An Introduction to the Integumentary System

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An Introduction to the Integumentary System

• The **Integument**
  • largest system of the body
    • two parts
      1. Cutaneous membrane
      2. Accessory structures
An Introduction to the Integumentary System

• Cutaneous Membrane

  1. Outer: epidermis
     • “epi” = ‘Above’
     • Superficial epithelium

  2. Inner: dermis
     • Connective tissues
Figure 5-1 The Components of the Integumentary System

Cutaneous Membrane

- Epidermis
- Dermis
An Introduction to the Integumentary System

- **Accessory Structures**
  - Originate in the dermis
  - Extend through the epidermis to skin surface
Figure 5-1  The Components of the Integumentary System

Accessory Structures

- Hair shaft
- Pore of sweat gland duct
- Sebaceous gland
- Lamellated corpuscle
- Sweat gland
- Fat
Epidermis

• The Epidermis
  • Is avascular
  • stratified squamous epithelium
    • keratinocytes
Thick skin

Surface
Stratum corneum
Stratum lucidum
Stratum granulosum
Stratum spinosum
Stratum basale
Dermis
Papillary layer of dermis

LM x 210

40 – 56 D

Come
Let’s
Get
Some
Beers

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• **Stratum Basale**
  
  • Forms *epidermal ridges*
Figure 5-4 The Epidermal Ridges of Thick Skin

Thick skin

SEM x 25

Epidermal ridge

Pores of sweat gland ducts
Epidermis

- Specialized Cells of Stratum Basale
  - *Merkel cells*
    - in hairless skin
    - light touch, shape discrimination
  - *Melanocytes*
    - Contain the pigment melanin
    - Scattered throughout stratum basale
Skin Color

• Skin Color is Influenced by Two Pigments
  
  1. Carotene
  2. Melanin

• Blood circulation (red blood cells)
Skin Color

- **Carotene**
  - Orange-yellow pigment
  - Found in orange vegetables
  - Accumulates in epidermal cells and fatty tissues of the dermis
  - Can be converted to vitamin A
Skin Color

- **Melanin**
  - Yellow-brown or black pigment
  - Produced by *melanocytes* in stratum basale
Figure 5-5 Melanocytes

Melanocytes

Melanin pigment

Basement membrane

Melanocytes in stratum basale

LM × 600
Figure 5-5  Melanocytes

- Melanin pigment
- Melanocyte
- Basement membrane
Skin Color

• Function of Melanocytes
  • Melanin protects skin from sun damage
  • Ultraviolet (UV) radiation
Two major skin cancers:

Basal cell carcinoma

- most common
- higher risk >40 y.o.
- blue eyes, moles, light skin
- Treat.: excision, freezing, scrapping
- almost no metastasis, so fairly curable
Two major skin cancers:

- most dangerous
- leading cause of death from skin cancer
- skin, under finger nails, eyes, mouth
- higher risk >40 y.o.
- tanning, >2 blistering sunburns (child)
  fair skin, family
- Treat.: if no spread, excising
  spread: chemo, radiation, surgery
- some early stages can be cured
Melanoma of the Skin
Incidence Rates by State, 2009

http://www.cdc.gov/cancer/skin/statistics/state.htm
Melanoma of the Skin
Death Rates by State, 2009

http://www.cdc.gov/cancer/skin/statistics/state.htm
The Dermis

- The Dermis
  - Two components
    1. Outer papillary layer
    2. Deep reticular layer
The Dermis

- **The Papillary Layer**
  - areolar tissue
  - small capillaries
  - lymphatics
  - sensory neurons
Figure 5-2a The Basic Organization of the Epidermis

**Why papillae?**
The Dermis

• The **Reticular Layer**
  • dense irregular connective tissue
    • larger
      • blood vessels
      • lymphatic vessels
      • nerve fibers
The Dermis

• What makes dermis strong and elastic?
  • Two types of fibers
    1. Collagen fibers
      • Very strong
    2. Elastic fibers
      • stretching and recoil
1861 Karl Langer

Cleavage (tension) lines

Aligned Collagen and elastic (dermis)

parallel cut? remains shut, heals well

cut across line? pulls open and scars

Body’s natural “damage control”
Figure 5-15  A Keloid
Burns: Depth

Fourth Degree?

Muscles and tendons destroyed
Figure 5-16 A Quick Method of Estimating the Percentage of Surface Area Affected by Burns

ADULT
- Head 9%
- Upper limb 9% each
- Trunk 36% (front and back)
- Genitalia 1%
- Lower limb 18% each

CHILD (5-year-old)
- Head 15%
- Trunk 32% (front and back)
- Upper limb 9% each
- Genitalia 1%
- Lower limb 17% each

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Burns: Extent
The Hypodermis

- The **Hypodermis**
  - Below dermis
  - Fat storage
  - Few capillaries
  - subcutaneous injections
    - hypodermic needles
Hair

- Human Body covered with hair, except:
  - Palms
  - Soles
  - Lips
  - Portions of external genitalia
Hair

- **Functions of Hair**
  - Protects and insulates
  - Guards openings against particles and insects
  - Is sensitive to very light touch

- **Types**
  - Lanugo
  - Vellus
  - Terminal
Hair

- when Lanugo doesn’t dissapear:
  - Hypertrichosis
    - abnormal amt. of hair growth
  - broad examples
Hair

- Accessory Structures of Hair
  - Arrector pili
    - Involuntary smooth muscle
    - Causes hairs to stand up
    - Produces “goose bumps”
  - Sebaceous glands
Diagrammatic sectional view along the long axis of a hair follicle.
Sebaceous Glands and Sweat Glands

- Apocrine Sweat Glands
  - armpits, around nipples, and groin
  - Secrete into hair follicles
  - Break down and cause odors
  - Sexy?
Sebaceous Glands and Sweat Glands

- **Merocrine Sweat Glands**
  - $\text{H}_2\text{O}$ and electrolytes
  - Cools skin
  - Throughout body surface
  - Sensible perspiration