

## Unit VII – Problem 8 – Physiology: Functions of Skin



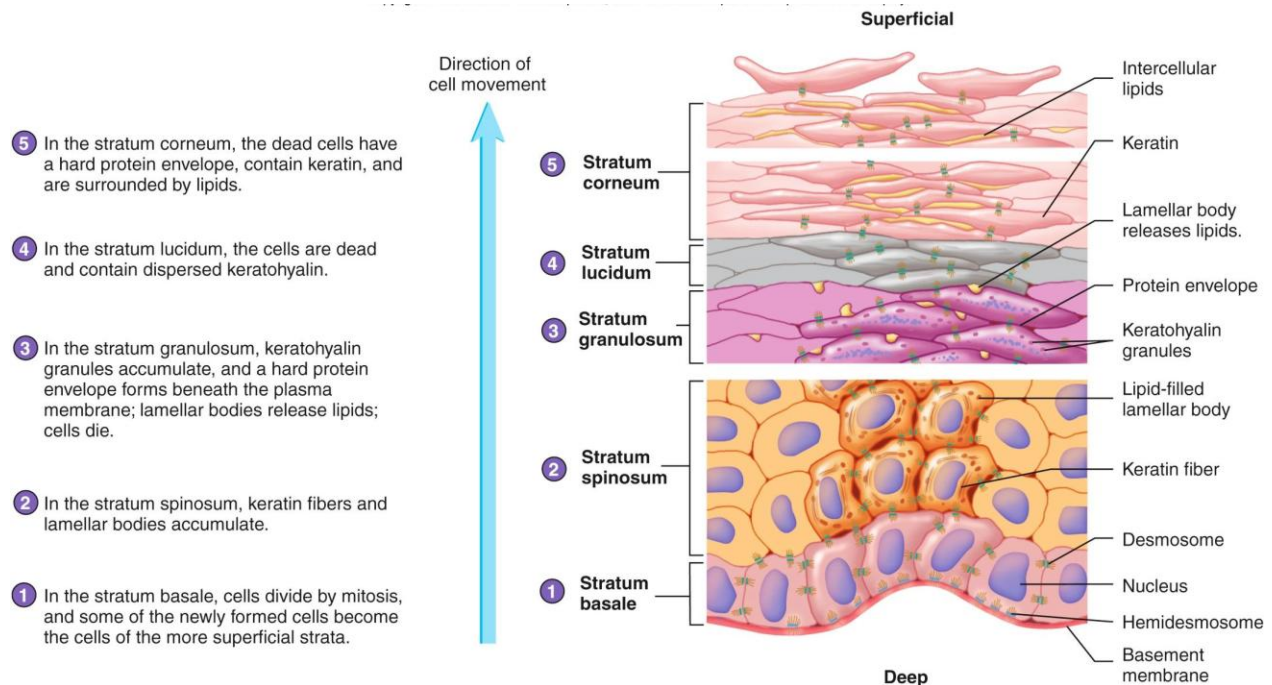
- Skin is the largest organ in the body in its surface area (1.8 m<sup>2</sup>).
- Structure of the skin:

- **Epidermis:** thinner outer layer of the skin.

- ✓ Cells in the epidermis include the following:

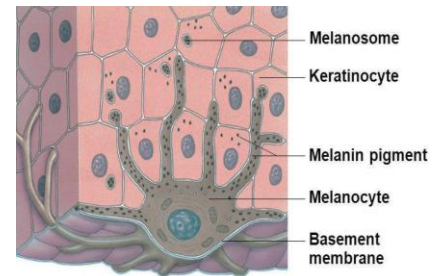
- ❖ *Keratinocytes (90% of epidermal cells):*

- Producing keratin which adheres cells together to form a barrier and this will form the impereable lipid-containing stratum corneum (one of the epidermal layers).
      - As these cells move upward through layers of epidermis, they lose their nuclei, die and become filled with keratin (forming a barrier against water loss, mechanical abrasion penetration).
      - This layer regenerates every 25-45 days.



- ❖ *Melanocytes (8% of epidermal cells):*

- Producing melanin (from tyrosine by the enzyme tyrosinase) which will be transferred to keratinocytes. Melanin accumulates in melanosomes and is transported along dendrites of the melanocytes to keratinocytes, shielding its nucleus from harmful UV-light.
      - When there is deficiency of melanin → a person becomes albino; local accumulation of melanin will result in freckles and pigmented moles.
      - In lighter skin, tyrosinase is not fully functional due to 2 genetic factors: much of tyrosinase produced is in an inactive form and various inhibitors of tyrosinase action will be produced.

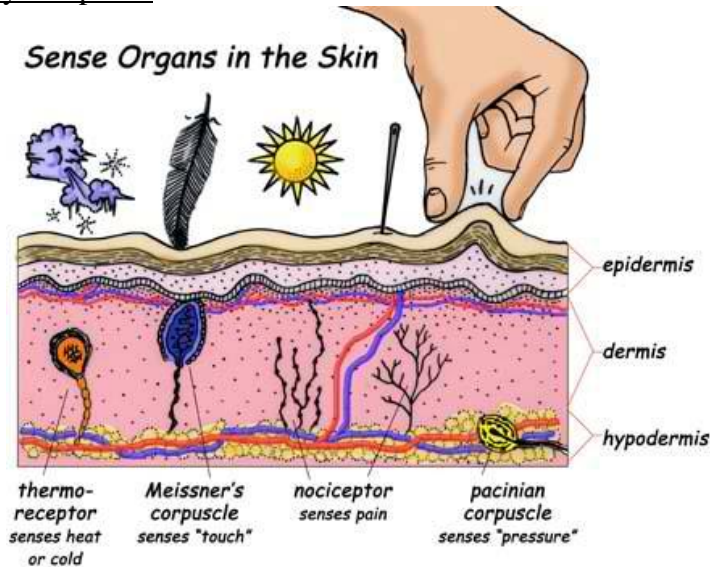


- ❖ *Granstein cells:*

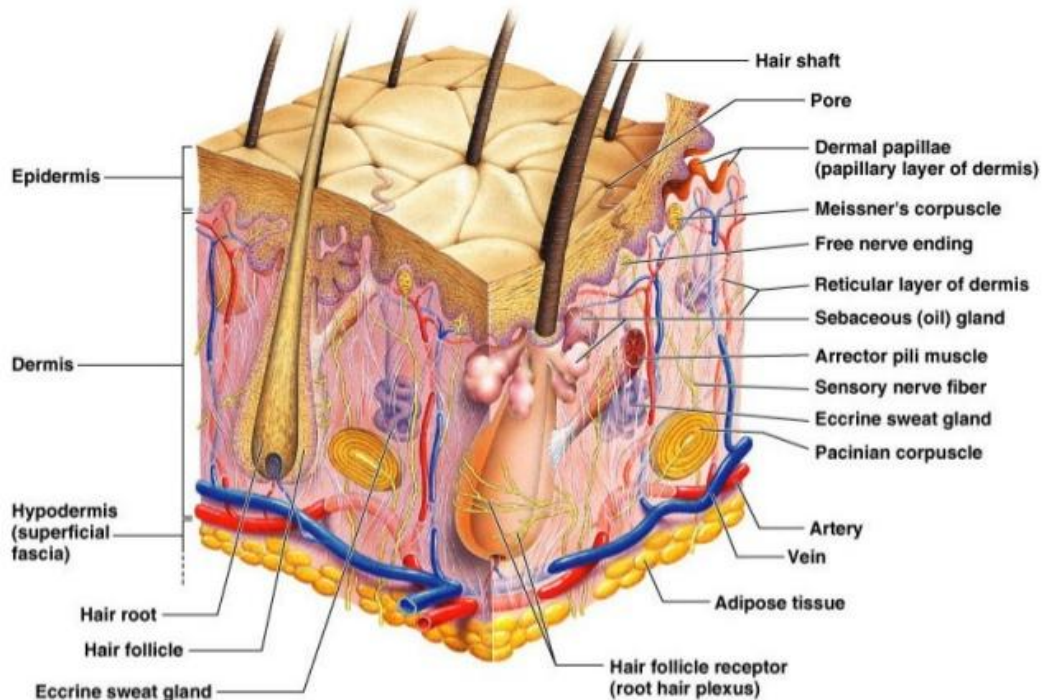
- Process and present antigen to suppressor cells.
      - Suppress skin-activated immune responses.



- ❖ *Langerhans cells:*
  - Process and present antigens to helper T-cells.
  - Facilitate responses to skin-associated antigens.
- **Dermis:** thicker connective tissue layer.
  - ✓ It is a flexible and strong connective tissue which is composed of elastic, reticular and collagen fibers.
  - ✓ It also contains the following:
    - ❖ *Cells:* fibroblasts, macrophages and mast cells.
    - ❖ Nerves, blood and lymphatic vessels.
    - ❖ Sweat and sebaceous glands.
  - ✓ Skin sensory receptors:



- **Hypodermis (subcutaneous layer).**



- **Functions of the skin:**

- **Protection:**
  - ✓ Skin is considered as a physical barrier (innate immunity) which protects underlying tissues from injury, cancerous effect of UV-light and bacterial invasion.
  - ✓ It prevents loss of fluids from the body (when patient's skin is burnt and lost, he will mostly die from dehydration of infection).



- **Regulation of body temperature:**
  - ✓ When the body is exposed to high temperatures, sweat glands in dermis of the skin will produce sweat that will cool the skin by evaporating from its surface.
  - ✓ Body temperature is also controlled through vasodilation (loss of more heat) or vasoconstriction (decreasing loss of heat).
- **Sensation:**
  - ✓ Skin contains nerve endings and cells which will detect stimuli to touch, pain, temperature and pressure.
- **Excretion:**
  - ✓ Sweat removes water and small amounts of salt, uric acid and ammonia from body surface.
- **Blood reservoir:**
  - ✓ Dermis of the skin has extensive network of blood vessels carrying 10% of total blood flow in a resting adult.
- **Synthesis of vitamin-D:**
  - ✓ UV-light in sunlight stimulates the production of vitamin-D.