Integumentary System

“The skin is no more separate from the brain than the surface of a lake is separate from its depths. They are two different locations in a continuous medium. To touch the surface is to stir the depths.”

—Deane Juhan
Lesson Plan: Integumentary System

- 5 minutes: Attendance and Breath of Arrival
- 50 minutes: Integumentary System
Punctuality—everybody's time is precious:

- Be ready to learn by the start of class, we'll have you out of here on time
- Tardiness: arriving late, late return after breaks, leaving early

The following are not allowed:

- Bare feet
- Side talking
- Lying down
- Inappropriate clothing
- Food or drink except water
- Phones in classrooms, clinic or bathrooms

You will receive one verbal warning, then you'll have to leave the room.
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Introduction
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The integumentary system includes the skin and its appendages such as hair, nails, and glands that produce blank oil or blank sweat.
Introduction

The skin houses more than half a million sensory receptors of pressure, pain, heat, cold, movement, and vibration.
Introduction

Skin is composed mostly of connective tissue underneath a layer of epithelial tissue.
Introduction

No other body system is more easily exposed to infections, disease, pollution, or injury than the skin.
Introduction

The appearance of the skin reflects our ________physiology_______, including information about a person's nutrition, hygiene habits, circulation, age, immunity, genetics, and environmental factors.
Introduction

Skin also mirrors our emotional self through muscular expression and neurological impulses.
Anatomy
Anatomy

Skin

Hair

Nails

Skin Glands
Fun Facts

Skin covers 22 square feet and weighs 9 lbs.

A piece of skin the size of a quarter contains:

- 3 million cells
- 100 sweat glands
- 50 nerve endings
- 3 feet of blood vessels

Fingertips have 700 touch receptors on a 2 square mm of surface area
Physiology

Protection  Physical, biologic, and chemical barrier.
Physiology

Absorption **Fat**-soluble molecules and vitamins, steroids, resins of plants such as poison ivy and poison oak, and salts of heavy metals.
Physiology

Sensation  Extension of the _____nervous_____ system. Receives stimuli such as pressure, pain, and temperature.

Fig. 22-1. Microscopic view of the skin.
Physiology

**Body temperature regulation**  As blood moves to the skin's surface and blood vessels dilate, heat is discharged. Heat can be dissipated through the evaporation of sweat produced by sweat glands.
Physiology

Waste regulation  Eliminating wastes through __sweating__.
Physiology

Vitamin D synthesis  Molecules in the skin are converted to vitamin D by the ___UV___ rays in sunlight (with a little help from liver and kidney enzymes).
Physiology

**Immunity** Langerhans cells trigger immunologic reactions.
Regions of the Skin
Epidermis
Epidermis

Epidermis **Outer** region of the skin. Composed of epithelial cells.
Epidermis

Keratinocyte  Epidermal cell that produces __keratin__, a protein that waterproofs the skin.
Epidermis

**Melanocyte**  Epidermal cell that produces **melanin**, a pigment that contributes to skin color and decreases the amount of ultraviolet light that can penetrate into the deeper layers of the skin.
Epidermis

Langerhans cell  Epidermal cell that triggers immunologic reactions.
Epidermis

Epidermal Layers (from deepest to most superficial):
Stratum germinativum
Stratum spinosum
Stratum granulosum
Stratum lucidum
Stratum corneum
Epidermis

Stratum germinativum — Deepest — epidermal layer.
Through cell division it generates all of the other layers.
Contains Merkel cells and pressure receptors.
**Epidermis**

**Stratum spinosum**  Bonding and transitional epidermal layer between germinativum and granulosum.
Epidermis

**Stratum granulosum**  Epidermal layer containing an accumulation of keratin granules.
Epidermis

**Stratum lucidum**  Translucent epidermal layer only found in the ___thick___ skin of palms and soles.
**Epidermis**

**Stratum corneum**  Outermost epidermal layer where cells are completely keratinized, not **living**, and ready to be sloughed off.
Fun Facts

It takes 21-27 days for cells created in the stratum germinativum to develop and push upward through each of the other layers eventually dying and sloughing off!
Dermis
Dermis

Dermis (AKA: corium, hide, true skin)  Inner region of the skin. Contains blood vessels, sensory nerve receptors, hair follicles, muscles, sweat and oil glands, and connective tissue.
**Dermis**

**Scar**  A dense collection of new connective tissue that forms as the result of an injury to the dermis.
Subcutaneous Layer
Subcutaneous Layer

Subcutaneous layer (AKA: hypodermis or superficial fascia)  Layer beneath the dermis but not a true layer of skin. Consists of loose connective tissue, fat, and nerve receptors.

Fig. 22-1. Microscopic view of the skin.
Hair
Hair

Composed of keratinized filaments arising from pouch-like follicles located in the dermis. Protects the scalp from injury and UV radiation. Protects the eyes, nose, and ears from foreign particles.
Hair

Arrector pili  Tiny ___________muscles_________ attached to hair follicles that contract to pull the hair upright.
Fun Facts

- Straight hair has a shaft that is round.
- Wavy hair has a shaft that is oval.
- Curly or kinky hair has a shaft that is flat.
- Fine hair does not have a medulla (inner core).
- White hair is lacking pigment in the medulla.
Skin Glands
**Skin Glands**

**Sebaceous gland**  Skin gland that secretes **sebum** (oil) to lubricate both the hair and the epidermis.
Skin Glands

**Sudoriferous gland**  Skin gland that secretes ____sweat____ in response to excess heat. Types: eccrine (all over), apocrine (axilla, genitals).
Nails
Nails

Nail  Compact keratinized _______ cells _______ that form the hard thin plates found on the distal surfaces of the fingers and toes. Protect the ends of fingers and toes. Used as tools for digging, scratching and manipulation of objects.

Fig. 22-4. Nail from above and in cross section.
Nervous System’s Role in Touch
Nervous System’s Role in Touch

**Discriminative touch**  Touch that is subtle and can be easily located on the skin.

**Crude touch**  Touch that is more easily identified, but is more difficult to locate on the skin.
Nervous System’s Role in Touch

Meissner corpuscle (AKA: tactile corpuscle)  Receptor that mediates sensations of discriminative touch such as light versus deep pressure, as well as low-frequency vibration.
Nervous System’s Role in Touch

**Ruffini corpuscle**  Receptor that mediates deep or __continuous__, pressure. They adapt slowly and permit the body to stay in contact with grasped objects. May also detect heat.
Nervous System’s Role in Touch

**Pacinian corpuscle**  Receptor that responds to crude and deep pressure, vibration, and stretch, and perceives **proprioceptive**, information about joint positions.
Nervous System’s Role in Touch

**Krause end bulb**  Receptor involved in discriminatory touch and low-frequency vibration. May also detect cold.
Merkel disk  Receptor that responds to light touch and discriminative touch.
Nervous System’s Role in Touch

Hair root plexus (AKA: hair follicle receptor)  Receptor that responds to light touch and ___hair___ movement.
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