



INTRODUCTION TO HUMAN SKIN

Basic science, structure and function

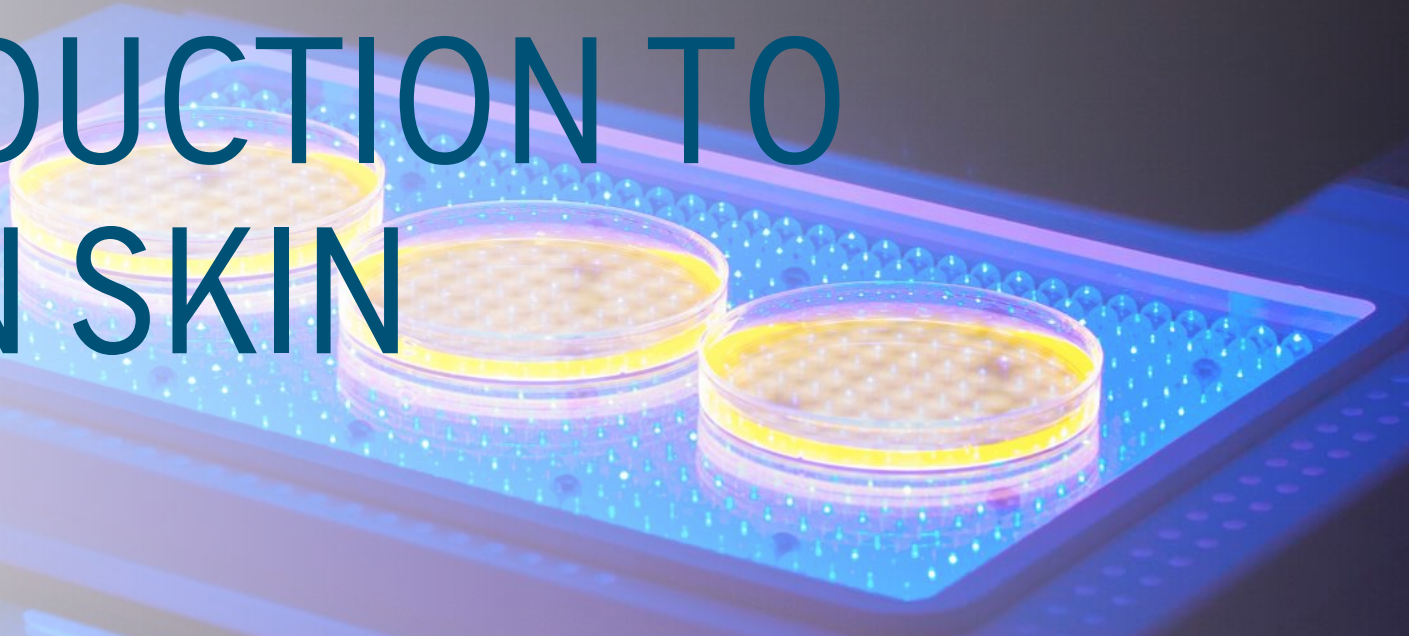
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INTRODUCTION TO HUMAN SKIN



SKIN¹⁻³

- Outer covering of the body
- In humans, the largest organ
- Guards the underlying muscles, bones, ligaments and internal organs
- **Cutaneous:** adjective that means 'of the skin' (from the Latin *cutis*, skin)
- **Main role:** protecting the body against pathogens and excessive water loss

MAIN FUNCTIONS¹⁻³

- Protection
- Insulation
- Temperature regulation
- Sensation
- Synthesis of Vitamin D

PHYSICAL BARRIER^{1,4}



- Regulates water loss
- Protects against mechanical, chemical and microbial agents
- Dysfunction of the skin barrier leads to:
 - Injury
 - Dehydration
 - Infection
 - Inflammation

IMMUNOLOGIC BARRIER^{1,3}



- Skin both senses and responds to pathogens
- Permeability and antimicrobial functions
- Limiting pathogen colonization through:
 - Low water content
 - Acidic pH
 - Resident (normal) microflora
 - Skin surface antimicrobial lipids
- Dysfunction of the immunologic barrier may lead to:
 - Infection
 - Skin cancer
 - Inflammatory skin conditions
 - Allergy

TEMPERATURE REGULATION^{1,2,4}



- Helps maintain a constant body temperature
 - Insulating properties of fat and hair
 - Accelerating heat loss with sweat production
 - Heat loss with superficial microvasculature
- Dysfunction leads to hyper- or hypothermia

RADIATION⁵



- Melanin, the dark skin pigment in epidermis, protects cells against UV radiation
- Dysfunction of melanin production causes patient to be more susceptible to skin cancer

NERVE SENSATION^{1,2}



- Sensory receptors allow the skin to monitor the environment
- Mechanoreceptors in the skin are important for the interaction with physical objects
- Dysfunction leads to:
 - Itch
 - Abnormal sensation
 - Insensitivity to injury

INJURY REPAIR¹⁻⁴



- Skin presents cutaneous wound repair processes that have four phases:
 - Coagulation
 - Inflammatory phase
 - Tissue formation
 - Remodeling phase
- Loss of ability to repair injury leads to delayed wound healing

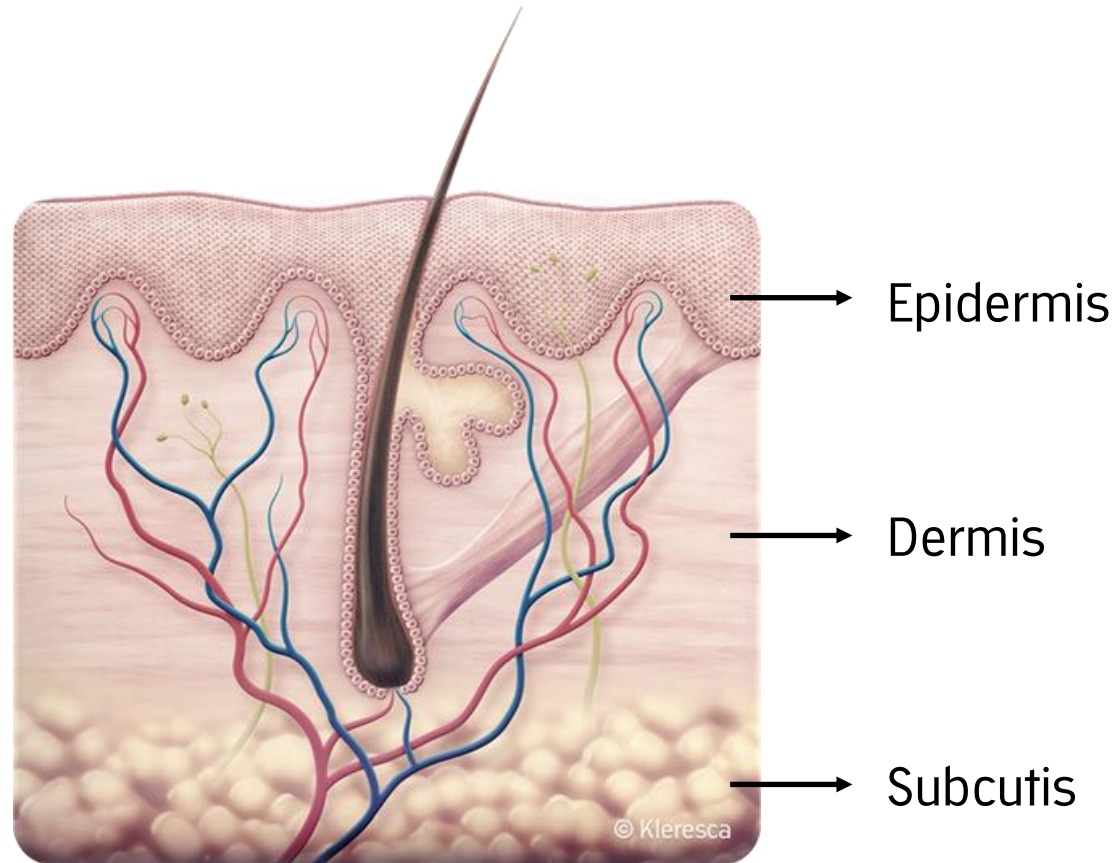
APPEARANCE & QUALITY OF LIFE⁶

- Skin defects and physiologic aging can result in considerable psychological distress
- Important clinical feature of many cutaneous diseases



BASIC ANATOMY OF THE SKIN

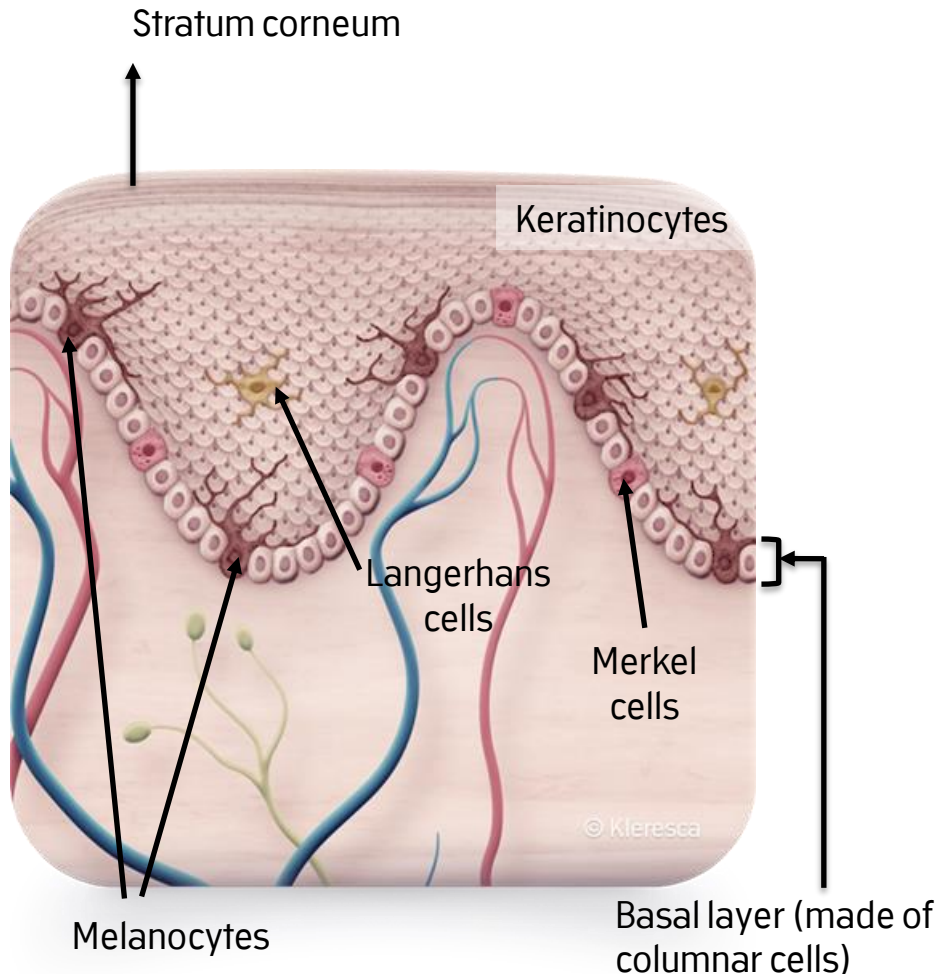
Three petri dishes containing yellow agar are arranged on a blue grid surface. The background is dark with blue and purple lighting, suggesting a laboratory or scientific setting.



HUMAN SKIN STRUCTURE

Skin is composed of three main layers¹

EPIDERMIS^{1,2,7,8}



- Outer layer of the skin, permanent contact with environment
- Made of stratified layers of flattened cells (keratinocytes)
- The bottom part of the epidermis is called **basal layer**, made by cells arranged perpendicularly (**columnar cells**)
- The basal layer continuously produces new cells that feed the stratified layers
- Entire epidermis is replaced by new cells over a period of 48 days
- The outermost layer of the epidermis consists of 15 – 20 layers of flattened dead cells, called **stratum corneum**. Its main function is to act as a barrier

FUNCTIONS OF THE EPIDERMIS^{1,2,9}

- Protective wrap over the body's surface
 - Waterproof
 - Barrier against microbes
- Main cell types:
 - Keratinocytes (90% of the cells)
 - Melanocytes
 - Langerhans cells (cells from the immune system)
 - Merkel cells (mechanoreceptors)



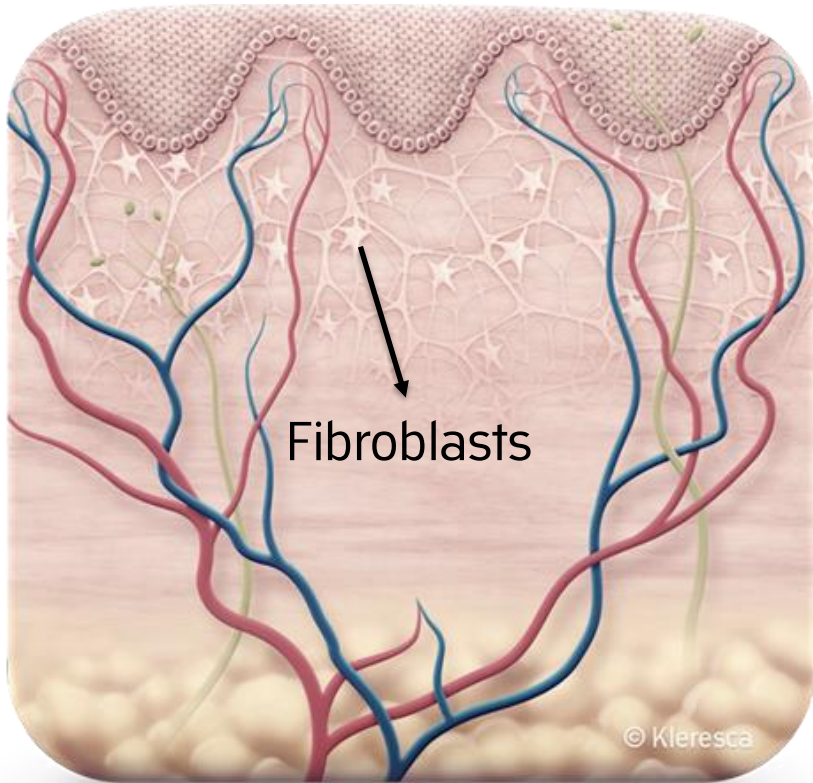
KERATINOCYTES^{1,2,10}

- Majority of the cells (90%)
- Form a barrier against environmental damage
 - pathogenic bacteria, fungi, parasites and viruses
 - heat
 - UV radiation
 - water loss

MELANOCYTES^{1,5,11}

- Melanin-producing cells located in the bottom layer of epidermis
- Scattered along the basal layer (around 1 in every 10 keratinocytes)
- Melanin is the pigment responsible for skin color
- After being synthesized, melanin is contained in special 'bags' called melanosomes

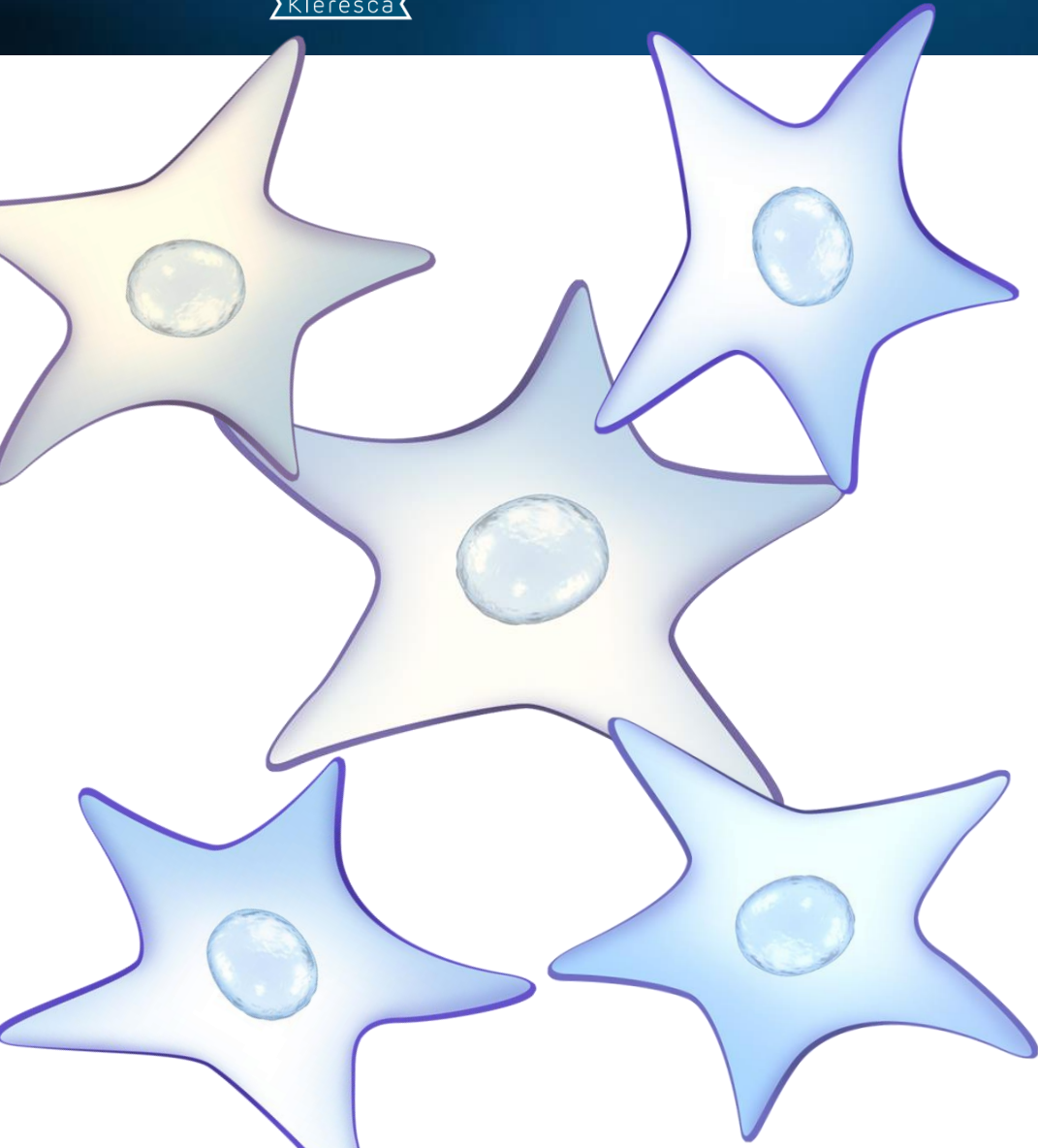
DERMIS^{1,2,12}



- Lies below epidermis
- The ECM (extracellular matrix) has an important role in the dermis
- Consists primarily of the following cells:
 - Fibroblasts
 - Mast cells (type of white blood cell)
- Contains blood and lymphatic vessels, nerves, sweat glands and hair follicles
- It also contains receptors to provide information to the body:
 - Mechanoreceptors: sense of touch
 - Thermoreceptors: sense of heat

FUNCTIONS OF THE DERMIS^{1,2,12}

- Provides a flexible but tough support structure
- Cushions the body from stress and strain
- Tightly connected to the epidermis by a membrane

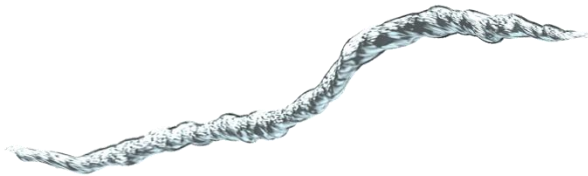


FIBROBLASTS^{1,2,13}

- Synthesize the proteins to create the extracellular matrix giving structure to the dermis
 - Collagen
 - Elastin
- Critical role in wound healing
- Crucial role in skin aging

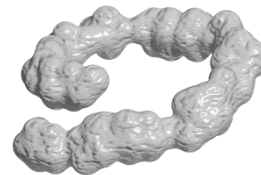
EXTRACELLULAR MATRIX^{1,2,13,14}

- Very important component in the dermis of our skin.
- Collection of extracellular molecules secreted by cells that provides structural and biochemical support to the surrounding cells.
- There are two main proteins in the ECM:



Collagen

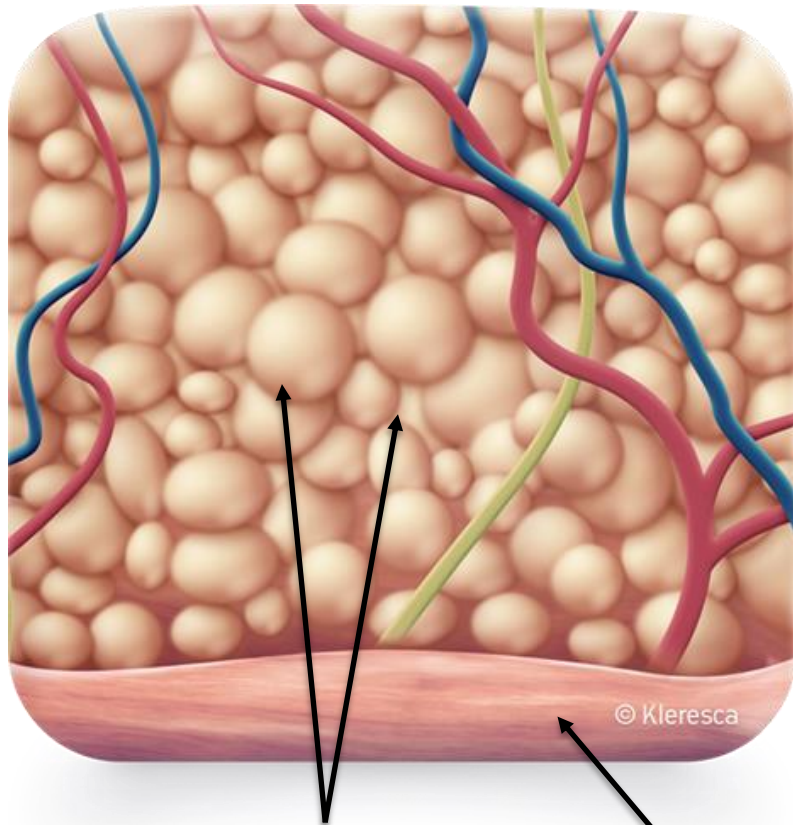
- The most abundant protein in the ECM (and in the human body)
- Fibrillar proteins that give structural support to the cells.



Elastin

- Give elasticity to tissues, allowing them to stretch when needed and return to their original state.

SUBCUTIS^{1,2}



Adipose cells

Muscle

- It has also other names (subcutaneous tissue, hypodermis, hypoderm, panniculus...)
- Lowermost layer of the skin, containing primarily:
 - Fat cells (adipose cells)
 - Fibroblasts
 - Macrophages (type of white blood cell, in charge to eat and digest anything not belonging to a healthy body)

FUNCTIONS OF THE SUBCUTIS^{1,2}

- Fat layer that separates dermis from deeper structures (e.g. muscles)
- It has different functions:
 - Insulates the body
 - Cushions and protects the skin
 - Allows skin mobility over underlying structures

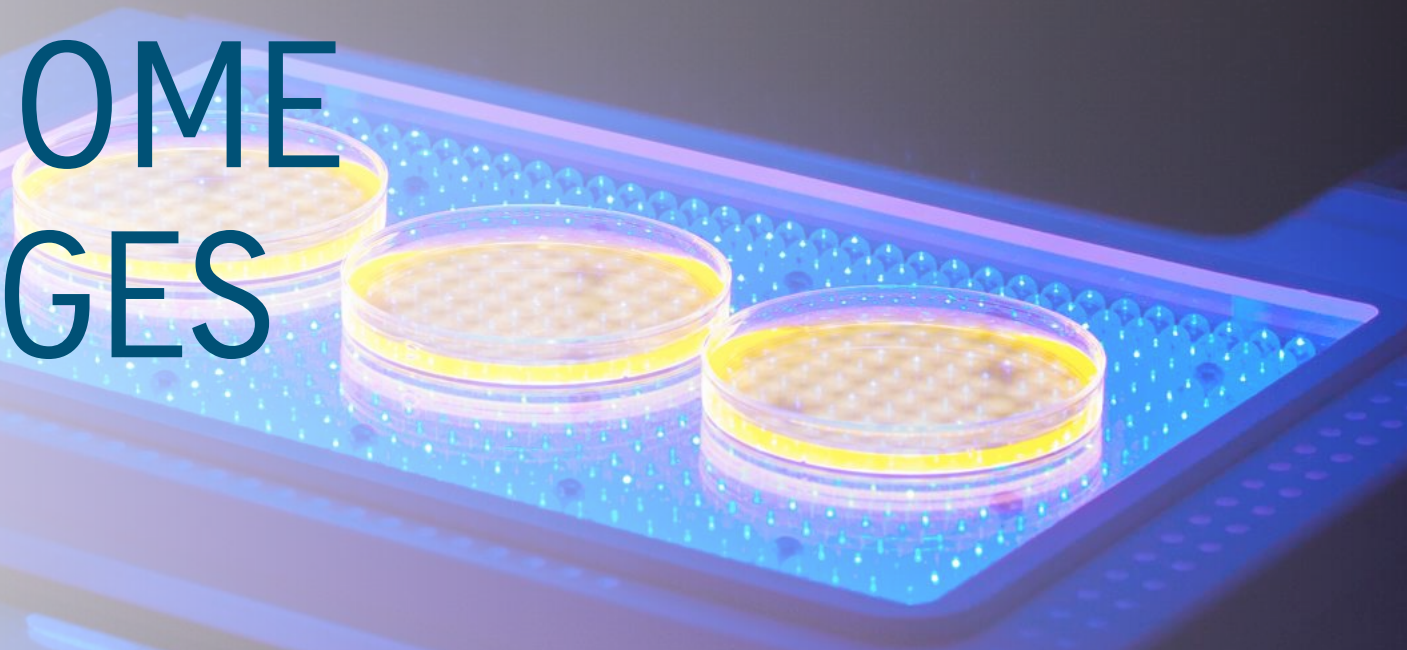
SKIN DISEASES & AGING

Disfunction of the skin, or of one of its layers, may lead to different skin disorders, like acne or rosacea^{1,2}.

The skin also suffers an 'aging process' where changes are happening in all the different layers of the skin¹⁴.

Learn more about acne, rosacea or skin aging in our different presentations within FB Academy to continue increasing your knowledge.

TAKE HOME MESSAGES



SUMMARY

- Skin is the outer covering of our body and has main functions in protection, insulation, temperature regulation, sensation and synthesis of Vitamin D
- Human skin is composed of three main layers: Epidermis, Dermis and Subcutis
- **Epidermis:** Outer layer of the skin, permanent contact with environment. Protective wrap over the body's surface. Waterproof and barrier against microbes.
 - **Main cell types:** Keratinocytes and Melanocytes
- **Dermis:** lies below the epidermis. The ECM has an important role in it. Provides a flexible but tough support structure, cushioning the body from stress and strain
 - **Main cell types:** Fibroblast, producing collagen and elastin.
- **Subcutis:** Lowermost layer of the skin. Insulates the body, cushions and protects the skin and allows skin mobility over underlying structures.
 - **Main cell types:** Fat cells, fibroblasts and macrophages.



Do you have further questions?
Send us a mail at info@fb-dermatology.com

Do you want to check your knowledge about human skin? Do the test to see how much you have learned and get your certificate of completion!

TAKE THE TEST



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