

14. INTEGUMENTARY SYSTEM

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14. INTEGUMENTARY SYSTEM

INTEGUMENTARY SYSTEM:

The integumentary system is the largest organ of the body. It forms a physical barrier between the external environment and the internal environment and protect the body.

The integumentary system includes:

1. Skin (epidermis, dermis)
2. Hypodermis
3. Associated glands
4. Hair
5. Nails.

1. SKIN:

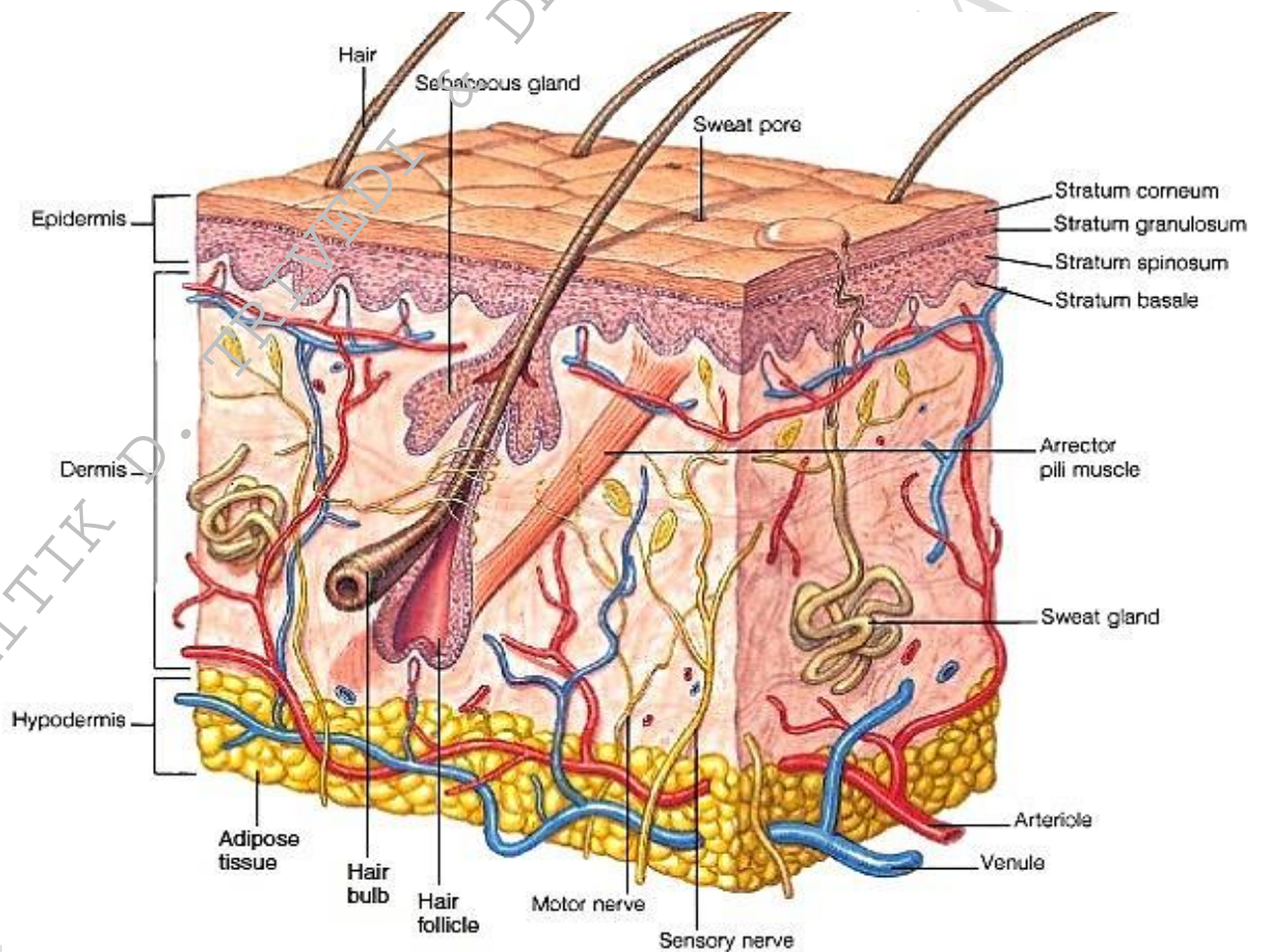


Diagram of Skin

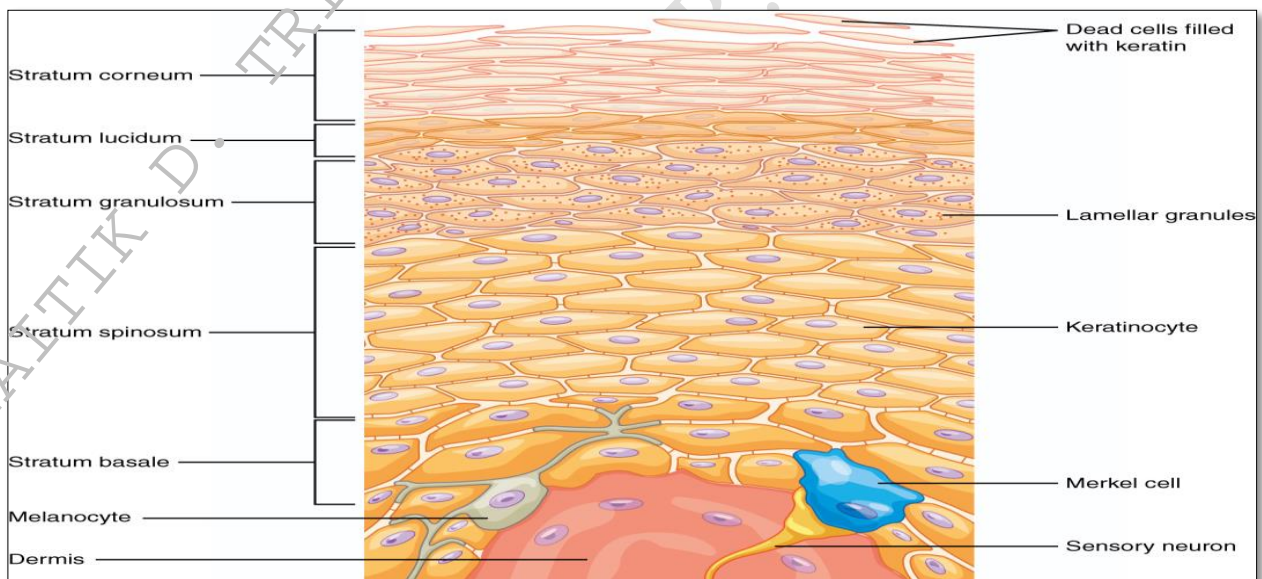
- Skin occupy 16% of our total body weight
- Skin is made up by two layers:
 - i. Epidermis:
 - It is a superficial layer of the skin
 - It contains four principal types of cells: **keratinocytes, melanocytes, Langerhans cells, and Merkel cells.**

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- About 90% of epidermal cells are **keratinocytes** which are arranged in four or five layers and produce the protein keratin, tough layer.
- About 8% of the epidermal cells are **melanocytes** which produce pigment melanin. Melanin is a yellow-red or brown-black pigment that contributes to skin color and absorbs damaging ultraviolet (UV) light.
- **Langerhans cells** develop from red bone marrow and migrate to the epidermis. They protect us from microbes.
- **Merkel cells** located in the deepest layer of the epidermis, it detect touch sensations.

Layers of Epidermis: (from deep to superficial):

- a. Stratum basale or germinatum – single row of cells attached to dermis; youngest cells
- b. Stratum spinosum – Made up of bundles of protein resist tension
- c. Stratum granulosum – layers of flattened keratinocytes producing keratin.
- d. Stratum lucidum- (only found in thick skin – that is, the palms of the hands, the soles of the feet and the digits)
- e. Stratum corneum – horn cornified superficial layer



Layers of epidermis

ii. Dermis:

- It is a deep layer of skin made up by fibre and it having good tensile strength.
 - It is divided in papillary and reticular region.
- a) **The Papillary Dermis:** The papillary dermis is the more superficial of the two, and lies just beneath the epidermal junction. It is relatively thin and is made up of loose connective tissue, which includes:
- Capillaries
 - Elastic fibers

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- Reticular fibers
- Collagen
- b) **The Reticular dermis:** The reticular dermis is the deeper and thicker layer of the dermis, which lies above the subcutaneous layer of the skin. It contains dense connective tissue, which includes:
 - Blood vessels
 - Elastic fibers (interlaced)
 - Collagen fibers (in parallel layers)
 - Fibroblasts
 - Mast cells
 - Nerve endings
 - Lymphatics

2. HYPODERMIS:

- The hypodermis lies between the dermis and underlying organs.
- It is also known as subcutaneous layer.
- It is composed of loose areolar tissue and adipose tissue.
- This layer provides additional cushion and insulation through its fat storage function and connects the skin to underlying structures such as muscle.

3. ASSOCIATED GLANDS:

- Integumentary system has four types of exocrine glands, which secrete their product or substance outside the cells and body.

i. Sudoriferous glands:

- Sweat glands excrete sweat via very small openings at the skin's surface.
- The purpose of sudoriferous glands is to emit perspiration to help cool the body off when the body temperature rises.

ii. Sebaceous glands:

- It is responsible for releasing oil into the hair follicle to help lubricate and protect the hair shaft, keeping it from becoming hard and brittle.

iii. Ceruminous glands:

- Located in the ear canal. It produce ear wax known as cerumen.
- Cerumen prevent entry of dust, bacteria and harmful agent in the ear.

iv. Mammary glands:

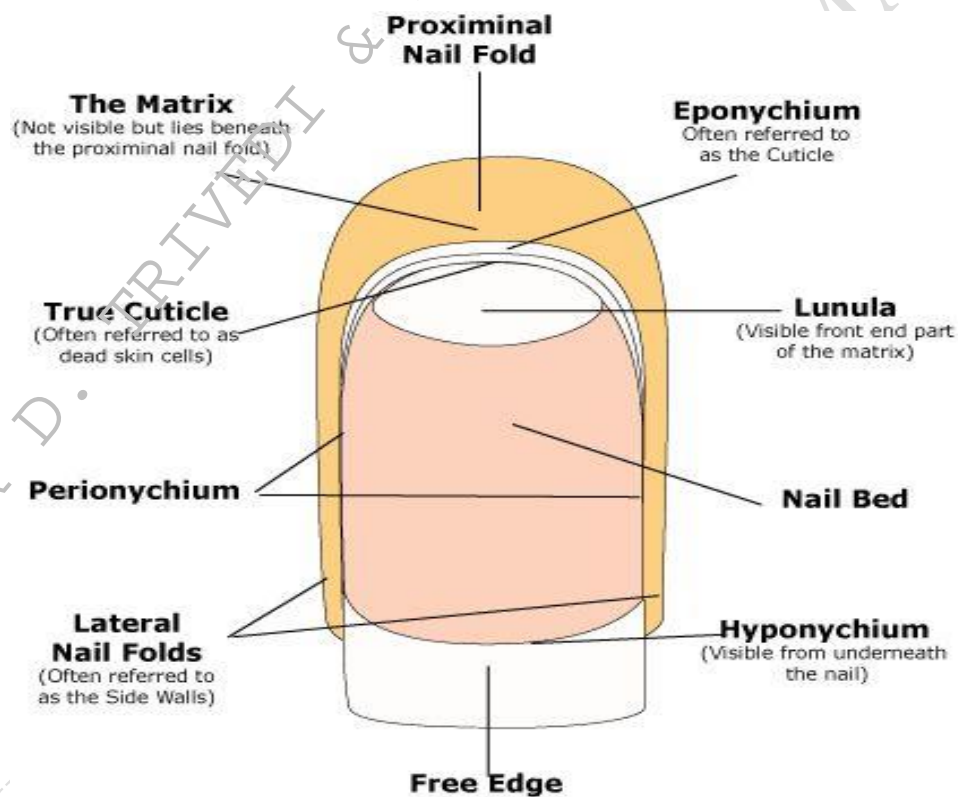
- There are two mammary glands located one at each side of the front of the chest wall.
- Both men and women have mammary glands, but in men, these glands are underdeveloped. In females, the glands function to produce breast milk after giving birth.

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4. HAIR:

- Hair is derived from the epidermis but grows its roots deep into the dermis.
- Its structure divides into the externally visible hair shaft and the hair follicle within the skin.
- Hair is primarily comprised of a fibrous protein and contains a very small amount of lipids (fats) and water.
- Hair comes from follicles, which are simple organs made up of cells called epithelial cells

5. NAIL:



- Nails consist of several segments, including:
 - i. **The nail plate:** The part of the nail that is visible.
 - ii. **The nail bed:** The skin that lies beneath the nail plate.
 - iii. **The cuticle:** The thin line of tissue that is located at the base of the nail and overlaps the nail plate.
 - iv. **The nail folds:** The folds of the skin located on the sides of the nail plate.
 - v. **The lunula:** The white-colored half-moon-shaped area located at the base of the nail plate.

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- vi. **The matrix:** Part of the nail that is not visible, located underneath the cuticle, this is the area responsible for the growth of the fingernail.

Functions of integumentary system:

- It act as barrier so it provides physical protection against bacteria and germs.
- It heal abrasions, cuts and other injuries.
- It protect us from the sun's ultraviolet (UV) rays and sunburn.
- It remove waste by excreting sebum, sweat and other waste from our body.
- It maintain our body temperature by heat evaporating and absorbing as needed.
- It give us sensation for heat, cold and detect other sensations.
- It helps to synthesizes vitamin D.
- It Stores fat for a source of energy
- It Keeps the body from becoming dehydrated