Medical Innovation and Public Health Awareness Club

July Presentation: The Integumentary System

Daniel Lin

What are the functions of skin?

- Protection
  - First line of defense against pathogens
    - Chemicals on the skin kill some surface bacteria
    - Acidic pH of sweat slows the growth of some microbes
  - Protects internal tissues and organs
  - Protects body from dehydration
  - Protects the body against changes in temperature
- Sensory Reception
  - Pain receptors
  - Fine touch receptors
  - Deep pressure receptors
  - Temperature receptors
- Temperature Regulation
  - It acts as a radiator with the heat being delivered by the dermal circulation and removed primarily by the evaporation of sweat or perspiration
- Synthesis and storage of nutrients
  - Stores water
  - Stores fat
- Excretion and secretion
  - Excretion of urea and uric acid
  - Synthesizes vitamin D

What types of tissue make up the layers of the skin?

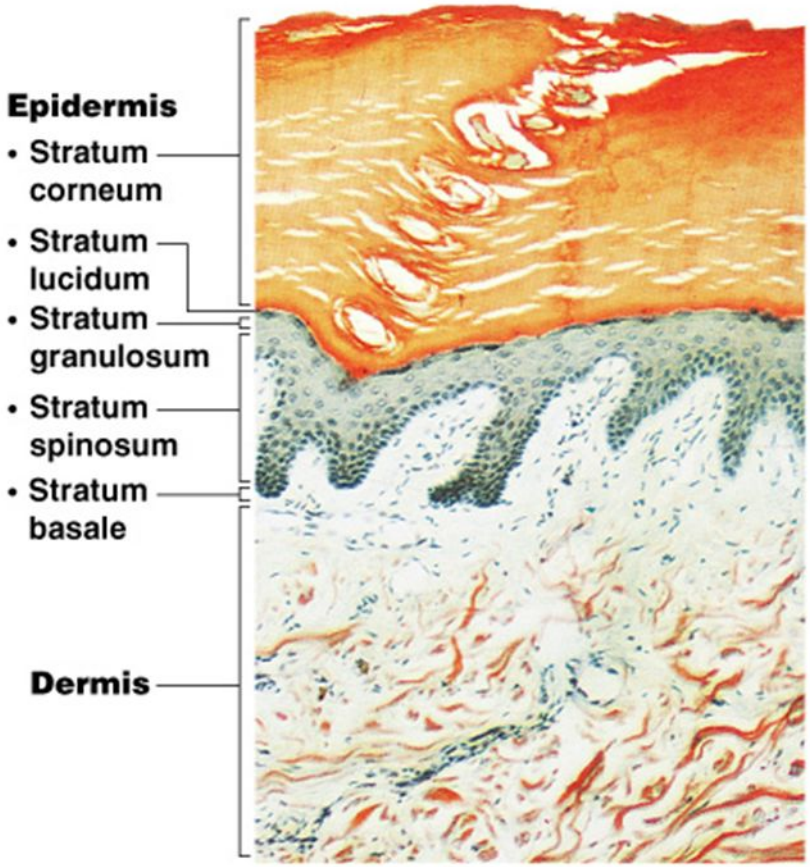
- Epidermis
  - Stratified Squamous epithelium
    - No nerve endings and no blood supply

      Contains keratin in the stratum corneum and melanin in the stratum basale
- Dermis
  - Papillary Layer
    - Loose connective tissue
  - Reticular Layer
    - dense irregular connective tissue
    - collagen and connective tissues are proteins found here
  - Nerve endings, glands, blood vessels
- Hypodermis

  Not part of the skin

  Anchors skin to underlying organs

  Composed mostly of adipose tissue



What role do accessory organs such as sweat glands and sebaceous glands play in t[illegible]?

Sweat glands

Begin in the superficial hypodermis and extend through the dermis and empty out of the epidermis.

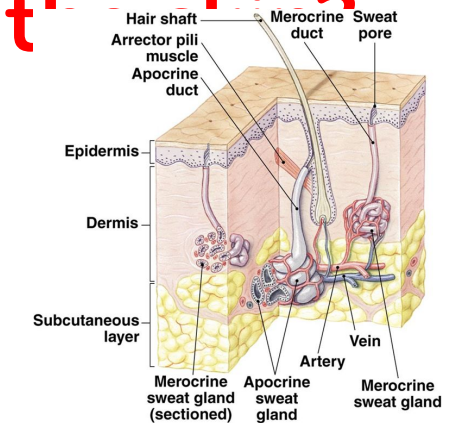
They are exocrine glands

Primary function of most humans sweat glands is to cool the body (eccrine glands, found all over).

- Large apocrine sweat glands in armpits and perianal regions secrete an oily, milky substance that coats hair so odor-causing bacteria can grow on it.

All sweat glands have specialized myoepithelial cells that help to squeeze the glands and push out the secretions

They are controlled by the nervous system & hormones from the endocrine system



Sebaceous glands

Begin in the hypodermis and empty through pores in the epidermis.

They are exocrine glands that secrete and oily/waxy material (sebum) to lubricate and waterproof skin and hair.

Humans have the greatest density of these glands on their faces and scalps. The only place they do NOT exist in humans is on the palm and soles.

- Eyelids have special sebaceous glands that secrete tears (a type of sebum).

What happens to skin as it is exposed to sunlight and as a person ages?

(a) Basal cell carcinoma

(b) Melanoma

Aging

Sun's UV rays damage the fibers in skin called elastin , that helps give skin its flexibility.

As elastin deteriorates, the skin starts to sag and stretch and become unable to go back into place after stretching. That makes skin bruise and tear more easily & take longer to heal

Skin becomes dry and scaly

Sun protection diminishes

Sunlight

Beneficial Effect:

Activates synthesis of Vitamin D

Harmful Effects:

- Sunburn

  Wrinkles, spots,

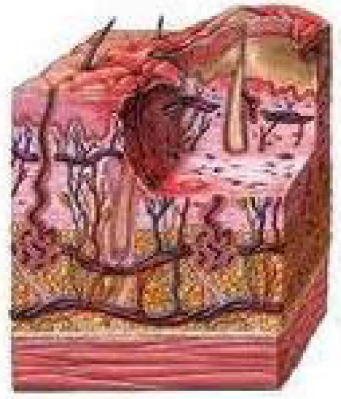
  Skin lesions, tumors, freckles, discolored areas, yellowing & destruction of elastin and collagen tissues.

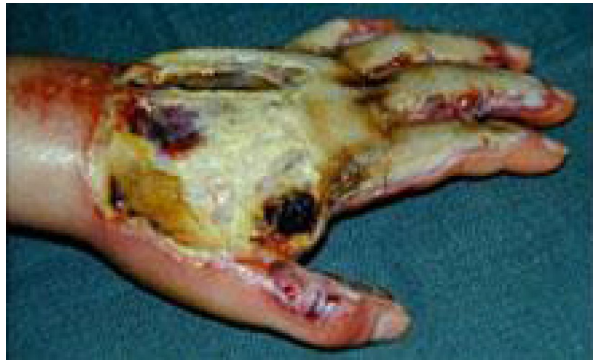
- Basal cell carcinoma (Stratum Basale)
- Squamous cell Carcinoma (St. spinosum)
- Malignant melanoma (Melanocytes)

Which layers of the skin are damaged in different types of burns?

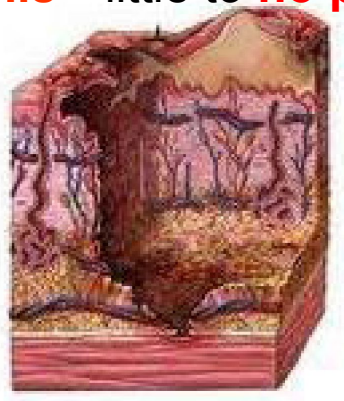
1st Degree Burn—damages **Epithelium**, painful/tender

2nd Degree Burn—damages **epithelium and top of demis, very painful**





3rd Degree Burn—damages **epithelium and dermis**—little to **no pain**



How does burn damage in the skin affect other functions in the body?

Skeletal	Circulatory	Muscular	Nervous	Respiratory
Bone marrow works to replace RBCs destroyed by burnt skin—blood transfusions may be needed	BP and blood volume drop, decreasing blood flow and oxygenation—can lead to shock/death	Metabolism increases and the body starts to consume muscle mass	K+ levels become abnormal which make nerve transmissions irregular (faster, slower or not at all)	Rate of breathing can increase from higher metabolism & edema—edema of throat can also obstruct the airway
Endocrine	**Lymphatic**	**Immune**	**Digestive**	**Urinary**
Adrenalin secretions can raise body temperature & increase metabolism	System under strain from inflammation (due to damaged tissues)	Becomes less effective because 1st line of defense (skin) compromised	Intestinal lining increases absorption of nutrients to support metabolism and repair cells	Kidneys increase reabsorption to compensate for lost fluid (can damage kidneys)

How do medical professionals in different fields assist with burn care and rehabilitation?

EMT

Reconstructive Surgeon

Dermatologist

Burn Care Nurse

Anesthesiologist

Psychologist (Daniel: L + ratio + no patient + homeless + mobile “gamer” + touch grace)

Physical Therapist

How does the body interpret and process pain?

Pain is perceived by naked nerve endings (dendrites of sensory nerves)

It is often experienced as physical discomfort (pricking, throbbing or aching).

A person typically **responds** by taking action to remove the source of the **pain**.

The brain secretes **endorphins** (a type of hormone made in the gland) in response to stress and pain

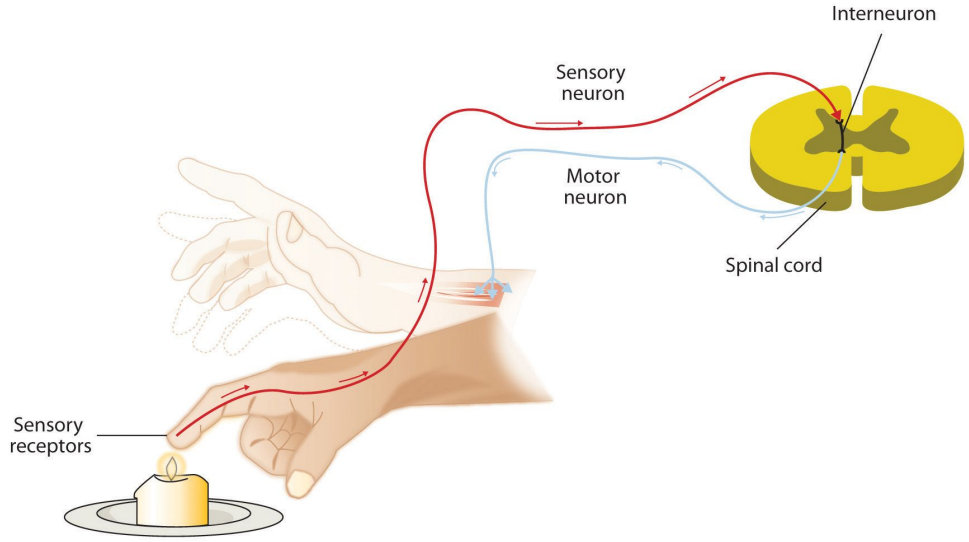
Endorphins can act in a similar way to morphine

- Reduce perception of **pain**

Promote feelings of euphoria and an increased immune response. (May be responsible for “runner’s high”)

Why would the inability to feel pain actually put the human body in danger?

- Acute (short term) pain is necessary to survival. If a human felt no risk from pain (i.e. touching a hot stove), he would take no action to remove the threat (i.e. pulling hand away) and would suffer more damage.
- No survival benefits to chronic (long term) pain (i.e. cancer pain)



Thank You!!!