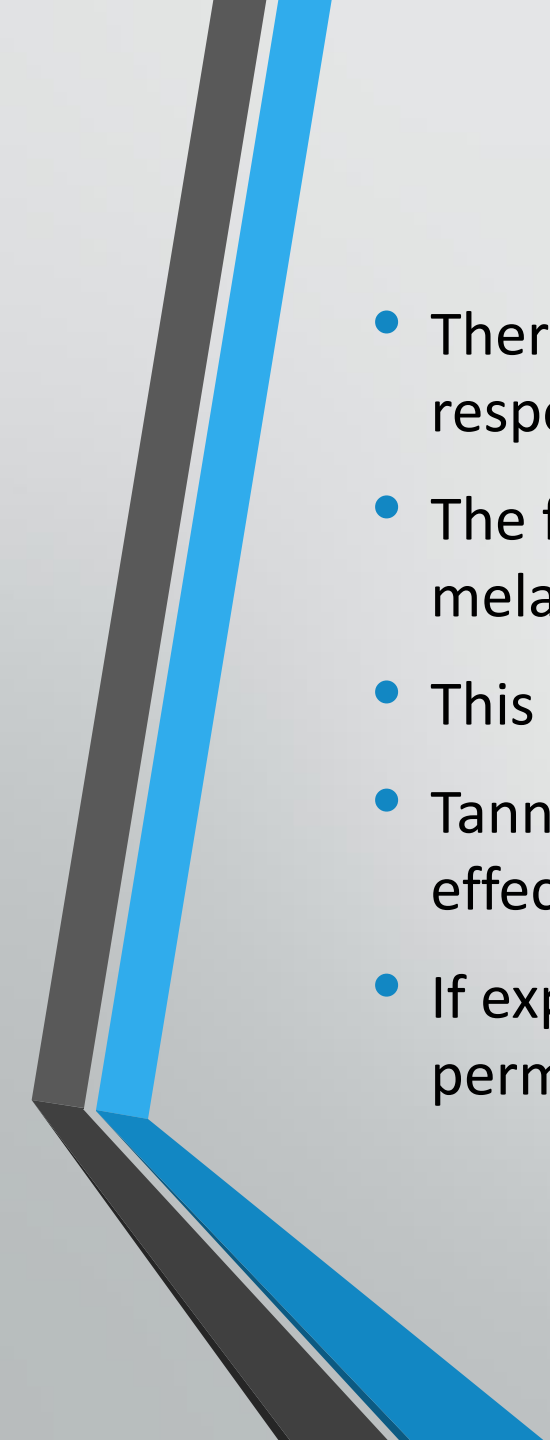
Disorders of pigmentation

Physiology of Pigmentation

- Skin color is determined by a complex interaction between:
 1. **Melanin** (the primary pigment).
 2. **Hemoglobin** (oxy- and deoxy-hemoglobin).
 3. **Carotene**.

Physiology of Pigmentation

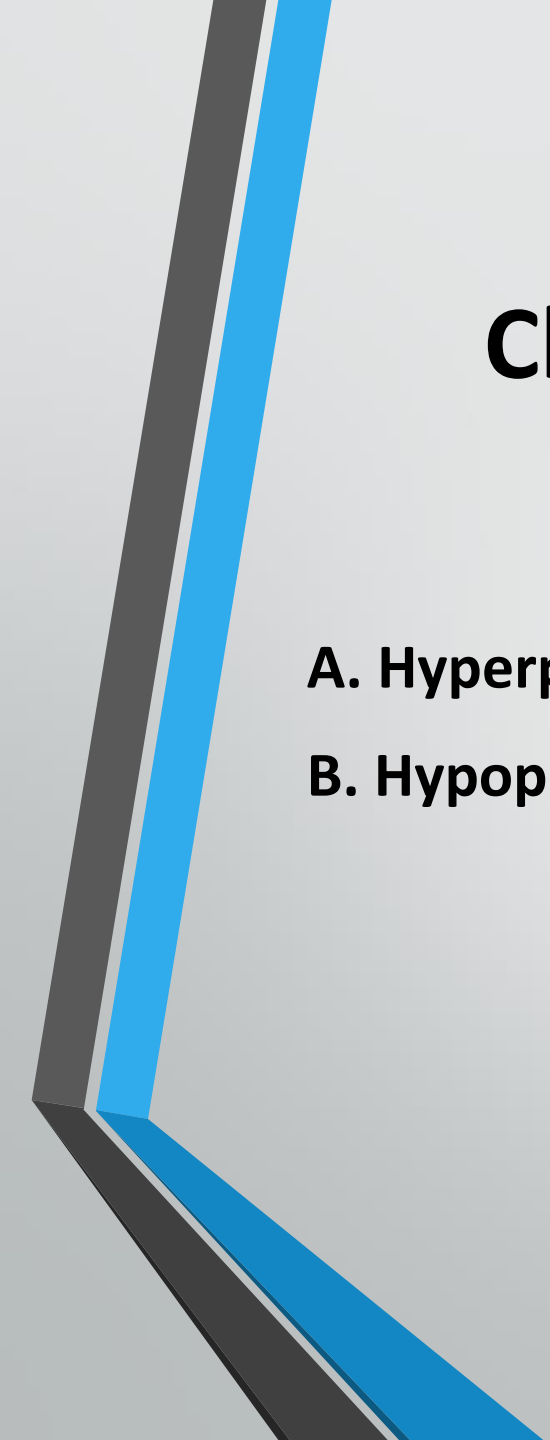
- The main determinant of pigmentation variation among individuals and ethnicities is **melanin**, produced by **melanocytes** located in the basal layer of the epidermis.
- Each melanocyte is associated with a group of keratinocytes (the **epidermal melanin unit**).
- Melanin is synthesized in **melanosomes** from **tyrosine** via the enzyme **tyrosinase**.
- There are racial differences in production, distribution and degradation of melanosomes, but not in the number of melanocytes.

- 
- There are, however, important genetic differences, reflected in the response to ultraviolet (UV) radiation, conventionally called skin types.
 - The first response to UV radiation is an increased distribution of melanosomes.
 - This rapidly increases basal layer pigmentation — the ‘sun tan’ .
 - Tanning represents the skin ’ s efforts to offer protection from the harmful effects of UV radiation, such as premature ageing and cancers.
 - If exposure is more prolonged, melanin production is stepped up more permanently.



Disorders arise from:

- 1. Altered melanocyte number.**
- 2. Abnormal melanin production.**
- 3. Defective melanosome transfer.**
- 4. Post-inflammatory changes.**



Classification of Pigmentation Disorders

- A. Hyperpigmentation Disorders** – excess melanin or increased melanocytes.
- B. Hypopigmentation Disorders** – reduced melanin, melanocytes, or function.



Hyperpigmentation Disorders

Hyperpigmentation

- There are many causes of increased skin pigmentation,
- including excessive production of melanin, and the deposition in the skin of several other pigments, such as β - carotene, bilirubin, drugs and metals.

A. Melasma

- **Etiology:** Chronic acquired hyper melanosis, primarily of sun-exposed areas (face). Influenced by ultraviolet (UV) radiation, hormonal factors (pregnancy, oral contraceptives), and genetic predisposition.
- **Clinical features:** more common in women , Symmetrical brown macules on cheeks, forehead, upper lip, or chin.
- **Histopathology:** Increased melanin in epidermis and/or dermis.
- **Management:**
 1. Photoprotection (broad-spectrum sunscreen).
 2. Topical depigmenting agents (hydroquinone, azelaic acid, tretinoin).
 3. Chemical peels or laser therapy (in resistant cases).



MELASMA

Skin Condition
(hyperpigmentation)

Sun exposure

Medications

Genetics

Hormones

Pregnancy

Blue light
(electronic
devices, etc.)



B. Post-Inflammatory Hyperpigmentation

- **Etiology:** Follows any inflammatory or traumatic skin condition (acne, eczema, burns).
- **Pathogenesis:** Overproduction or irregular distribution of melanin due to cytokine-mediated stimulation of melanocytes.
- **Clinical features:** Irregular brown or gray macules at sites of previous inflammation.
- **Management:**
 1. Treat the underlying cause
 2. Topical lightening agents
 3. Sun protection



C. Lentigines

- **Simple lentigo:** Benign melanocytic hyperplasia not related to sun exposure.
- **Solar lentigo:** “Liver spots” or “age spots” related to chronic UV exposure.
- **Histopathology:** Elongation of rete ridges and increased basal melanocytes.
- **Management:** Cryotherapy, laser therapy, or chemical peels



Hyperpigmentation is an important physical sign in **several systemic diseases**:

- 1. Addison's disease:** the changes are most marked in skin creases, scratch marks and the gums.
- 2. Renal failure.**
- 3. Haemochromatosis.**
- 4. Some chronic liver diseases,** e.g. primary biliary cirrhosis



Hypopigmentation Disorders

A. Congenital

- Some individuals are born with generalized or localized defects in pigmentation.
- **Albinism and phenylketonuria** are due to genetic defects in melanin production.
- In albinos, the enzyme tyrosinase may be absent (tyrosinase negative), leading to generalized white skin and hair, and red eyes (the iris is also depigmented). Vision is usually markedly impaired, with nystagmus.

B. Vitiligo

- **Definition:** Acquired depigmentation disorder due to loss of functional melanocytes or absent of melanocytes.
- **Pathogenesis:** Autoimmune destruction of melanocytes; associated with thyroid disease, diabetes mellitus, and pernicious anemia.
- **Clinical features:** Well-demarcated depigmented macules and patches, Although vitiligo can occur anywhere, it is often strikingly symmetrical, involving the hands, and perioral and periocular skin.
- **Histopathology:** Absence of melanocytes in affected skin.

Management of vitiligo

Treatment is generally unsatisfactory.

- Topical corticosteroids or calcineurin inhibitors (early stages).
- Phototherapy (NB-UVB, PUVA), psoralen can be successful.
- Surgical melanocyte transplantation (stable disease)
- Sunscreens should be used in the summer, because vitiliginous areas will not tan and will burn easily.



B. Pityriasis Alba

- very common cause of hypopigmentation in children, especially in darker skins ,clear at puberty.
- Mildly hypopigmented scaly patches on the face or upper arms, often following eczema.
- **Management:** Emollients and low-potency topical steroids



C. Post-Inflammatory Hypopigmentation

- Follows skin injury or inflammation; due to disturbances in epidermal integrity and melanin production ---temporary melanocyte suppression.
- Both eczema and psoriasis often leave temporary hypopigmentation when they resolve.
- **Treatment:** Time, sun protection, and control of primary cause.

Diagnostic Tools

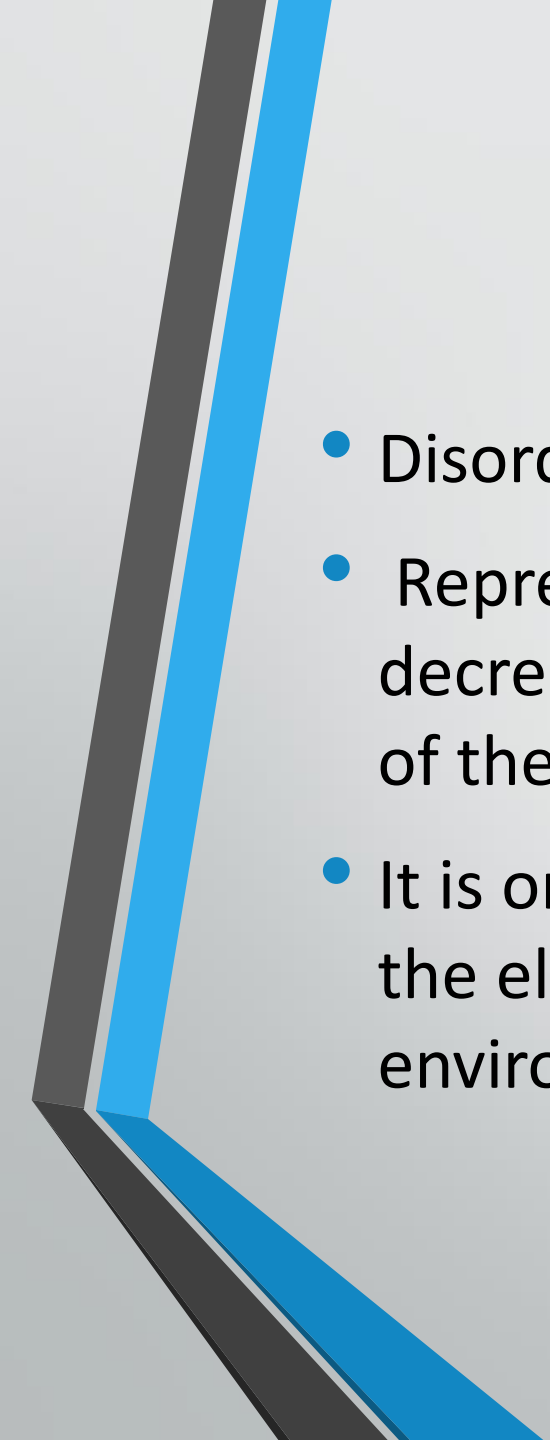
- **Wood's Lamp Examination:** Differentiates epidermal (enhanced contrast) vs. dermal pigmentation.
- **Dermoscopy:** Visualizes pigment network and patterns.
- **Biopsy and Histopathology:** To assess melanocyte number and distribution

Management Principles

1. Identify the underlying cause.
2. **Sun protection:** cornerstone for all pigmentary disorders.
3. **Topical agents:** hydroquinone, retinoids, azelaic acid, corticosteroids, calcineurin inhibitors. For hyperpigmentation and melisma.
4. **Systemic agents:** corticosteroids, phototherapy, immunomodulators (for autoimmune cases).
5. **Cosmetic camouflage and psychological support** for chronic disorders like vitiligo or melasma.



Disorders of Dryness (Xerosis and Related Conditions)

- 
- Disorders of dryness, collectively referred to as **xerotic disorders**.
 - Represent a spectrum of skin conditions characterized by decreased hydration of the stratum corneum, the outermost layer of the epidermis.
 - It is one of the most common dermatologic findings, especially in the elderly, patients with systemic disease, and those exposed to environmental stressors.



Normal Skin Hydration Physiology

- The skin barrier is primarily maintained by the **stratum corneum**, which contains:
 - I. **Corneocytes** embedded in a lipid matrix (ceramides, cholesterol, and free fatty acids).
 - II. **Natural Moisturizing Factors (NMFs)**—mainly amino acids, urea, and lactic acid.
 - III. **Sebum** and **sweat** contribute to surface moisture.
- Optimal hydration depends on the **integrity of the lipid barrier** and **environmental humidity**. Disruption of either leads to transepidermal water loss (TEWL) and xerosis.

Etiology and Pathogenesis

A. Environmental Causes

- Low humidity and cold climates.
- Frequent washing with harsh soaps or detergents .
- Hot water bathing.
- Exposure to wind or sunlight.

B. Physiological Causes

- **Aging (senile xerosis):** Sebum and sweat gland activity decline, and the epidermal lipid synthesis decreases.
- **Dehydration:** Reduced systemic water intake or fluid loss.

C. Pathological Causes

○ Systemic diseases:

- **Hypothyroidism** – reduced sweat gland activity.
- **Diabetes mellitus** – autonomic neuropathy and impaired sebaceous function.
- **Chronic renal failure** – reduced sweat and sebaceous secretion.
- **Malnutrition** – deficiencies in essential fatty acids, zinc, or vitamin A.

○ Dermatologic diseases:

- **Atopic dermatitis** (barrier dysfunction).
- **Ichthyosis vulgaris** (filaggrin gene mutation).
- **Psoriasis** and **contact dermatitis** may show secondary dryness.

○ Drug-induced xerosis:

- **Retinoids, diuretics, statins, anticholinergics, and chemotherapeutic agents.**



Clinical Features

- **Symptoms:** Dryness, roughness, scaling, itching (one of the most common symptoms), tightness, or burning.
- **Signs:**
 1. Fine white or grayish scales.
 2. Cracking or fissuring, especially on shins, hands, and forearms.
 3. “Fish scale” appearance in severe xerosis (ichthyosis-like).
 4. Secondary **eczema craquelé** — a cracked porcelain-like dermatitis.
- **Commonly affected sites:** lower legs, arms, flanks, and hands.

Diagnosis

- Diagnosis is mainly **clinical**, based on history and examination.
- **Investigations** may be done for underlying systemic causes:
 - I. Thyroid function tests
 - II. Blood glucose
 - III. Renal and liver function tests
 - IV. Nutritional assessment

Differential Diagnosis

- Ichthyosis vulgaris.
- Atopic dermatitis
- Contact dermatitis.
- Psoriasis.
- Seborrheic dermatitis.

Management

A. General Measures

- I. Avoid hot water and prolonged bathing.
- II. Use mild, fragrance-free **cleansers** (syndets).
- III. Pat skin dry rather than rubbing.
- IV. Maintain indoor **humidity** and adequate **hydration**.

B. Pharmacologic and Topical Therapy

1. Moisturizers (Emollients):

- Contain **occlusives** (petrolatum, mineral oil), **humectants** (glycerin, urea, hyaluronic acid), and **emollients** (fatty alcohols, silicones).
- Apply immediately after bathing to lock in moisture.

2. Keratolytics (for thick scales):

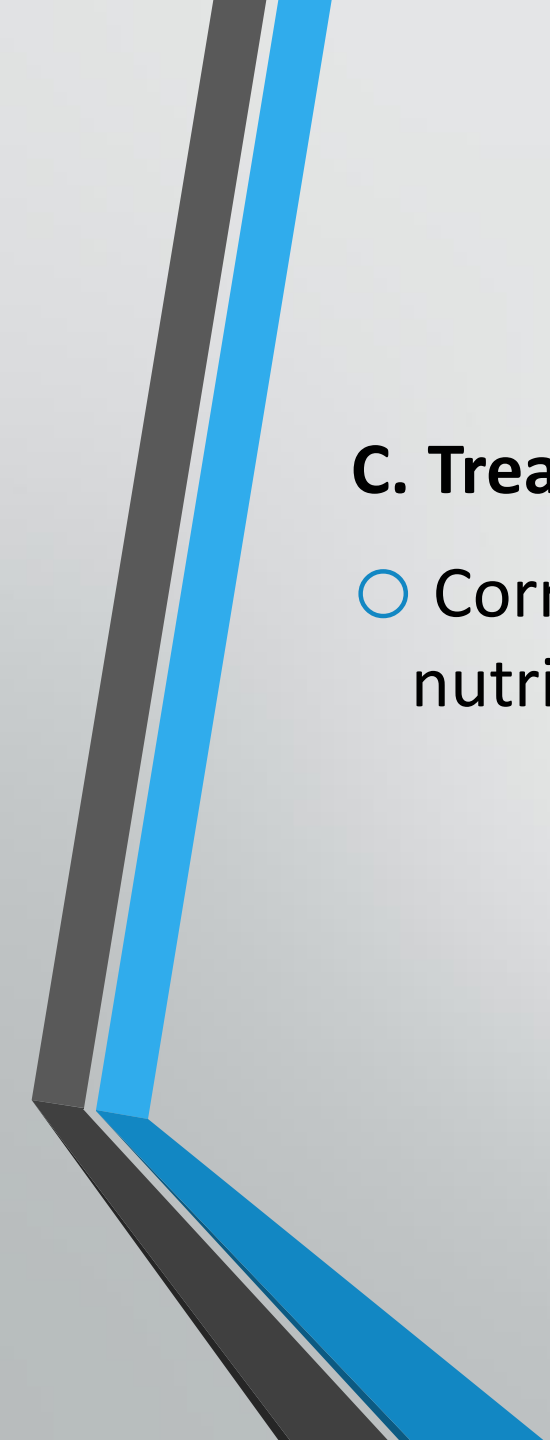
- Urea (5–20%), lactic acid (5–12%), or salicylic acid (2–6%).

3. Topical anti-inflammatory agents:

- Low-potency corticosteroids if secondary eczema is present.

4. Systemic therapy:

- Rarely required; in refractory cases with pruritus, oral antihistamines may help.



C. Treat Underlying Cause

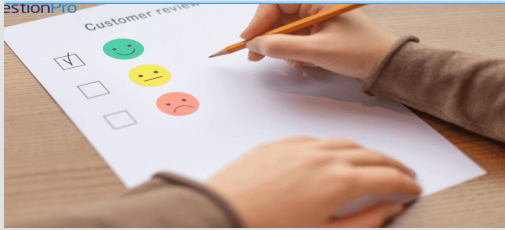
- Correct hypothyroidism, manage diabetes, ensure adequate nutrition

Prevention

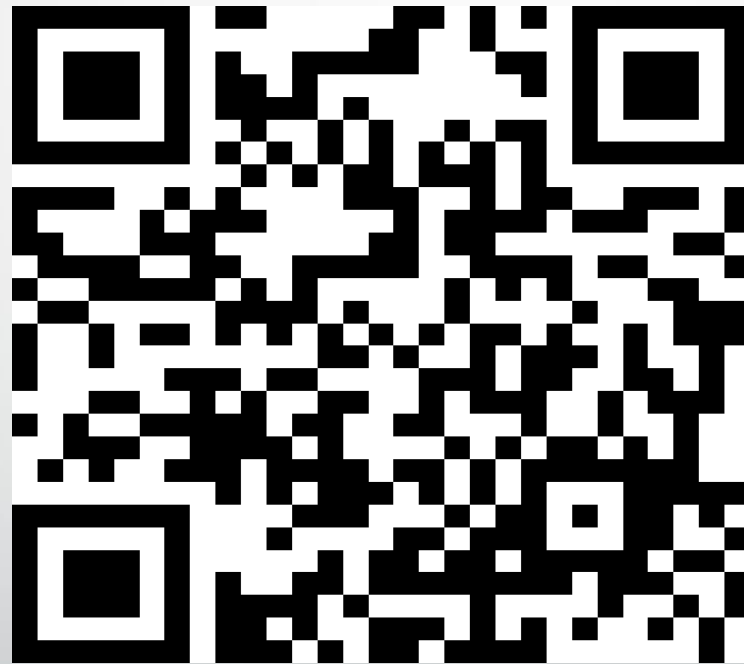
- Use of lipid-rich, non-alkaline cleansers.
- Daily use of moisturizers.
- Avoidance of environmental extremes.
- Education on **barrier maintenance**—especially in elderly and atopic patients.

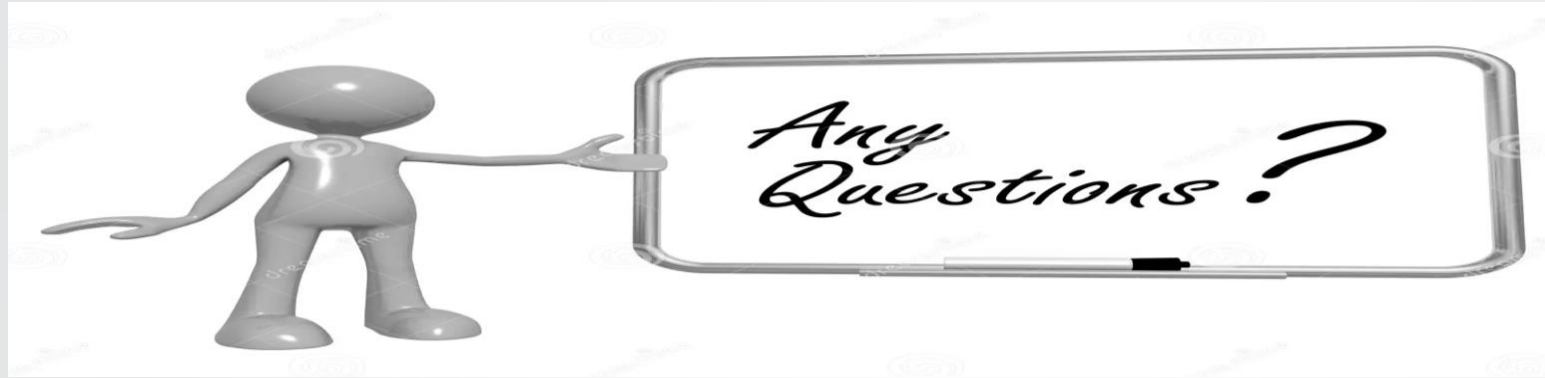
References

- Bologna, J. L., Schaffer, J. V., & Cerroni, L. (2024). *Dermatology* (5th ed.). Elsevier.
- Habif, T. P. (2022). *Clinical Dermatology: A Color Guide to Diagnosis and Therapy* (7th ed.). Elsevier.
- Loden, M., & Maibach, H. I. (2019). *Treatment of Dry Skin Syndrome: The Art and Science of Moisturizers* (2nd ed.). Springer.
- Ghadially, R. (2012). "Dry skin in the elderly: Complexities of barrier repair." *Dermato-Endocrinology*, 4(3): 265–270.
- *Lecture Notes on Dermatology* 10th edition 2011.
- *Oxford Handbook of Medical Dermatology* 2nd edition 2016.



Survey





hussein.rasheed@atu.edu.iq

@HusseinHamood



Thank you



جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة الفرات الاوسط التقنية
كلية التقنيات الصحية والطبية / كوفة
قسم تقنيات التجميل والليزر



Active Ingredients in Skin Care Products

Active and Inactive Ingredients

- **Active ingredients** are the components in a cosmetic formulation that produce a biological effect or a targeted benefit on the skin.
- For example, retinol stimulates collagen production to reduce wrinkles, while salicylic acid exfoliates the skin and treats acne.
- Active ingredient have defined mechanisms of action, measurable effects, and often must be used within specific concentrations to maintain both efficacy and safety.

Active and Inactive Ingredients

- **Inactive ingredients**, on the other hand, do not directly cause biological changes in the skin. Instead, they support the function, texture, stability, or delivery of the active ingredients.
- Examples include emollients, preservatives, emulsifiers, thickeners, and solvents.
- For instance, water acts as a solvent, glycerin as a humectant, and preservatives prevent microbial growth.

Role of Active Ingredients in Skin Care Formulations

- Targeting specific skin concerns.
- Modulating cellular and biochemical processes.
- Improving skin barrier function.
- Enhancing long-term skin health.
- The effectiveness of active ingredients depends on **several factors, including their molecular size, concentration, formulation type, skin penetration ability, and PH environment.**



Classification of Active Ingredients in Skin Care Products

1. Moisturizing Agents

A- Humectants

Prototypes: Glycerin, Hyaluronic Acid (HA), Propylene Glycol, urea and sorbitol.

Hyaluronic Acid

Mechanism of Action

1. Water Retention (Humectant Effect):

- HA can bind up to 1,000 times its own weight in water.
- When applied topically, it draws moisture from the environment and from the deeper skin layers (the dermis) into the outer layer (the stratum corneum).
- This plumps the skin and smooths fine lines.

2.Barrier Function Support:

- By maintaining hydration, HA helps stabilize the skin's lipid barrier.
- A strong barrier reduces transepidermal water loss (TEWL), keeping the skin supple and protected from irritants and pollutants.

3.Cell Signaling and Repair:

- On a cellular level, HA interacts with receptors like CD44 and RHAMM, which influence cell proliferation, migration, and wound healing.
- This is why it's also used in regenerative dermatology and after aesthetic procedures

4.Molecular Weight Matters:

- High-molecular-weight HA stays on the surface, forming a hydrating film.
- Low-molecular-weight HA can penetrate deeper, improving long-term hydration and stimulating repair mechanisms.
- Very low-molecular-weight HA may even modulate inflammation and improve skin elasticity.

Uses in Skin Care

- 1. Moisturizers and Serums:** HA is a cornerstone of hydrating formulas. It gives instant plumping and softness, often paired with ceramides or glycerin for synergistic hydration.
- 2. Anti-aging Products:** Because hydrated skin looks firmer and smoother, HA reduces the appearance of wrinkles. It's often combined with retinoids or peptides to enhance firmness and repair.
- 3. Post-procedure Care:** After chemical peels, laser therapy, or microneedling, HA-based gels help speed recovery and minimize irritation.
- 4. Injectable Fillers:** In dermatology and aesthetic medicine, *cross-linked HA* is used as a dermal filler to restore volume in areas like lips, cheeks, and nasolabial folds. The same water-retaining principle provides structural lift.
- 5. Sheet Masks and Eye Gels:** These rely on HA's film-forming and moisture-locking properties for temporary plumping and soothing effects.

Hyaluronic Acid 2% + B5

Before



After



Skin Hydration



Wrinkles



Sun Burn



HYALURONIC ACID



B-Occlusive

1. Hydrocarbons (Petrolatum (Vaseline)), Mineral Oil, Paraffin)

- Extremely effective, inert, and non-irritating. Petrolatum can reduce TEWL by up to 99%. Often used in healing ointments and for very dry, cracked skin. Can feel very greasy.

2. Silicones (Dimethicone, Cyclomethicone, Amodimethicone)

- Provide a smooth, silky feel, are non-greasy, and often non-comedogenic. They fill in fine lines and pores, creating a smooth canvas. Common in primers, serums, and moisturizers for normal/oily skin.

3.Plant Oils & Butters (Jojoba Oil, Shea Butter, Cocoa Butter, Squalane)

- Natural & Multi-functional.
- Provide occlusive benefits along with emolliency and sometimes even nourishing fatty acids. Heavier butters (like shea) are more occlusive than lighter oils (like rosehip). Popular in "clean" beauty products.

4.Lanolin & Derivatives Lanolin, Lanolin Alcohol

- Derived from Sheep's Wool.
- An excellent, potent occlusive similar to human sebum.
- Highly effective but a potential allergen for some. Often used in nipple creams and medical-grade skin protectants.





Uses and Benefits of occlusives

1. Treating Dry & Dehydrated Skin:

This is the primary use. Occlusives are essential for restoring the skin's barrier and preventing moisture loss in conditions like xerosis (extremely dry skin).

2. Managing Skin Conditions:

Eczema & Psoriasis: They are a cornerstone of treatment, helping to protect the compromised skin barrier, reduce itching, and prevent flare-ups. o Dermatitis: Used to protect skin from irritants (like in diaper rash creams).

3. Healing Wounds & Cracks:

By creating a moist wound-healing environment, occlusives like petrolatum accelerate the repair of minor cuts, scrapes, and cracked heels.

Uses and Benefits of occlusives

4. Enhancing the Efficacy of Other Products (The "Slugging" Method):

Applying a thin layer of a pure occlusive (like petrolatum) as the last step of a nighttime routine over serums and moisturizers. This "slugs" everything in, maximizing hydration and the penetration of active ingredients.

5. Preventing Irritation from Actives:

Using an occlusive around the eyes, nostrils, and mouth can create a protective barrier to prevent irritation from potent ingredients like retinoids or chemical exfoliants (a technique called "buffer framing").

6. Improving Skin Texture & Feel:

Silicones, in particular, provide an immediate smoothing effect, making skin feel soft and look more refined. This is why they are ubiquitous in primers.

Important Considerations

1. Not for Everyone:

- Occlusives can be too heavy for very oily or acne-prone skin and may lead to clogged pores and breakouts.
- It's crucial to choose non-comedogenic options (like squalane or dimethicone) if you are prone to acne.

2. Layering is Key:

For best results, apply them as the final step in routine: Cleanser -> Toner/Essence -> Humectants (serums) -> Emollients (light moisturizers) -> Occlusives (heavy cream/ointment).

3. They Don't Moisturize:

Remember, they only prevent water loss. They do not add water to the skin. Always pair them with hydrating (humectant) products.

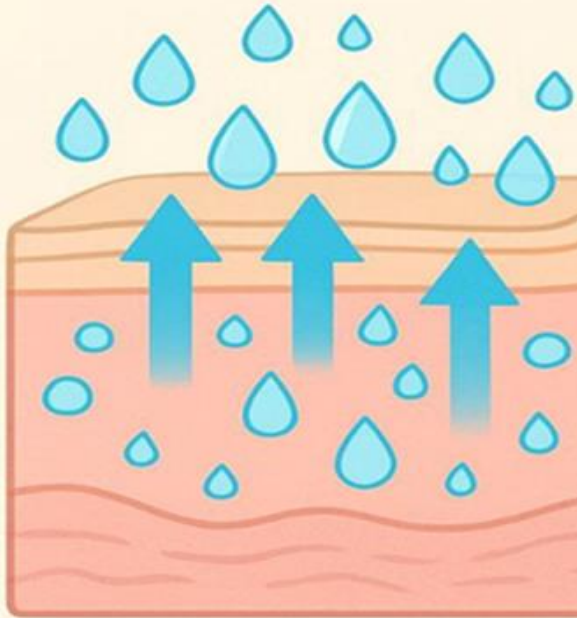
C- Barrier lipids and Emollients

- **Prototypes:** Ceramides, Cholesterol, Fatty Acids (e.g., Linoleic Acid).
- **Mechanism of Action:** These are the fundamental building blocks of the skin's lipid matrix. They fill the spaces between corneocytes, restoring the "brick and mortar" structure of the skin barrier. This prevents Transepidermal Water Loss (TEWL).
- **Clinical Application:** Essential in treating conditions like atopic dermatitis, xerosis, and a compromised skin barrier.



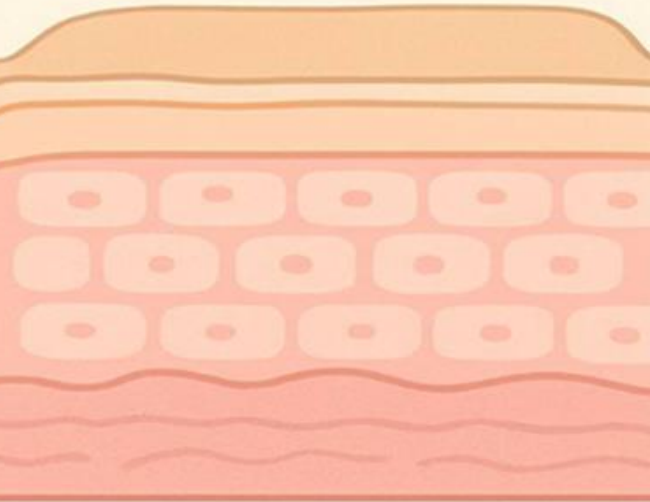
Humectants

Attract water
to skin



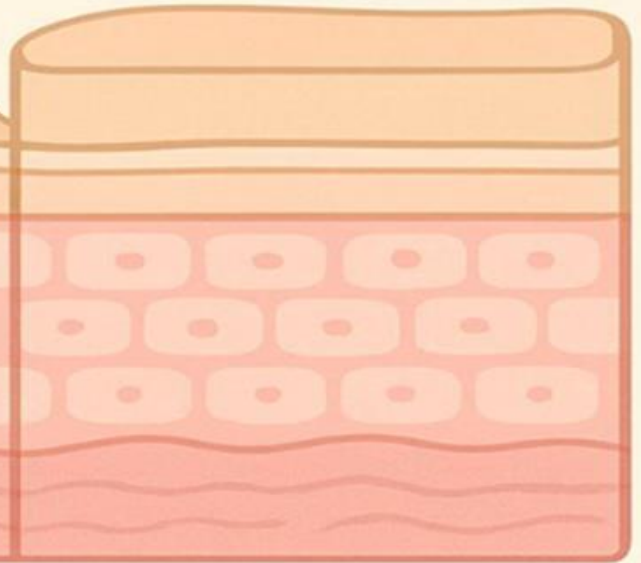
Emollients

Soothe and
soften skin



Occlusives

Create
protective barrier



2. Exfoliating and Keratolytic Agents

Alpha Hydroxy Acids (AHAs):

- **Prototypes:** Glycolic Acid (from sugarcane), Lactic Acid (from milk).
- **Mechanism of Action:** AHAs are water-soluble. They function by weakening the ionic bonds (corneodesmosomes) that hold dead skin cells (corneocytes) together in the stratum corneum.
- This is a chemo-exfoliant action. At higher concentrations (>20%), they induce epidermolysis, effectively peeling the skin.

Clinical Applications

- **Glycolic Acid:** Due to its small molecular size, it penetrates effectively. Used for fine lines, mild hyperpigmentation, and improving skin texture.
- **Lactic Acid:** A larger molecule, slightly more gentle, and a natural component of the Natural Moisturizing Factor (NMF), providing humectant properties.

Beta Hydroxy Acid (BHA)

- **Prototype:** Salicylic Acid.
- **Mechanism of Action:** Salicylic Acid is lipid-soluble. This allows it to penetrate into the pilosebaceous unit (pores), where it dissolves the intercellular "cement" between corneocytes. It is also comedolytic and anti-inflammatory.
- **Clinical Applications:** Primarily used for acne-prone and oily skin due to its ability to exfoliate within the pore and reduce comedones.

3. Skin-Lightening Agents

- These target the multi-step process of melanogenesis to reduce hyperpigmentation

1. Hydroquinone

- **Mechanism of Action:** It inhibits the enzyme tyrosinase, thereby preventing the conversion of tyrosine to melanin. It may also be cytotoxic to melanocytes.
- **Safety:** Its use is controversial and banned in some countries due to concerns about exogenous ochronosis (blue-black discoloration) with long-term, high-concentration use.

2. Tyrosinase Inhibitors:

- **Kojic Acid (from fungi):** A chelator of copper, which is required for tyrosinase activity.
- **Arbutin (from bearberry):** A natural derivative of hydroquinone with a more favorable safety profile.
- **Tranexamic Acid:** Works by inhibiting the interaction between melanocytes and keratinocytes (via the plasminogen pathway), and is particularly effective for melasma.
- **Azelaic acid:**
Antimicrobial and tyrosinase-inhibiting properties.
Use: Melasma, rosacea, mild acne.
- **Niacinamide (Vitamin B3):** Reduces melanosome transfer to keratinocytes.
Additional benefit: Anti-inflammatory and barrier repair effects.

4. Antioxidants

- These molecules neutralize free radicals (Reactive Oxygen Species - ROS) generated by UV exposure and pollution, which cause oxidative stress and damage DNA, proteins, and lipids. And theses can lead to aging and inflammation.

1. L-Ascorbic Acid (Vitamin C)

- **Mechanism of Action:** As the primary water-soluble antioxidant in the skin, it donates electrons to neutralize free radicals. It is also an essential cofactor for the enzymes lysyl and prolyl hydroxylase, which are required for collagen synthesis. It also inhibits the enzyme tyrosinase, impacting melanogenesis.
- **Formulation Challenge:** It is highly unstable, oxidizing rapidly when exposed to light and air. Effective formulations are typically at a low PH (<3.5) and in opaque, airtight packaging.

2. Vitamin E (Tocopherol).

- **Mechanism of Action:** The primary lipid-soluble antioxidant in the skin, protecting cell membranes from peroxidation. It often works synergistically with Vitamin C, which can regenerate oxidized Vitamin E.

3. Niacinamide (Vitamin B3).

- **Mechanism of Action:** A remarkably versatile ingredient. It improves the skin barrier by stimulating ceramide synthesis. It inhibits the transfer of melanosomes from melanocytes to keratinocytes, reducing hyperpigmentation. It also has anti-inflammatory properties beneficial for acne and rosacea



Balance Oil Production

Balance Oil Production: Licorice Root Serum For Face contains 10% vitamin B3 with natural, soothing properties that actively work to regulate your skin's sebum production and effectively reduce breakouts, blemishes, irritation.



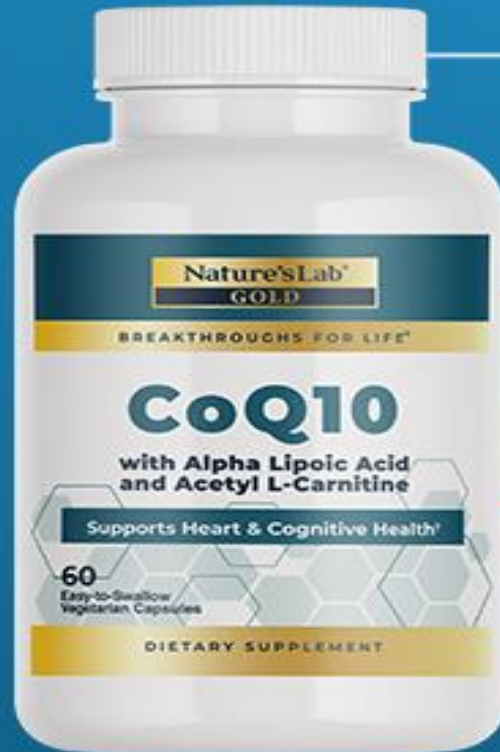
How to Use it ?

- Apply the Serum to your skin.
- Softly spread all over your face.
- The Serum will gently absorb into your skin.



4. Coenzyme Q10

- **Mechanism:** Naturally occurs in the skin and declines with age; helps to neutralize free radicals and support cellular regeneration.
- **Benefits:** Reduces the appearance of wrinkles and protects against oxidative stress.



Alpha Lipoic Acid

Alpha Lipoic Acid is an antioxidant made by the body. It has been shown to combat free radicals, thus making it work more efficiently throughout the body including the heart.[†]

Co-enzyme Q10

Coenzyme Q10 is a powerful fat soluble antioxidant compound made naturally in the body through the cells. CoQ10 has been shown to support the body's energy production.[†]

Acetyl L-Carnitine

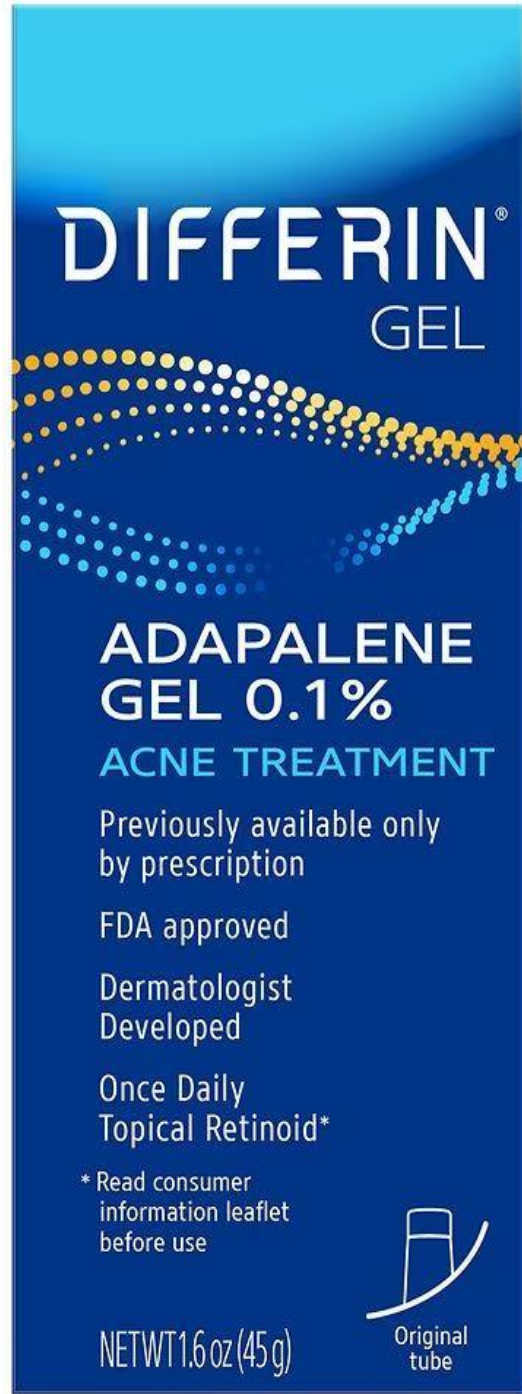
Acetyl L-Carnitine functions as an antioxidant and promotes the production of glutathione, a free radical scavenger, in cells.[†]

5. Retinoids

- **Prototypes:** Retinol (OTC), Retinaldehyde, Retinoic acid (Tretinoin)(Rx), Adapalene (Rx/OTC).
- **Mechanism of Action:** This is a profound class. Retinoids are vitamin A derivatives that bind to nuclear retinoic acid receptors (RARs and RXRs) in the skin. This binding acts as a transcription factor, modulating gene expression.
- **The effects are multi-modal:** Increased Cellular Turnover: Accelerates the shedding of old cells and promotes the generation of new keratinocytes. Stimulation of Collagen & Elastin: Downregulates collagenase (MMP-1), preventing collagen breakdown, and upregulates procollagen synthesis. Normalization of Follicular Epithelium: Prevents the hyperkeratinization that leads to microcomedones
- **Clinical Applications:** The gold standard for photoaging, acne vulgaris, and some forms of hyperpigmentation.
- **Adverse effects:** Irritation, erythema, teratogenicity (systemic forms).







6. Anti-inflammatory and Barrier-Reinforcing Agents

- These ingredients work to calm, soothe, and reduce redness and irritation in the skin. They are essential for conditions like rosacea, eczema, acne, and general sensitivity.
- **1. Inhibition of Pro-Inflammatory Mediators:** They block the production or action of key signaling molecules that drive inflammation, such as: Cytokines (e.g., TNF- α , IL-1 β , IL-6) , Prostaglandins (by inhibiting the cyclooxygenase (COX) enzymes) and Leukotrienes.
- **2. Antioxidant Activity:** Many antioxidants are also anti-inflammatory because they neutralize free radicals (Reactive Oxygen Species - ROS) that can trigger and exacerbate inflammation.
- **3. Modulation of Immune Cell Activity:** They can calm down overactive immune cells in the skin, like mast cells and Langerhans cells, preventing them from releasing histamine and other inflammatory signals.

Types

1.Niacinamide (Vitamin B3) : multi-tasking superstar. Inhibits the transfer of inflammatory mediators to skin cells. Used for redness, acne, strengthening the barrier, and brightening.



Shrinks Enlarged
Pores



Treats Acne



**VISIBLY REDUCES THE APPEARANCE OF DARK SPOTS,
DEEP REPAIR, BRIGHT SKIN**

2.Aloe Vera

Contains polysaccharides and glycoproteins that have a cooling, soothing effect. Provides immediate relief for burns, sunburns, and general irritation.

3.Green Tea Extract Epigallocatechin Gallate (EGCG)

A potent antioxidant that suppresses inflammatory cytokines. Excellent for calming acne-related redness and protecting against environmental damage

4.Beta-Glucan

A powerful polysaccharide derived from oats or yeast. It soothes by forming a protective film and modulating the skin's immune response. Very gentle and hydrating.

LUXE
ORGANIX



Suitable for all
skin types

Helps treat skin
pigmentation

Aloe vera
leaf juice

Removes dead skin
cells naturally





5. Panthenol (Vitamin B5)

A pro-vitamin that converts to pantothenic acid in the skin. It attracts moisture and has strong anti-inflammatory and wound-healing properties.

6. Oats

Unique antioxidants in oats that are exceptionally effective at relieving itch and inflammation. The basis for many colloidal oatmeal products for eczema



Uses in Skincare

- 1. Treating Redness & Rosacea:** To reduce facial flushing and visible blood vessels.
- 2. Calming Acne & Reducing PIE:** To lessen the red, inflamed appearance of pimples and post-acne red marks (Post-Inflammatory Erythema).
- 3. Managing Eczema & Dermatitis:** To relieve itching, scaling, and irritation. 
Soothing Post-Procedure Skin: After chemical peels, laser treatments, or microneedling to aid healing.
- 4. Counteracting Irritation:** Used in formulations with strong actives (like retinols or exfoliating acids) to buffer their potential side effects

7. Peptides:

- **Mechanism:** Short chains of amino acids that act as signaling molecules to encourage the skin to produce more collagen and elastin.
- **Benefits:** Enhance skin firmness, elasticity, and reduce the appearance of wrinkles.

MEDICUBE PDRN Pink Peptide Serum

Transform your skin with the power
of PDRN + 5 Peptide Complex ♥

- ✓ Boost Radiance
- ✓ Fight Fine Lines
- ✓ Deep Hydration
- ✓ Youthful Glow

Upgrade your
skincare routine
with this pink
powerhouse serum!

#Medicube
#PeptideSerum
#KBeautySkincare
#GlowingSkin
#AntiAgingSerum
#SkincareRoutine
#RadiantSkin #GlassSkinGoals
#KBeautySecrets



8. Sunscreen Active Ingredients

- **Chemical filters:**

Absorb UV energy (e.g., avobenzone, octinoxate).

- **Physical filter**

Reflect/scatter UV radiation (e.g., zinc oxide, titanium dioxide).

Mechanism:

Prevent DNA damage, photoaging, photocarcinogenesis.

SPF rating:

- Indicates protection primarily against UVB. Sun Protection Factor, which measures how effectively a sunscreen protects against the sun's ultraviolet B (UVB) rays that cause sunburn. The higher the number, the more protection it provides; for example, SPF 30 blocks about 97% of UVB rays, while SPF 50 blocks about 98%. It's important to remember that no sunscreen can block 100% of rays, and the protection can decrease from sweat, water, or towel-drying.

SPF = (Time to burn with sunscreen) / (Time to burn without sunscreen).

Difference Between Physical and Chemical Sunscreens

- **Physical sunscreens**, also known as mineral sunscreens, work by sitting on the surface of the skin and reflecting or scattering ultraviolet (UV) rays.
- They typically contain zinc oxide or titanium dioxide as active ingredients. Because of their mode of action, they provide immediate protection upon application and are generally well tolerated by sensitive, reactive, or post-procedure skin. **However, one common drawback is that they may leave a white cast, particularly on darker skin tones, which can be cosmetically undesirable.**

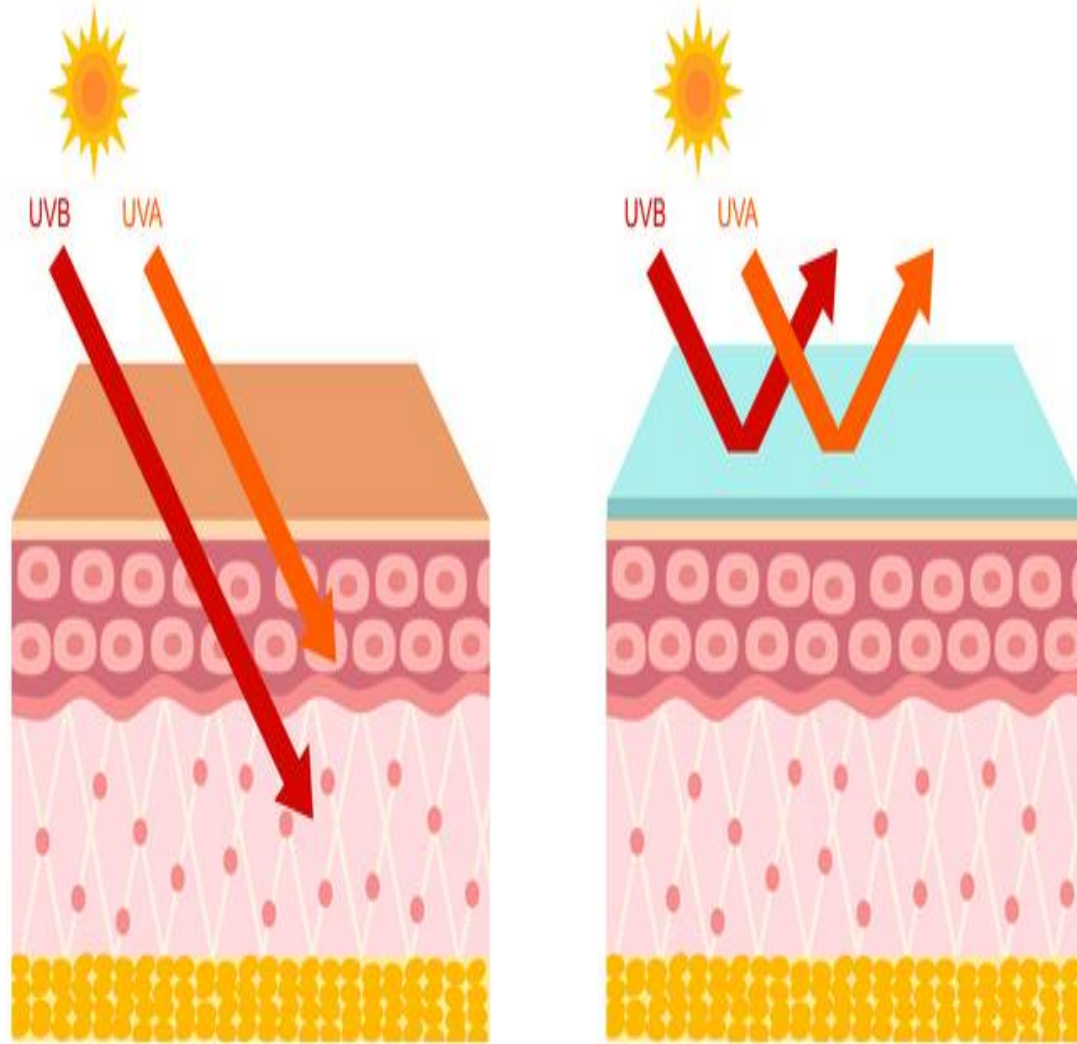
Difference Between Physical and Chemical Sunscreens

- **Chemical sunscreens**, on the other hand, are also called organic sunscreens. They work by absorbing UV radiation and converting it into heat, which is then released from the skin.
- These sunscreens usually contain ingredients such as avobenzone, oxybenzone, octinoxate, or octocrylene. They require 15 to 30 minutes after application before becoming effective. They are generally more cosmetically elegant — lightweight, transparent, and easier to apply — making them a popular choice for daily use and under makeup.

Difference Between Physical and Chemical Sunscreens

- **physical sunscreens** are recommended for patients with **rosacea, eczema, acne-prone skin**, or those undergoing **post-laser treatments**, as they are less likely to cause irritation or allergic reactions. They are also considered safe during pregnancy and for young children.
- **Chemical sunscreens**, while effective and aesthetically pleasing, may irritate sensitive or compromised skin, especially after procedures like chemical peels or laser resurfacing. Some chemical filters can cause stinging or burning, particularly around the eyes or on broken skin. Additionally, certain ingredients (like oxybenzone) have raised concerns regarding coral reef safety and potential hormonal effects, although data on this is still being studied.

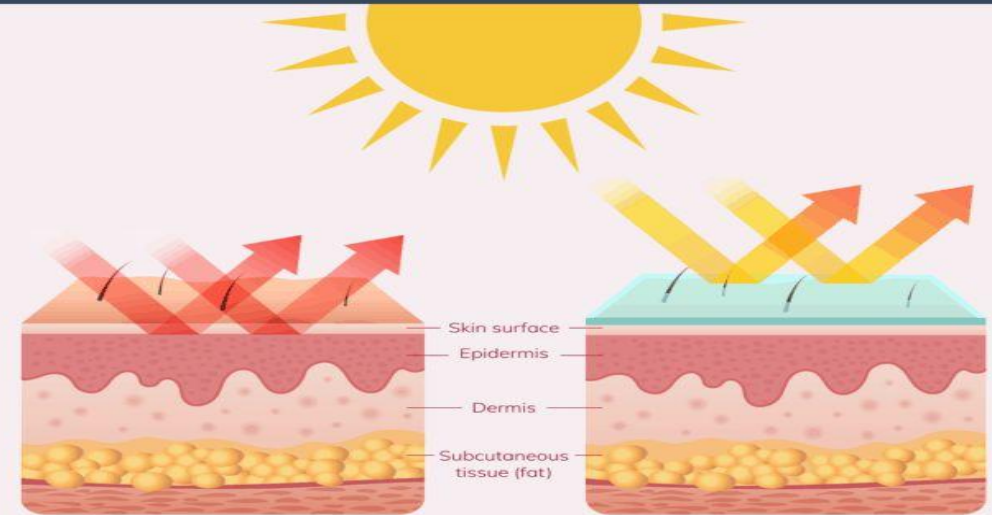
UV PROTECTION



NORMAL SKIN

SKIN WITH SUNSCREEN

Chemical vs. Physical Sunscreen



Chemical sunscreens

Absorbs

Works by absorbing UV radiation and converting it into heat

Chemicals

Active ingredients include a variety of synthetic chemicals

Risks to health

potential long-term safety concerns

Possible allergic reaction to skin, endocrine disruption, and skin penetration

Physical sunscreens

Reflects

Works by scattering and reflecting UV radiation

Minerals

Active ingredients include zinc oxide and titanium dioxide

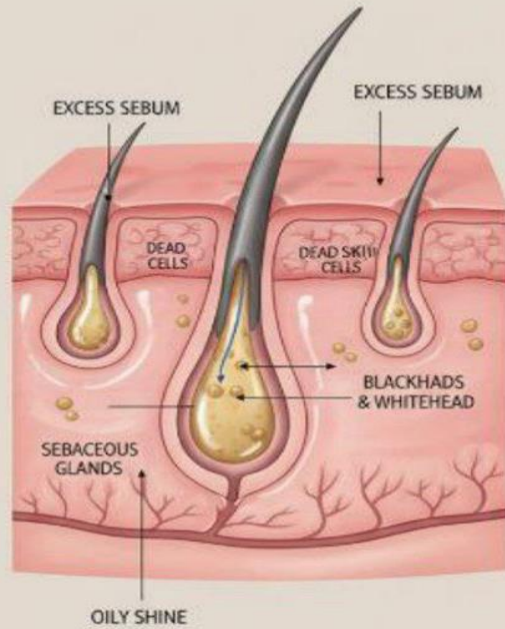
Generally safe

Does not penetrate the skin

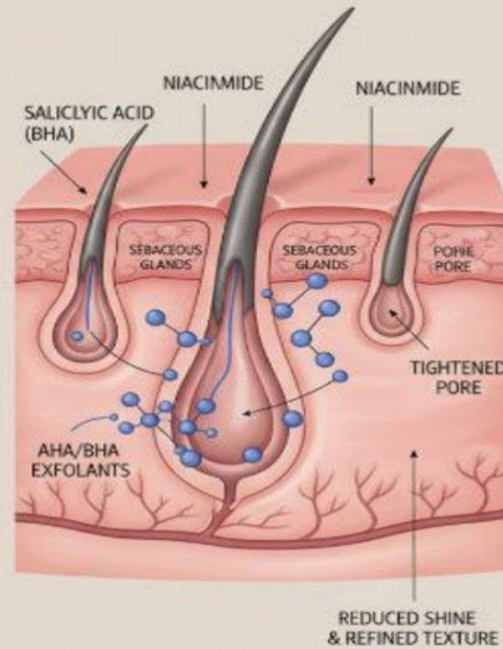
Ingredients considered safe

Possible inhalation concerns for spray/aerosol form

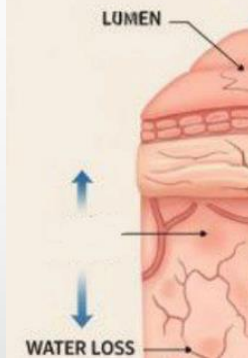
LARGE PORES & OILY SKIN



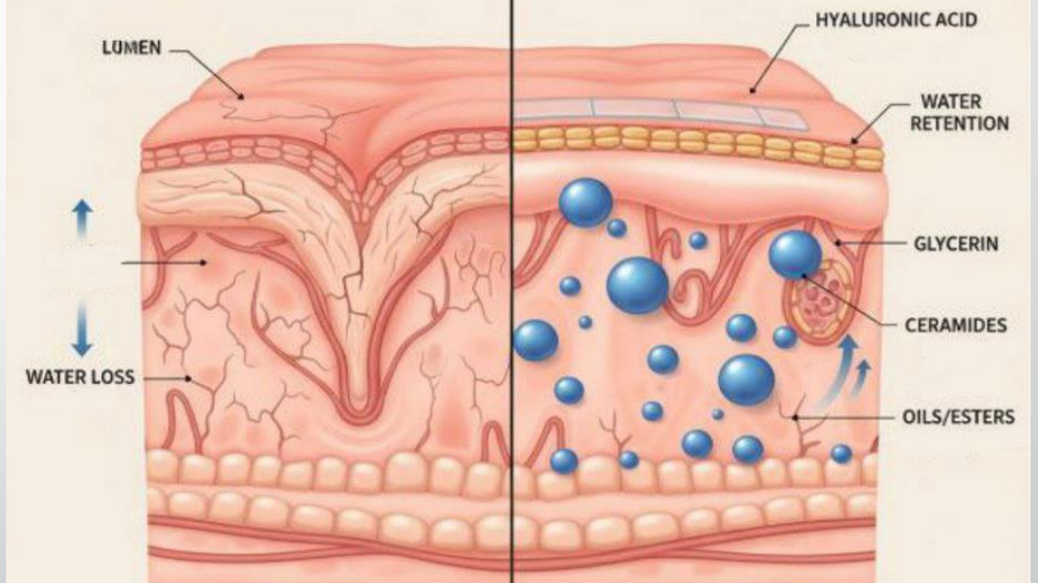
ACTIVE INGREDIENT SOLUTIONS



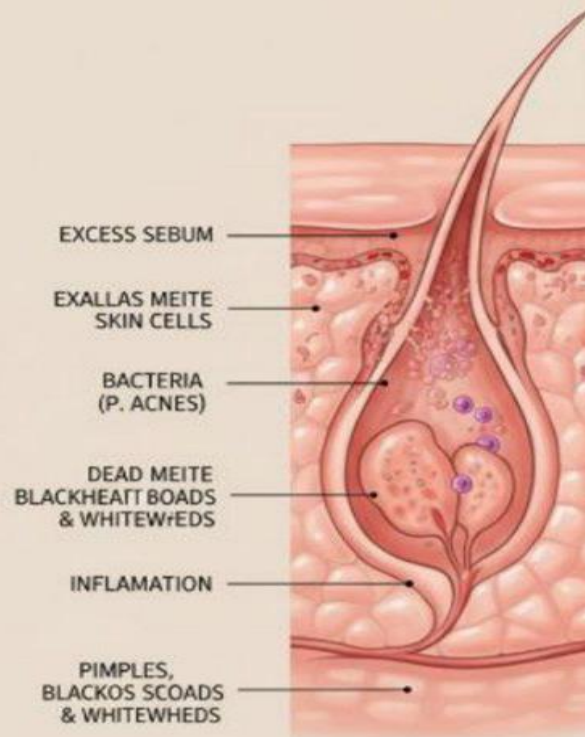
DRY SKIN DRY SKIN & LOSS PLUMPNESS DEHYDRATION & VOLUME LOSS



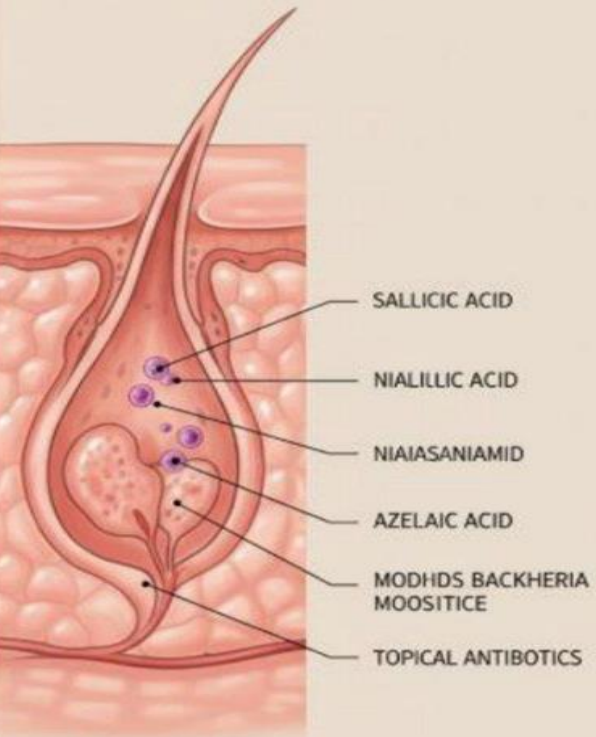
ACTIVE INGREDIENT SOLUTIONS HYDRATION & BARRIER REPAIR

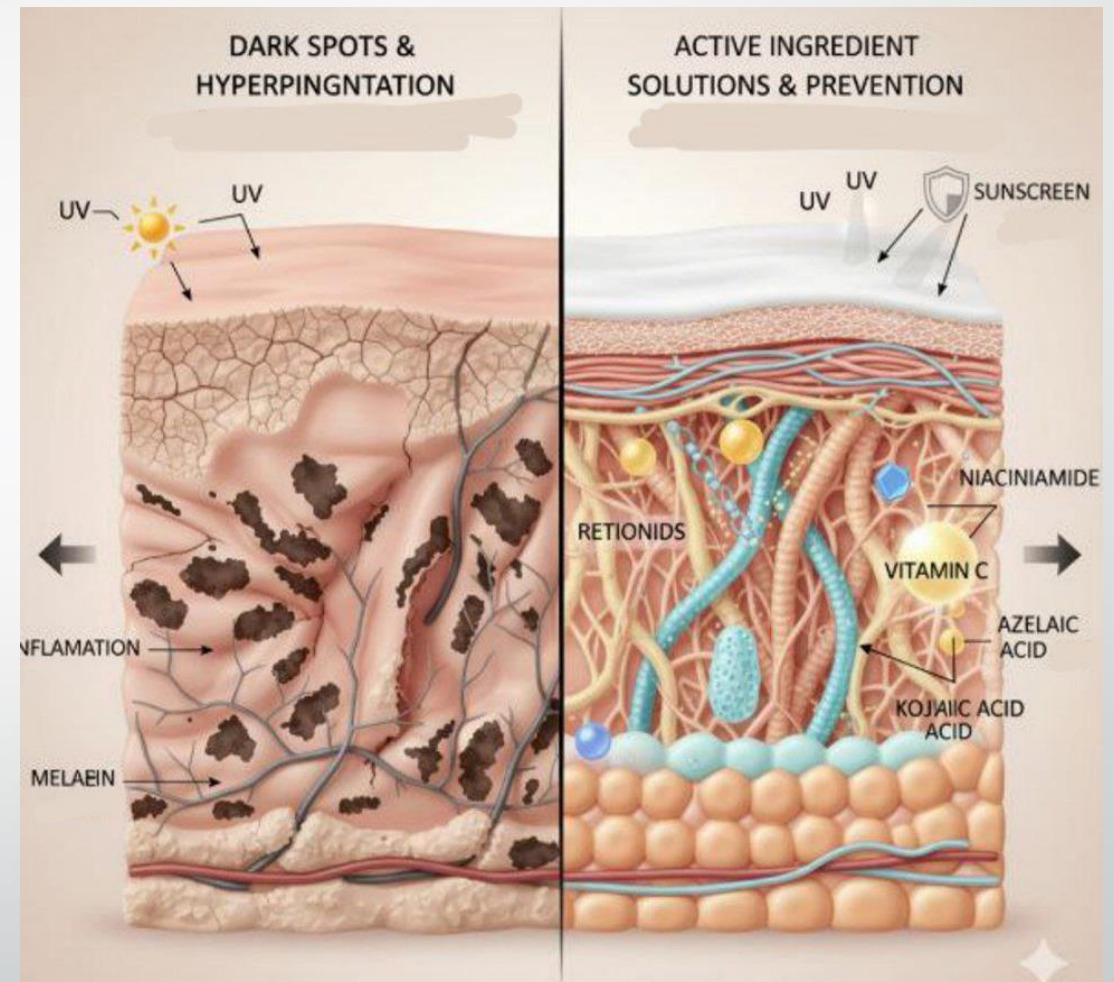
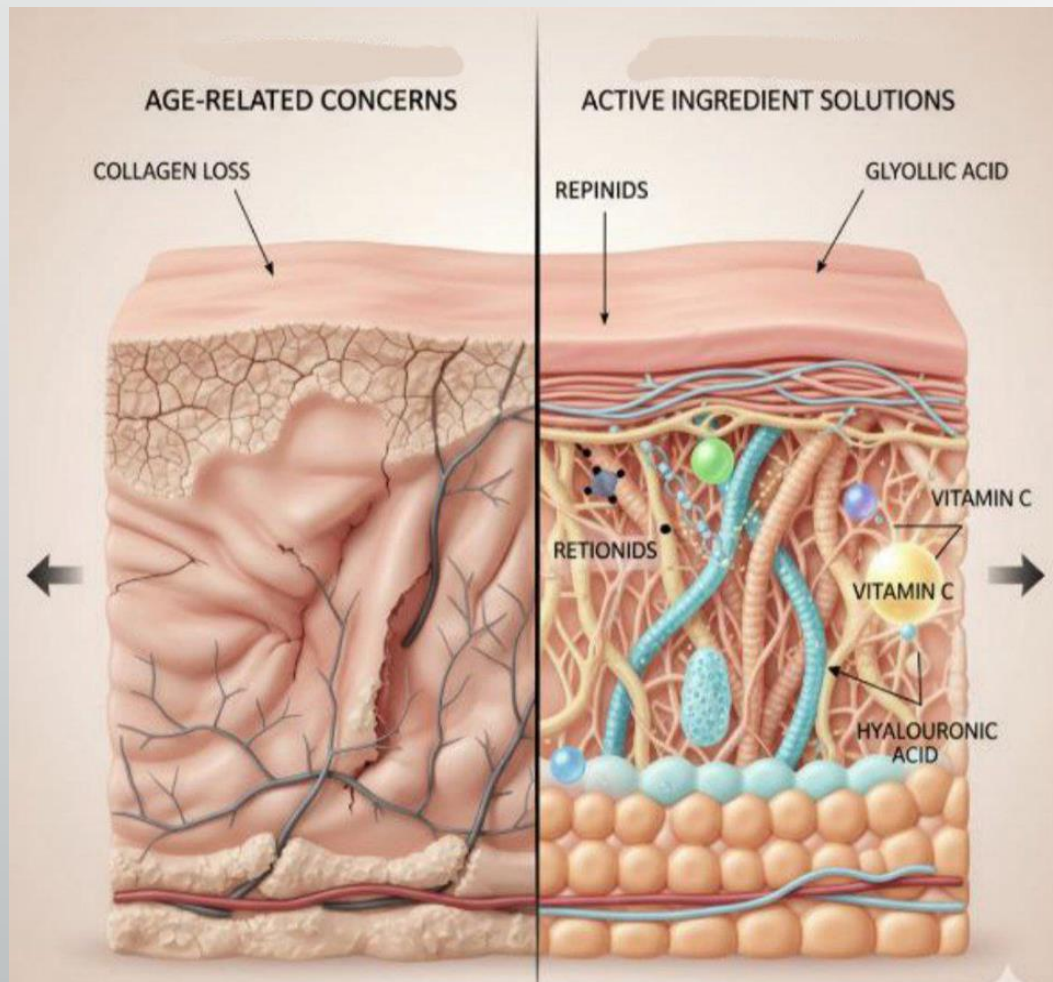


ACNE CONCERNS



ACTIVE INGREDIENT SOLUTIONS





Clinical Application and Patient Counseling

1. Tailor product choice to skin type, age, and condition.
2. Introduce active ingredients gradually to minimize irritation.
3. Warn about contraindication in pregnancy (e.g., retinoids)
4. Emphasize photoprotection, especially when using retinoids or acids.

Factors Influencing Effectiveness of Active Ingredients

1. PH of the Formulation

- The pH level determines the solubility, penetration, and stability of many active ingredients.
- Vitamin C (L-ascorbic acid) is most effective at pH ~3.0–3.5.
- Alpha Hydroxy Acids (AHAs) like glycolic acid work best at low pH (~3–4) to exfoliate effectively.
- Salicylic acid (BHA) requires slightly acidic pH (~3–4) for optimal oil solubility and pore penetration.

Factors Influencing Effectiveness of Active Ingredients

2. Concentration and Stability

- Higher concentrations can increase efficacy, but stability and skin tolerance must also be considered.
- Retinol is effective at 0.25–1%, but it is highly unstable and sensitive to light and oxygen.
- Niacinamide is stable and effective between 2–5%; higher concentrations may cause flushing.
- Hydroquinone is used at 2–4% for pigmentation but oxidizes easily, turning brown when unstable

Factors Influencing Effectiveness of Active Ingredients

3. Delivery Systems

- Encapsulation or delivery technologies can enhance skin absorption and reduce irritation.
- Encapsulated retinol releases slowly, reducing irritation and increasing stability.
- Liposomal Vitamin C penetrates deeper and resists oxidation compared to free ascorbic acid.
- Niacinamide in nanoemulsions allows better absorption with less surface irritation.

Factors Influencing Effectiveness of Active Ingredients

4. Skin Type and Condition

- The effectiveness and tolerability of actives vary depending on the individual's skin type and any existing conditions.
- Azelaic acid is ideal for sensitive or rosacea-prone skin.
- Salicylic acid works well for oily and acne-prone skin, but may dry out dry skin types.
- AHAs like glycolic acid may irritate eczema-prone or barrier-damaged skin.

Factors Influencing Effectiveness of Active Ingredients

- **5. Compatibility with Other Ingredients**
- Some ingredients enhance each other, while others may cause irritation or reduce effectiveness when combined.
- Vitamin C + Vitamin E + Ferulic Acid → synergistic antioxidant effect.
- Retinol + Niacinamide → improves tolerance and boosts anti-aging effects.
- Benzoyl peroxide + Retinoids → can deactivate retinoids or cause excessive irritation if not spaced apart.

Azelaic Acid

- Is a naturally occurring dicarboxylic acid derived from grains such as wheat, rye, and barley. It is used in dermatology and cosmetic products for its antibacterial, anti-inflammatory, keratolytic, and skin-brightening properties.
- It is commonly applied topically to treat conditions such as acne, rosacea, and melasma, and is well tolerated by sensitive skin types.

Azelaic Acid

Before



Inflammation

After



Pigmentation



Bumpy Texture



Panthenol

- Panthenol is a pro-vitamin B5 compound commonly used in skincare and cosmetic products. It acts as a moisturizer, humectant, and skin conditioning agent, helping to improve skin hydration, promote healing, and enhance the skin barrier function.
- Panthenol is widely used to soothe irritated or dry skin, accelerate wound healing, and improve softness and elasticity.



References

- **Bolognia JL, Schaffer JV, Cerroni L. Dermatology. 5th ed. Elsevier, 2024.**
- **Draelos ZD. Cosmetic Dermatology: Products and Procedures. 3rd ed. Wiley-Blackwell, 2022.**
- **Zouboulis CC, et al. "Evidence-based use of skin care products in dermatology." Clin Dermatol. 2021;39(4):569–579.**
- **Mukherjee S, et al. "Retinoids in the treatment of skin aging: An overview of clinical efficacy and safety." Clin Interv Aging. 2022.**



Thank you



جمهورية العراق
وزارة التعليم العالي و البحث العلمي
جامعة الفرات الاوسط التقنية
كلية التقنيات الطبية والصحية / قسم التجميل
والليزر



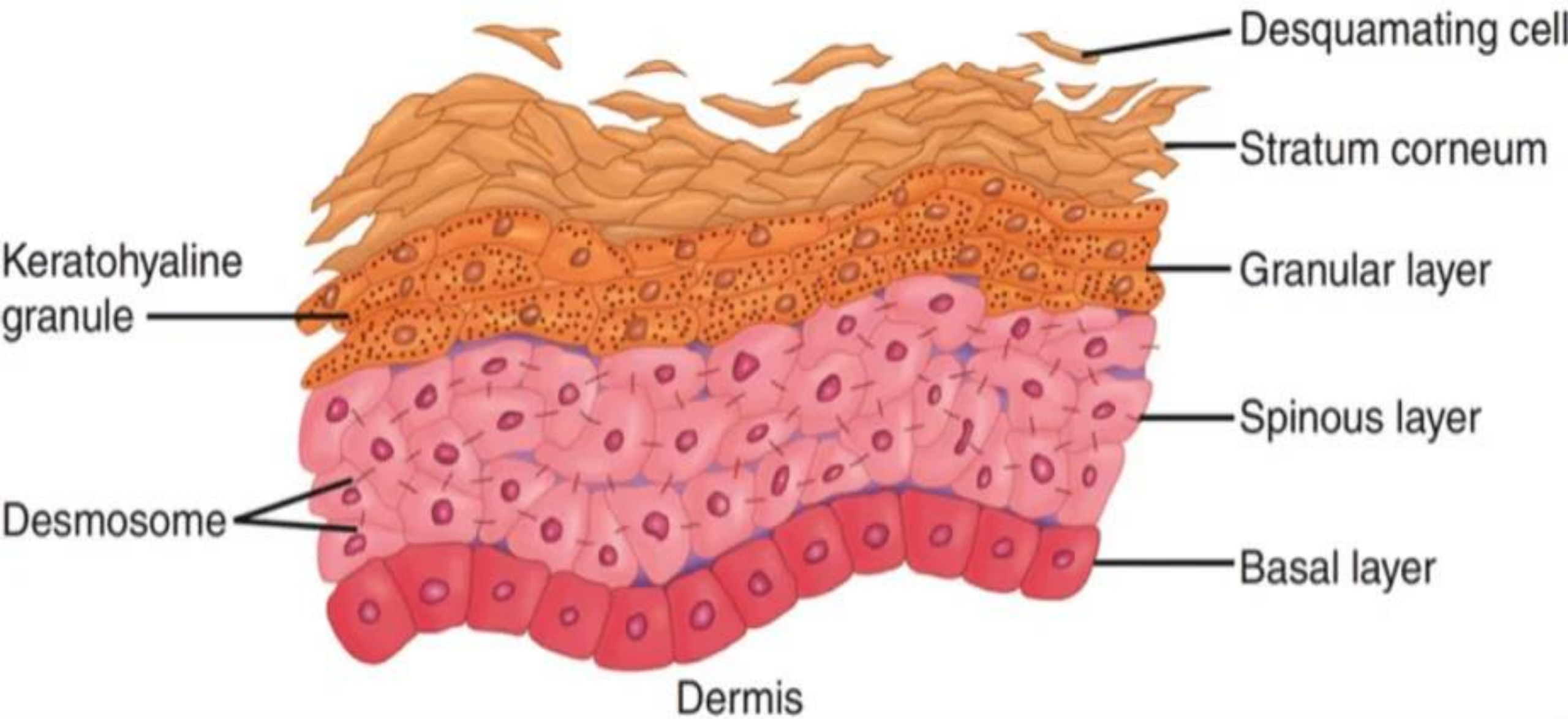
Therapeutic Techniques Exfoliation & peels

Learning Objectives

- Differentiate between mechanical, enzymatic, and chemical exfoliation.
- Classify peels by agent and depth (superficial-medium-deep) and match to indications.
- Select protocols tailored to Fitzpatrick skin types and skin-of-color safety.
- Implement evidence-based pre/post-peel care and complication management.
- Interpret the latest regulatory safety updates for in-clinic vs at-home products.

Introduction

- The outermost skin layer, the stratum corneum, is composed of corneocytes (dead, flattened keratinocytes) embedded in a lipid matrix looks like “brick-and-mortar” structure.
- Bricks: corneocytes filled with keratin.
- Mortar: intercellular lipids like ceramides, cholesterol, and free fatty acids.
- With aging and accumulate UV damage, corneocyte desquamation slows down. Dead cells cling too long, causing dullness, roughness, comedone formation, and uneven pigmentation.

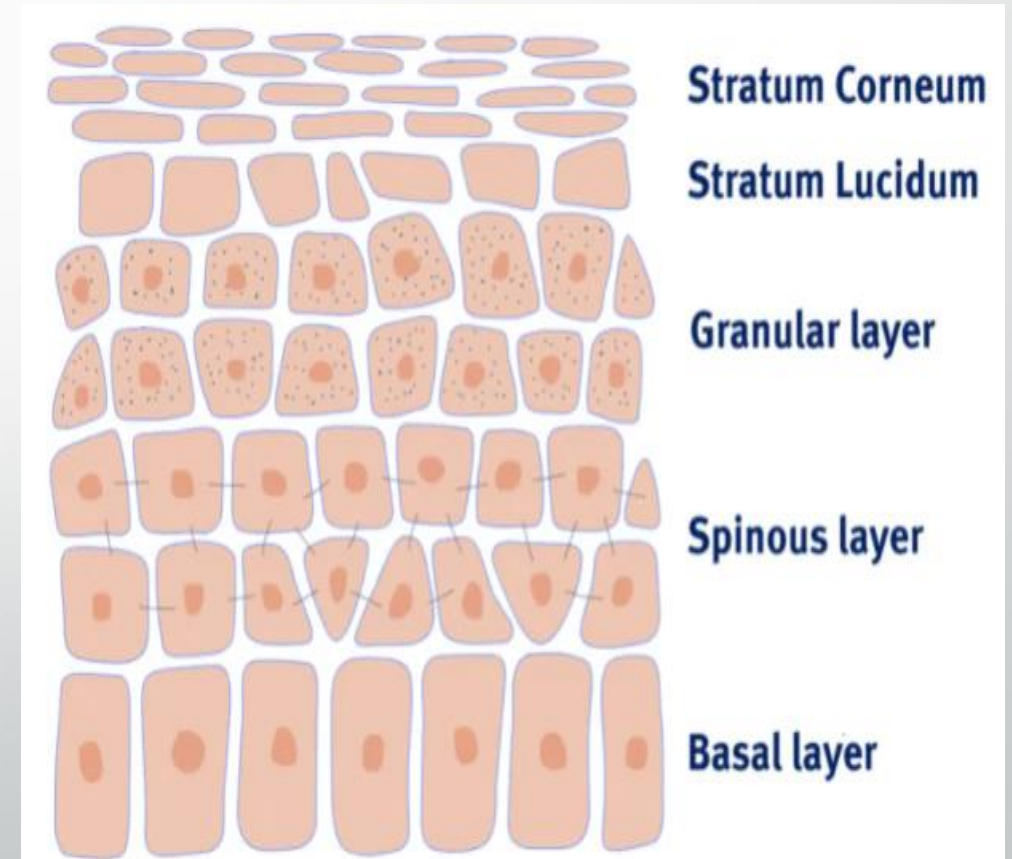


Exfoliation and Peel

- **Exfoliation and chemical peeling are key therapeutic techniques in modern skincare that remove damaged skin layers, promote cell renewal, enhance texture and tone.**
- **Accelerate desquamation through different mechanisms either mechanical disruption, enzymatic proteolysis, or chemical dissolution of the “mortar.”**

What is skin keratinization?

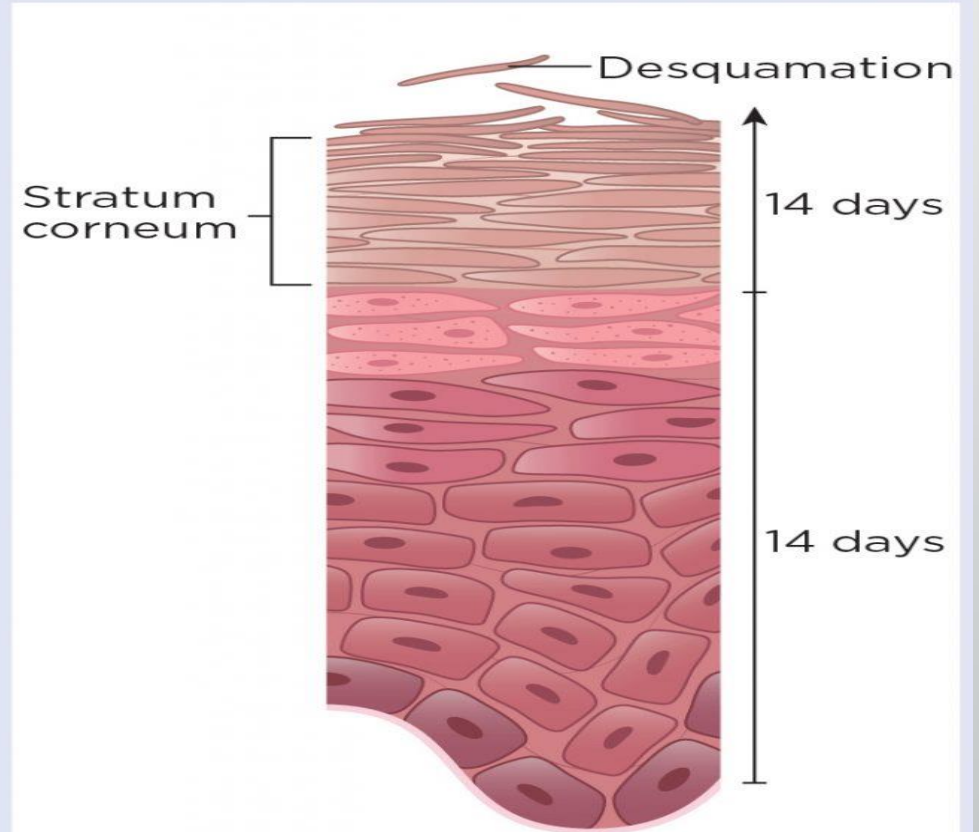
- Skin keratinization is the natural process in which skin cells (keratinocytes) in the lower layers of the epidermis mature, move upward, and produce keratin, a tough, protective protein.
- As these cells rise to the surface, they become flat, hard, and eventually die, forming the stratum corneum, the outermost protective layer of the skin.



What is desquamation?

- Desquamation is the natural process of shedding dead skin cells from the outermost layer of the epidermis, known as the stratum corneum.
- As new cells are produced in the deeper layers of the skin, older cells on the surface gradually loosen and flake off.

Fig 3. **Desquamation process**







Roughness

- Refers to an uneven skin texture caused by a buildup of dead skin cells or poor desquamation.
- The skin feels bumpy or coarse to the touch.
- Roughness can occur even in oily skin and is often linked to inadequate exfoliation or conditions like keratosis pilaris.







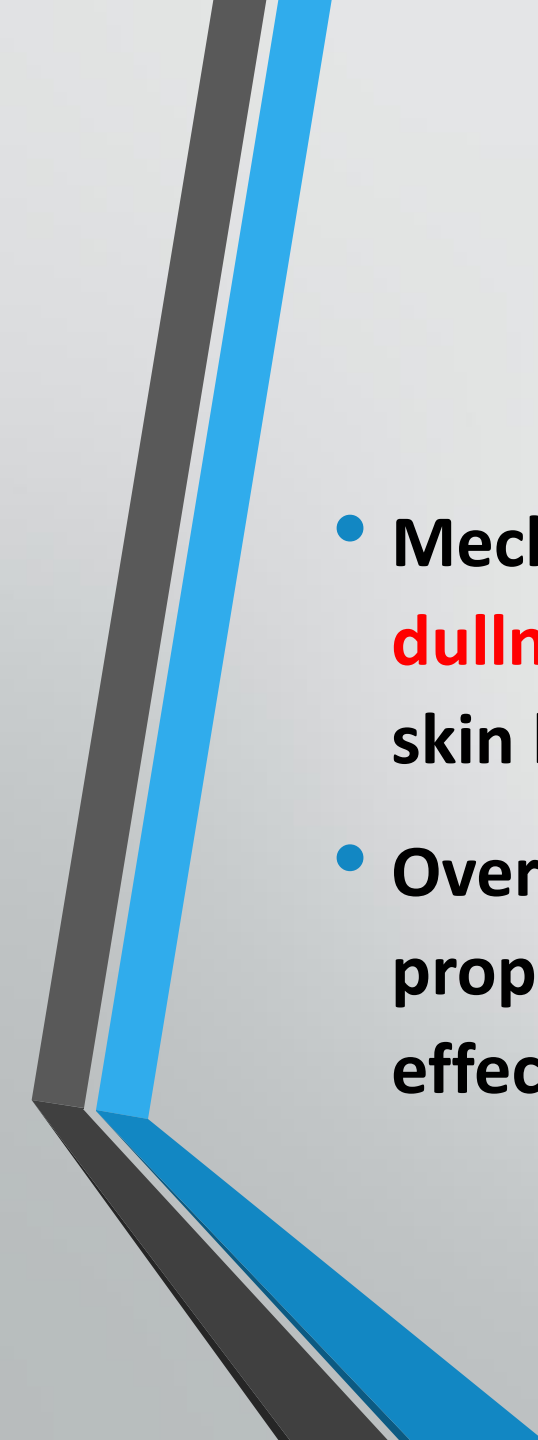
Exfoliation modalities

A.Mechanical Exfoliation

- **Common mechanical exfoliation techniques include: Scrub , Dermaplaning and Microdermabrasion.**

Mechanism of Action

- Mechanical exfoliation uses a scrubbing or abrading action to dislodge and remove these dead cells manually.
- This stimulates skin renewal by:
 1. Increasing cell turnover.
 2. Enhancing microcirculation.
 3. Improving absorption of topical skincare products.

- 
- Mechanical exfoliation helps improve **superficial roughness, dullness, and early photoaging** but has limited effects on deeper skin layers or pigmentation.
 - Overuse or poor hygiene can cause irritation or infection, so proper technique and aftercare are essential for safety and effectiveness.

Precautions

- Should be avoided on inflamed acne, rosacea, or sensitive skin, as friction can worsen irritation.
- Always follow with a moisturizer and sunscreen since exfoliation increases photosensitivity and transepidermal water loss.
- Frequency depends on skin type — generally 1–2 times weekly for home use.

1.Facial Scrub

- Scrubs are one of the most common and accessible forms of mechanical exfoliation.
- They contain abrasive particles such as sugar, salt, microbeads, or natural powders (e.g., walnut shell, oatmeal, or coffee grounds) suspended in a cream or gel base.
- When massaged onto the skin, these particles physically remove dead corneocytes from the stratum corneum, helping to smooth texture, brighten the complexion, and enhance product absorption.





Indications

- 1. Dull, Tired-Looking Skin:** To slough off dead cells and reveal the brighter, fresher skin underneath.
- 2. Uneven Skin Texture:** To smooth rough patches and improve skin's feel.
- 3. Clogged Pores (Blackheads & Whiteheads):** To help clear out debris from pores, making them appear smaller.
- 4. Prepping Skin for Other Products:** By removing the barrier of dead cells, subsequent products like serums and moisturizers can penetrate more deeply and work more effectively.
- 5. Pre-Shave Exfoliation (for men):** Helps prevent ingrown hairs by clearing dead skin that can trap hairs.

Precautions & Contraindications

- **Do Not Use on Active Acne, Cuts, or Sunburn:** Scrubbing can tear, irritate, and spread bacteria, worsening inflammation and delaying healing.
- **Avoid if there's Certain Skin Conditions:** Such as Rosacea, Eczema, or active Psoriasis. The physical friction will aggravate these conditions.
- **Beware of Over-Exfoliation:** Redness, stinging, tightness, increased sensitivity, shiny but tight skin, and increased breakouts.
- **If this happens:** Stop all exfoliation immediately. Switch to a very gentle, reparative skincare routine (gentle cleanser, fragrance-free moisturizer, and sunscreen) until your skin barrier recovers, which can take several weeks.

Choosing the Right Scrub for Skin Type:

- **Sensitive Skin:** very fine, round particles like jojoba beads or oatmeal.
- **Oily/Acne-Prone Skin:** Avoid oil-based scrubs. Prefer gel-based one with salicylic acid.
- **Dry Skin:** A cream or oil-based scrub with hydrating ingredients is best
- **Mature Skin:** Be extra gentle. Fine particles are key to avoiding damage to thinner, more fragile skin.
- **Patch Test:** Always test a new scrub on a small area of your skin (like behind the ear or on the jawline) before applying it to your entire face to check for adverse reactions

2.Dermaplaning

- **Is a cosmetic procedure that uses a surgical scalpel to gently exfoliate the top layer of dead skin cells and fine vellus hair, resulting in a smoother and brighter complexion.**
- **Performed by a trained professional, it can help improve skin texture, reduce the appearance of fine lines, acne scars, and makeup application, and make skincare products more effective by improving their penetration.**



Indication

- 1. Superficial Exfoliation.**
- 2. Removal of Vellus Hair .**
- 3. Enhancing Product Penetration.**
- 4. Dull, Lackluster Complexion.**
- 5. Improving the Appearance of Fine Lines and Superficial Scarring.**
- 6. Managing Mild Textural Irregularities.**
- 7. As a Treatment for "Pregnancy Safe" Skincare.**

Contraindications (Should NOT be done)

- **Active Acne, Cysts, or Cold Sores:** The procedure can spread bacteria, worsening breakouts. It can also spread the herpes simplex virus.
- **Inflammatory Skin Conditions:** Such as active rosacea, eczema, or psoriasis on the face. The scraping can cause severe irritation and flare-ups.
- **Sunburn:** The skin barrier is compromised and damaged.
- **Active Skin Infections** of any kind.
- **History of Keloid Scarring:** Any form of trauma can trigger keloid formation in prone individuals.
- **Fragile or Thinning Skin:** Often seen in individuals on long-term topical steroids or the elderly.
- **Uncontrolled Diabetes or Blood Clotting Disorders:** Due to impaired wound healing and bleeding risk.
- **Use of Blood Thinners:** This can increase the risk of bleeding and nicks.

3. Microdermabrasion

- **Is a mechanical exfoliation technique that removes superficial dead skin cells using fine abrasive crystals or a diamond-tipped handpiece under controlled vacuum suction.**
- **It improves skin texture, promotes cell turnover, and enhances the penetration of topical agents.**



B. Enzymatic Exfoliation

- Enzymatic exfoliation utilizes proteolytic enzymes, primarily **papain** (from papaya) and **bromelain** (from pineapple), to gently **break down corneodesmosomes** the protein bridges that hold corneocytes together in the stratum corneum.
- This controlled enzymatic degradation promotes desquamation without significant disruption of the epidermal barrier.

Enzymatic Exfoliation

- **Papain exhibits keratolytic and anti-inflammatory properties and is often used in enzyme masks or peels for mild textural irregularities and dull skin.**
- **Bromelain has similar proteolytic effects but also provides mild anti-edematous and soothing actions.**
- **Both are effective in enhancing skin smoothness and radiance with minimal irritation risk.**

Enzymatic Exfoliation

- Enzymatic exfoliation is ideal for patients who cannot tolerate acids or mechanical abrasion. However, its limitations include **a shallower depth of action and variable activity depending on pH, temperature, and enzyme stability**. Hypersensitivity reactions are rare but may occur in individuals allergic to plant enzymes or latex.

C. Chemical Exfoliation

- Chemical exfoliation, or chemical peeling, involves applying controlled concentrations of acids to the skin to induce keratolysis, stimulate cell turnover, and improve overall texture and tone.
- These agents vary in strength, penetration depth, and indication, depending on their molecular structure, and formulation.
- This process extends beyond surface exfoliation to include epidermal and dermal remodeling.

CHEMICAL PEEL FOR ACNE



Chemical Peels: Classification and Depth

- Chemical peels are categorized by depth of penetration:

Type	Depth of Action	Examples	Clinical Use
Superficial Peel	Stratum corneum to upper epidermis	Glycolic acid (20–50%), salicylic acid (20–30%), lactic acid, Jessner's solution	Acne, pigmentation, photoaging, dull skin
Medium Peel	Papillary dermis	Trichloroacetic acid (TCA 20–35%), glycolic acid (70%), Jessner's + TCA combination	Actinic keratoses, dyschromia, fine wrinkles
Deep Peel	Reticular dermis	Phenol (Baker-Gordon formula)	Severe photoaging, deep wrinkles, scars

Healing time increases with depth:

- Superficial: 2–4 days
- Medium: 5–10 days
- Deep: 10–21 days or more

Mechanism of Action

Chemical peeling works through controlled chemical injury:

1. Coagulation of proteins in the epidermis and dermis.
2. Inflammatory response stimulates fibroblast activity.
3. Regeneration: new epidermal cells form from adnexal structures (hair follicles, sweat glands).
4. Remodeling: collagen and elastin fibers reorganize, improving skin firmness and texture.

Adverse Effects

- **Immediate**: stinging, erythema, edema, frosting (controlled necrosis).
- **Delayed**: PIH, infection, scarring, milia, persistent erythema.
- **Prevention**: proper skin preparation, accurate timing, neutralization, and strict photoprotection.

Post-Treatment Care :

1. Avoid UV exposure for at least 2 weeks.
2. Use bland cleansers, ceramide-based moisturizers, and broad-spectrum SPF 50+.
3. Avoid exfoliating products, retinoids, and harsh cleansers for 7–10 days.
4. For medium/deep peels: use prophylactic antivirals (acyclovir) if herpes history is present.

Contraindications of chemical peeling

1. Active infections (herpes simplex, bacterial, or fungal).
2. Open wounds or eczema.
3. Recent isotretinoin use (<6 months).
4. Pregnancy (for certain acids).
5. Fitzpatrick skin types V–VI: higher risk of post-inflammatory hyperpigmentation.

Clinical Pearls

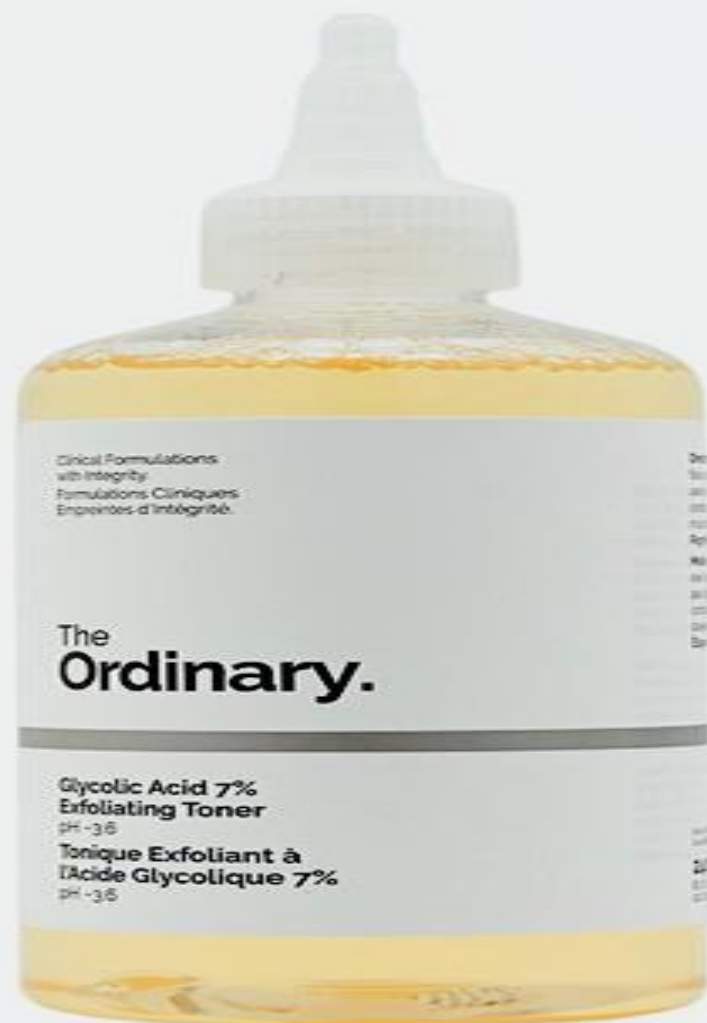
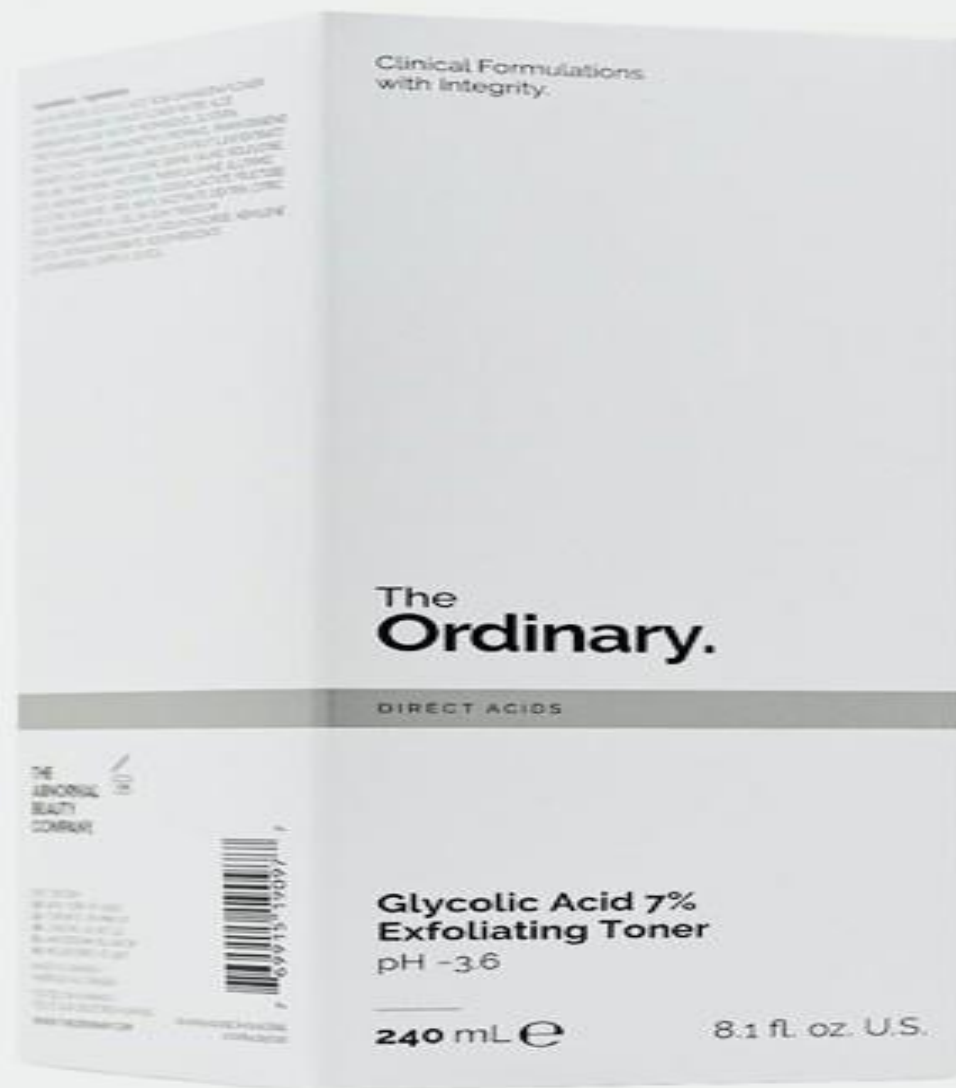
- Always prepare the skin with retinoids or AHAs for 2–4 weeks prior to medium peels to ensure even penetration.
- Perform test peels on darker skin types.
- Neutralize acid peels properly (especially glycolic acid) to prevent chemical burns.
- Patient education on realistic expectations and adherence to post-peel care.

1. Alpha Hydroxy Acids (AHAs)

- AHAs are water-soluble acids that act by weakening the ionic bonds between corneocytes, promoting exfoliation of the stratum corneum (keratolysis).
- They also enhance Natural Moisturizing Factor (NMF) components, improve skin hydration, and upregulate collagen synthesis by stimulating fibroblast activity in the dermis.

Glycolic Acid (AHA)

- **Is the smallest alpha hydroxy acid, derived primarily from sugarcane.**
- **Its low molecular weight allows it to penetrate the stratum corneum efficiently, reaching deeper epidermal layers compared with other AHAs such as lactic or mandelic acid.**



Mechanism of action

- Glycolic acid exerts its exfoliative effect by disrupting ionic bonds between corneocytes and dissolving corneodesmosomal linkages, leading to controlled desquamation. Additionally, it reduces corneocyte cohesion and accelerates epidermal turnover.
- At the dermal level, glycolic acid can stimulate fibroblast activity, increasing synthesis of collagen, elastin, and glycosaminoglycans. This remodeling effect contributes to smoother texture, improved elasticity, and reduction of fine wrinkles.

Clinical indications

- **Photoaging**: improving roughness, fine lines, and mild atrophy through dermal stimulation.
- **Melasma and hyperpigmentation**: by enhancing epidermal turnover and facilitating even pigment dispersion.
- **Acne-prone skin**: reducing follicular hyperkeratinization and post-inflammatory pigmentation.
- **Dull or thickened skin**: restoring brightness and even tone.

Improve
blemishes
and acne

Reverse
and prevent
skin aging

7% Glycolic
Acid+ Shrink
pores

GLYCOLIC ACID 7% TONING SOLUTION



Concentration and application

Low concentrations 5–10% (Home-care / Daily use)

- PH: 3.5–4.0
- Depth: Very superficial.
- Use: Gentle exfoliation, improving texture and radiance, maintaining hydration.
- Notes: Found in cleansers, toners, and creams; safe for regular use; minimal irritation.

Concentration and application

Low professional strength 20–30%

- **PH: 3.0–3.5**
- **Depth: Superficial peel.**
- **Use: Mild photoaging, early pigmentation, acne-prone skin, dull complexion.**
- **Notes: Common in treatments; minimal downtime; well-tolerated by most skin types.**

Concentration and application

Medium professional strength 35–50%

- **PH: 2.5–3.0**
- **Depth: Superficial to near-medium**
- **Use: Moderate photoaging, melasma, uneven tone, post-acne marks**
- **Notes: Requires professional supervision; mild erythema or peeling may appear for 1–3 days.**

Concentration and application

High professional / medical strength 60–70%

- **PH: 2.0–2.5**
- **Depth: Medium-depth peel.**
- **Use: Resistant pigmentation, fine wrinkles, rough texture, thickened skin.**
- **Notes: Performed only by trained professionals; strict timing and neutralization required; higher irritation and PIH risk in darker skin types.**

Clinical Tips

- Always begin with lower concentrations and gradually increase with tolerance and clinical need.
- Contact time (1–5 minutes) and preparation (degreasing, pretreatment with retinoids or pigment suppressors) influence penetration depth.
- Neutralization is mandatory for peels $\geq 20\%$ (commonly with sodium bicarbonate or cool water).
- For Fitzpatrick IV–VI, use $\leq 30\%$ or switch to mandelic/lactic acids to minimize PIH risk.

Lactic acid

- Lactic acid is a mild alpha hydroxy acid (AHA) derived from milk.
- It gently exfoliates the skin by loosening dead cells while acting as a humectant, attracting moisture to improve hydration and smoothness. Commonly used in concentrations of 20–50%, it suits dry, sensitive, or mature skin, enhancing texture and brightness with minimal irritation risk.

Mandelic acid

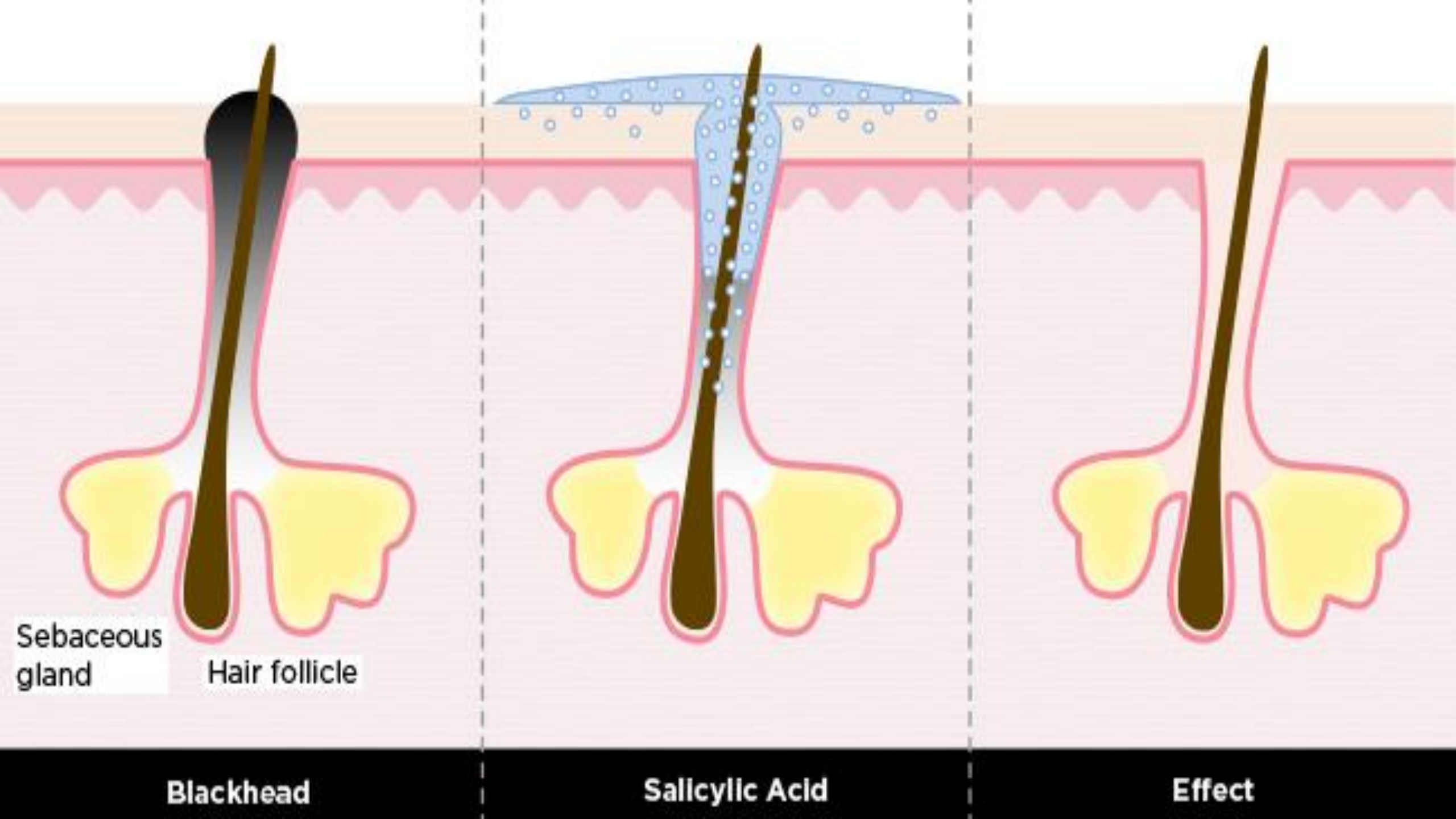
- Mandelic acid is a gentle AHA derived from bitter almonds.
- Its larger molecular size makes it absorb slowly, reducing irritation and inflammation.
- It is especially suitable for acne-prone, sensitive, and darker skin types (Fitzpatrick IV–VI), helping to treat acne, uneven tone, and pigmentation while minimizing the risk of post-inflammatory hyperpigmentation (PIH).

2. Beta Hydroxy Acid (BHA)

- Beta Hydroxy Acid (BHA), mainly salicylic acid, is a lipid-soluble exfoliant that penetrates deep into pores to remove excess oil and dead cells.
- It is especially effective for acne-prone and oily skin, helping to clear comedones and reduce inflammation.

Salicylic acid

- It works by disrupting the intercellular bonds between corneocytes in the stratum corneum, promoting exfoliation and clearing clogged pores.
- It has strong keratolytic and comedolytic properties, meaning it helps remove dead skin cells and dissolve blackheads and whiteheads.



Sebaceous
gland

Hair follicle

Blackhead

Salicylic Acid

Effect

Clinical Indications

- **Acne vulgaris**: Especially comedonal and mild inflammatory acne due to its comedolytic and anti-inflammatory effects.
- **Seborrheic dermatitis and oily skin**: Helps control excess sebum and flaking.
- **Post-inflammatory hyperpigmentation (PIH)**: Improves uneven tone and smooths texture.
- **Photoaging (mild)**: Enhances skin brightness and reduces superficial roughness.
- **Keratosis pilaris and psoriasis** (adjunctive): Softens hyperkeratotic lesions through keratolysis.

Concentration and Application

Low concentrations (0.5–2%)

- Found in OTC cleansers, toners, and creams.
- Used for daily home care to maintain clear pores and prevent acne.
- Safe for most skin types with minimal irritation.

Medium concentrations (20–30%)

- Used in professional superficial chemical peels.
- Applied for acne, oily skin, enlarged pores, and post-acne pigmentation.
- Produces a self-limiting "frost" effect due to crystallization, not true coagulation.
- Usually left on for 3–5 minutes and self-neutralizes; no external neutralizer required.

Concentration and Application

High concentrations (>30%)

- Rarely used and limited to specialized medical procedures for localized lesions such as warts or keratoses.
- Must be performed under strict medical supervision due to irritation and potential burns.



Before treatment

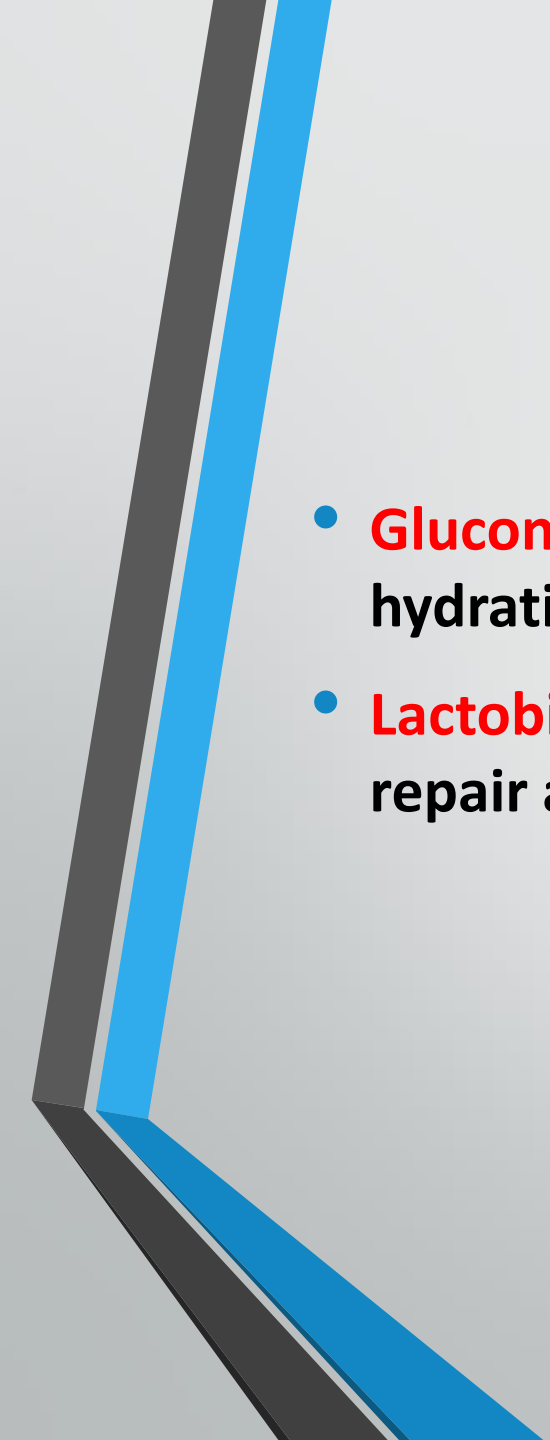


Pseudofrost after application of 30% salicylic acid



3. Polyhydroxy and Lipohydroxy Acids (PHAs/LHAs)

- PHAs and LHAs represent a newer generation of hydroxy acids, designed to provide exfoliation with enhanced tolerability. Their larger molecular size leads to slower skin penetration, minimizing irritation while maintaining gradual keratolytic effects.
- These acids are ideal for sensitive, rosacea-prone, or post-procedure skin, as well as for skin of color, where minimizing barrier disruption and inflammation is crucial to avoid PIH.

- 
- **Gluconolactone** acts as a gentle exfoliant and antioxidant, improving hydration and reducing oxidative stress.
 - **Lactobionic acid** adds humectant and chelating benefits, promoting barrier repair and reducing inflammation.

4. Trichloroacetic Acid (TCA)

- TCA is a medium-depth peeling agent that causes protein coagulation and keratocoagulation, leading to controlled necrosis of the epidermis and upper dermis.
- The resulting wound healing process stimulates collagen remodeling and improves photoaging, actinic keratoses, acne scars, and dyschromia.

Concentration and Application

TCA peels are classified by concentration:

- **10–25%** → superficial (epidermal level)
- **30–40%** → medium-depth (papillary dermis)
- **>50%** → deep peels (used with caution, higher risk of scarring)





Jessner's Solution

- The original Jessner's solution contains 14g of resorcinol, 14g of salicylic acid, and 14mL of 85% lactic acid, diluted in 100mL of 95% ethyl alcohol.
 - Modified versions may exclude resorcinol to avoid allergic reactions or hyperpigmentation.
1. Treating photoaging (fine lines, actinic keratosis).
 2. Improving pigmentary disorders like melasma.
 3. Treating oily and acne-prone skin, including comedones (blackheads).
 4. Improving the appearance of thick or rough skin and large pores.



Phenol Peels

- Is the deepest and most potent type of chemical peel, using a phenol solution to deeply exfoliate the skin to treat severe wrinkles, sun damage, and scars.
- It stimulates new collagen and elastin to create a significant and long-lasting tightening effect, similar to a facelift but without surgery.
- Due to its intensity, it is typically recommended for fair skin on the face and requires a skilled professional for administration, with a lengthy recovery period.
- Deepest acting; causes coagulative necrosis of the dermis.
- Requires cardiac monitoring due to systemic absorption risk.
- Long-lasting results but higher risk of scarring and pigment alteration.

Light Chemical Peels

Alpha Hydroxy Acid (AHA) is used to penetrate the outer layer of skin to gently exfoliate it.

Moderate Chemical Peels

Trichloroacetic Acid (TCA) is used to cause controlled damage to the Epidermis and into the Papillary dermis.

Deep Chemical Peels

Phenol Acid is used to deeply penetrate into the Reticular Dermis layer of the skin.

