Could you please not leave your old skins lying around the house!
INTEGUMENTARY SYSTEM

Could you please not leave your old skins lying around the house!
WHAT COULD POSSIBLY GO WRONG???
And you think you have skin problems?

What could possibly go wrong???
Striae - Stretch Marks
Black Hairy tongue
Athlete’s Foot
Chicken Pox
Herpes Zoster
Shingles
Genital Herpes
Dermatographism
Dematographism
Ehlers-Danlos Syndrome
Collagen Degeneration
Gangrene
Acne Vulgaris
Keloids
Keloids
Keloids
Keloids
Malignant Melanoma
Psoriasis
Anthrax
Secondary Syphilis
INTEGUMENTARY SYSTEM
FACTS:

- Largest organ in the body
- covers 22 square feet
- weighs 10 - 12 lbs
- represents about 16% of body weight
- 0.5 mm to 4 mm thick
- 2 major layers
  - upper epithelial Epidermis
  - lower connective tissue Dermis
  - underlying dermis is Subcutaneous Layer (not part of skin)

Major functions

- thermoregulation
- protection
- Sensations
- excretion
- Absorption
- Vitamin synthesis
OVERVIEW OF SKIN

epidermis
dermis
hypodermis
OVERVIEW OF SKIN

- epidermis
- dermis
- hypodermis

- papillary layer
- reticular layer
ADDITIONAL STRUCTURES

- sweat pore
- meissner's corpuscle
- arrector pili muscle
- eccrine sweat gland
- sensory nerve
- free nerve ending
- sebaceous gland
- apocrine sweat gland
arranged in four or five layers and produce the protein keratin. Keratin is a tough, fibrous protein that helps protect the skin and underlying tissues from heat, microbes, and chemicals. Keratinocytes also produce lamellar granules, which release a water-repellent sealant that decreases water entry and loss and inhibits the entry of foreign materials.
EPIDERMAL CELL TYPES

Keratinocytes are arranged in four or five layers and produce the protein keratin. Keratin is a tough, fibrous protein that helps protect the skin and underlying tissues from heat, microbes, and chemicals. Keratinocytes also produce lamellar granules, which release a water-repellent sealant that decreases water entry and loss and inhibits the entry of foreign materials.

8% of the epidermal cells are melanocytes and produce the pigment melanin. Their long, slender projections extend between the keratinocytes and transfer melanin granules to them. Melanin is a yellow-red or brown-black pigment that contributes to skin color and absorbs damaging ultraviolet (UV) light. Once inside keratinocytes, the melanin granules cluster to form a protective veil over the nucleus, on the side toward the skin surface. In this way, they shield the nuclear DNA from damage by UV light. Although their melanin granules effectively protect keratinocytes, melanocytes themselves are particularly susceptible to damage by UV light.
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Langerhans Cells

Merkel cells are the least numerous of the epidermal cells. They are located in the deepest layer of the epidermis, where they contact the flattened process of a sensory neuron (nerve cell), a structure called a tactile (Merkel) disc. Merkel cells and tactile discs detect different aspects of touch sensations.
Layers of the Epidermis

- stratum corneum (25-30)
- most superficial
- most deep
Layers of the Epidermis

- **stratum corneum (25-30)**
- **stratum lucidum (3-5)**

Most superficial

Most deep
Layers of the Epidermis

- stratum corneum (25-30)
- stratum lucidum (3-5)
- stratum granulosum (3-5)

most superficial

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Layers of the Epidermis

- **stratum corneum (25-30)**
- **stratum lucidum (3-5)**
- **stratum granulosum (3-5)**
- **stratum spinosum (8-10)**

**Most superficial**

- keratinocyte
- langerhans cell

**Most deep**
Layers of the Epidermis

- stratum corneum (25-30)
- stratum lucidum (3-5)
- stratum granulosum (3-5)
- stratum spinosum (8-10)
- stratum basale (1)

- dermis

- keratinocyte
- langerhans cell
- merkel's disc
- free nerve ending

most superficial
most deep
EPIDERMIS

- stratum corneum
- stratum spinosum
EPIDERMIS

- stratum corneum
- 5
- stratum granulosum
- stratum spinosum
- dermis
stratum corneum
stratum lucidum
stratum granulosum
stratum spinosum
dermis

EPIDERMIS
DERMIS

- papillary layer
- friction ridges
- Meissners corpuscles
- blood capillaries
- free nerve endings

- areolar c.t.
- dermal papilla
- dermal papilla

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DERMIS

papillary layer:
- dermal papilla
- friction ridges
- Meissner's corpuscles
- blood capillaries
- free nerve endings

reticular layer:
- dense irregular c.t.
- fibroblasts
- collagen fibers
- elastin fibers
- Pacinian corpuscle
- sweat glands
- sebaceous glands
- blood supply

areolar c.t.
STRETCHING SKIN
Hair Photomicrograph

Sebaceous gland
free edge or hyponychium
NAILS

- free edge or hyponychium
- nail body
- lunula
NAILS

- free edge or hyponychium
- nail body
- lunula
- nail root
- eponychium or cuticle
GLANDS OF THE SKIN
Sebaceous Glands
Sebaceous Glands

- Sebaceous glands or oil glands are simple, branched glands connected to hair follicles.
- The secreting portion of a sebaceous gland lies in the dermis and usually opens into the neck of a hair follicle.
- In some locations, such as the lips, glans penis, labia minora, and tarsal glands of the eyelids, sebaceous glands open directly onto the surface of the skin.
- Absent in the palms and soles, sebaceous glands are small in most areas of the trunk and limbs, but large in the skin of the breasts, face, neck, and superior chest.
- Sebaceous glands secrete an oily substance called sebum a mixture of triglycerides, cholesterol, proteins, and inorganic salts.
- Sebum coats the surface of hairs and helps keep them from drying and becoming brittle.
- Sebum also prevents excessive evaporation of water from the skin, keeps the skin soft and pliable, and inhibits the growth of certain bacteria.
Sudoriferous Sweat Glands - Eccrine

- Eccrine sweat glands also known as merocrine sweat glands, are more common than apocrine sweat glands.

- They are distributed throughout the skin of most regions of the body, especially in the skin of the forehead, palms, and soles.

- Eccrine sweat glands are not present in the margins of the lips, nail beds of the fingers and toes, glans penis, glans clitoris, labia minora, and eardrums.

- The secretory portion of eccrine sweat glands is located mostly in the deep dermis and projects through the dermis and epidermis and ends as a pore at the surface of the epidermis.

- The sweat produced by eccrine sweat glands (about 600 mL per day) consists of water, ions, urea, uric acid, ammonia, amino acids, glucose, and lactic acid.

- The main function of eccrine sweat glands is to help regulate body temperature through evaporation.

- As sweat evaporates, large quantities of heat energy leave the body surface. Eccrine sweat also plays a small role in eliminating wastes such as urea, uric acid, and ammonia from the body.

- Sweat that evaporates from the skin before it is perceived as moisture is termed **insensible perspiration**. Sweat that is excreted in larger amounts and is seen as moisture on the skin is called **sensible perspiration**.
Sudoriferous Sweat Glands - Apocrine
Sudoriferous Sweat Glands - Apocrine

- They are found mainly in the skin of the axilla (armpit), groin, areolae (pigmented areas around the nipples) of the breasts, and bearded regions of the face in adult males.

- The secretory portion of these sweat glands is located mostly in the subcutaneous layer, and the excretory duct opens into hair follicles.

- Their secretory product is slightly viscous compared to eccrine secretions and contains the same components as eccrine sweat plus lipids and proteins.

- Eccrine sweat glands start to function soon after birth, but apocrine sweat glands do not begin to function until puberty.

- Apocrine sweat glands are stimulated during emotional stress and sexual excitement; these secretions are commonly known as a “cold sweat.”
CERUMINOUS GLANDS
CERUMINOUS GLANDS

- Modified sweat glands in the external ear, called ceruminous glands produce a waxy secretion.
- The secretory portions of ceruminous glands lie in the subcutaneous layer, deep to sebaceous glands.
- Their excretory ducts open either directly onto the surface of the external auditory canal or into ducts of sebaceous glands.
- The combined secretion of the ceruminous and sebaceous glands is called cerumen, or earwax.
- Cerumen, together with hairs in the external auditory canal, provides a sticky barrier that impedes the entrance of foreign bodies.
pacinian corpuscle

lamellated pressure receptor consisting of concentric connective tissue rings around the dendrites of a sensory neuron. Design for deep pressure and pain
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Meissner's Corpuscle

- Sensory receptor for the sensation of touch, located in the dermal papilla and found numerously in the palms of hands and soles of feet.
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Free Nerve Ending

Dendritic endings of nerves also found in dermal papillae used for fine discriminating touch. Most numerous in the fingertips and lips.
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Pili Nerve Plexus

- Dendritic nerve endings surrounding hair follicle to detect movement.
Neural Structures

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Free Nerve Ending
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Pili Nerve Plexus
- Dendritic nerve endings surrounding hair follicle to detect movement.

Arrector Pili Muscle
- Smooth muscle anchoring follicle to dermis. Contraction pulls hair vertically resulting in goose bumps.
Overall Contribution
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✦ Provides a major barrier for all internal organs
Overall Contribution

- Provides a major barrier for all internal organs
- Regulates body temperature via sweat glands
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✦ Activates Vitamin D
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✦ Provides some calcium ions
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- Provides a major barrier for all internal organs
- regulates body temperature via sweat glands
- Activates Vitamin D
- Provides some calcium ions
- allows for fine sensations of touch and temperature
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- Keratinocytes activate vitamin D to calcitrol
**Overall Contribution**

- Provides a major barrier for all internal organs
- Regulates body temperature via sweat glands
- Activates Vitamin D
- Provides some calcium ions
- Allows for fine sensations of touch and temperature
- Keratinocytes activate vitamin D to calcitrol
- Functions as the first line of defense
Overall Contribution

✦ Provides a major barrier for all internal organs
✦ regulates body temperature via sweat glands
✦ Activates Vitamin D
✦ Provides some calcium ions
✦ allows for fine sensations of touch and temperature
✦ keratinocytes activate vitamin D to calcitrol
✦ functions as the first line of defense
✦ nasal hair filters air
Overall Contribution

- Provides a major barrier for all internal organs
- Regulates body temperature via sweat glands
- Activates Vitamin D
- Provides some calcium ions
- Allows for fine sensations of touch and temperature
- Keratinocytes activate vitamin D to calcitrol
- Functions as the first line of defense
- Nasal hair filters air
- Response to erotic stimuli
Overall Contribution

- Provides a major barrier for all internal organs
- Regulates body temperature via sweat glands
- Activates Vitamin D
- Provides some calcium ions
- Allows for fine sensations of touch and temperature
- Keratinocytes activate vitamin D to calcitrol
- Functions as the first line of defense
- Nasal hair filters air
- Response to erotic stimuli
- Production of milk