Outline

- Cell to cell contact
- Body Cavities
- Membranes
- Homeostasis
- Integumentary System
  - Skin, hair, nails

Cell Junctions

- 3 types of junctions
  - Tight junctions
  - Adhesion junctions
  - Gap junctions

Tight Junctions

- Function
  - Prevent substances from leaking across tissue
- Location

Adhesion Junctions

- Function
  - Hold adjacent cells together and allow tissues to be flexible
- Locations

Tight Junctions

- Creates an impermeable junction
- Prevents the exchange of materials between cells
- Between epithelial cells of the digestive tract
  - Prevent digestive enzymes and microorganisms from entering the blood
Adhesion Junctions

- Holds cells together despite stretching
- Found in tissues that are often stretched
  - Skin and the opening of the uterus

Gap Junctions

- Function
  - Open channels between cells allowing rapid communication due to quick transfer of ions and small molecules between neighboring cells
- Location

Gap Junctions

- Allows cells to communicate
- Found in epithelia in which the movement of ions coordinates functions
  - Beating of cilia
  - Found in excitable tissue such as heart and smooth muscle

Review Question

- What junction allows rapid communication between neighboring cells?
- Which junction prevents substances from leaking across tissues?

Body Cavities

- 2 main cavities
  - Dorsal cavity
    - Posterior
  - Ventral cavity
    - Anterior

Body Cavities

- Dorsal cavity
  - Cranial cavity contains brain
  - Spinal cavity contains spinal cord
- Ventral cavity
  - Thoracic cavity
  - Diaphragm
  - Abdominal cavity
  - Rib
  - Vertebra
Ventral Body Cavity

- Divided into two cavities
  - Thoracic cavity
    - 2 parts
      - Pleural cavity
      - Pericardial cavity
  - Abdominal cavity
    - Contains the digestive, urinary and reproductive systems
    - Diaphragm

Dorsal Body Cavity

- Divided into two cavities
  - Cranial
    - Contains brain
  - Spinal
    - Contains spinal cord

Review Questions

- What is the arrow pointing to in the following images?
Membranes

- Cover body cavities and surfaces of organs
- Sheets of epithelium supported by connective tissues
- Protect tissues and organs

Membranes

- Four types
  - Mucous
  - Serous
  - Synovial
  - Cutaneous

Mucous Membranes

- Line passages to the exterior world
  - Respiratory
  - Digestive
  - Reproductive
  - Urinary Systems
- Secrete mucous

Serous Membranes

- Line thoracic and abdominopelvic cavities and the organs contained in them
- Secrete lubricating fluid

Synovial Membranes

- Line cavities of freely movable joints
- Secrete a lubricating fluid

Cutaneous Membranes

- Skin
- Lines the outside of the body
- Thick, dry
Organs and Organ System

• Organ
  — Group of tissues that work together to perform a specific function

• Organ system
  — Organs that work together

Organ Example

• Stomach
  — Lines the stomach and secretes acid to digest food
  — Stimulates cells to release the acid
  — Contracts to push food through the stomach
  — Supports these other tissues

Homeostasis

• The ability to maintain the body at a relatively stable environment
  — Body Temperature
  — pH
  — Blood pressure
  — Blood glucose
  — Salt concentrations

Feedback

• Body uses the nervous system and the endocrine system to maintain homeostasis

• Controlled by positive or negative feedback
Feedback Mechanism

- **Receptor**
  - Detects a change in the internal or external environment
- **Control center**
  - Integrates the information coming from all receptors and sends out an appropriate response
- **Effector**
  - Carries out the response returning the system to homeostasis again

Hormones

- **Substance released into the blood**
- **Carries a message to other parts of the body**

Feedback

- **Negative feedback**
  - Used to keep the body in balance
  - Keeps up the status quo
- **Positive feedback**
  - Used to change the situation

Example – Negative Feedback

- **Stimulus**
  - Calcium levels drop too low in the blood stream
- **Sensor**
  - Parathyroid glands
- **Control center**
  - The parathyroid gland released parathyroid hormone
- **Effector**
  - Osteoclast cells in bone release calcium
  - Kidneys reabsorb more calcium

Example – Negative Feedback

- **Stimulus**
  - Calcium levels increase too high in the blood stream
- **Sensor**
- **Control center**
- **Effector**
Example – Negative Feedback

• Temperature
  – The thermostat for the body is located in the hypothalamus

[link to a YouTube video]

Example – Positive Feedback

• Stimulus
  – When the baby leaves the uterus, the muscles in the cervix stretch
  – Nerves in the cervix send a message to the hypothalamus

• Sensor
  – Stretch receptors in the cervix

Example – Positive Feedback

• Control center
  – Hypothalamus gland causes the pituitary gland to release oxytocin

• Effector
  – Muscles of the uterus contract

Organ Systems

<table>
<thead>
<tr>
<th>ORGAN SYSTEM</th>
<th>FUNCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Integumentary</td>
<td>Covers and protects our body</td>
</tr>
<tr>
<td>Digestive</td>
<td>Converts food to nutrients</td>
</tr>
<tr>
<td>Circulatory (Cardiovascular)</td>
<td>Transports nutrients and wastes to and from the cells</td>
</tr>
<tr>
<td>Immune</td>
<td>Defends against disease</td>
</tr>
<tr>
<td>Respiratory</td>
<td>Exchange gases with the environment</td>
</tr>
<tr>
<td>Urinary</td>
<td>Eliminates wastes</td>
</tr>
<tr>
<td>Nervous</td>
<td>Communication within the body, regulates functions</td>
</tr>
<tr>
<td>Muscular</td>
<td>Moves the body</td>
</tr>
<tr>
<td>Skeletal</td>
<td>Supports the body</td>
</tr>
<tr>
<td>Endocrine</td>
<td>Regulates systems and internal environment</td>
</tr>
<tr>
<td>Reproductive</td>
<td>Produces offspring</td>
</tr>
</tbody>
</table>

Integumentary System

• Components
  – Skin
  – Nails
  – Hair
  – Exocrine glands
    • Sweat glands
    • Oil glands

Integumentary System

• Five Functions
**Skin Layers**

- The epidermis has 2 layers
  - Epidermis
    - Thin outer layer of stratified squamous epithelial tissue
  - Dermis
    - Thick underlying layer of mainly connective tissue

**Epidermis**

- Several layers of squamous epithelial cells
  - Deepest layer contains rapidly dividing cells
  - Outer surface is made up of dead skin cells
  - Protective properties come from keratin
  - Melanocytes produce melanin

**Dermis**

- Consists primarily of connective tissue
- Also contains
  - Vascular tissue, hair follicles, sweat glands, nerves, sensory receptors
- Collagen and elastic fibers in lower layer
  - Allows skin to stretch and return to its original shape

**Hypodermis**

- Layer of loose connective tissue beneath the dermis and epidermis
- Connects dermis/epidermis to other tissues
- Not a part of the skin but lays underneath the skin
Accessory Organs of the Skin

- **Nails**
  - Sheets of hard keratinized cells
  - Form a protective coating for the fingers and toes

- **Hair follicles**
  - Found in the dermis and where sebum is released to lubricate the hair

- **Sweat glands**
  - Play a role in modifying body temperature
  - Have ducts that lead to a pore at the surface of the skin

- **Sebaceous glands**
  - Secrete sebum
  - Oily substance that lubricates the skin and hair

Skin Cancer

- **Melanin protects against UV radiation**
- **3 types of skin cancer**
  - Basal cell carcinoma
  - Squamous cell carcinoma
  - Melanoma

Skin Cancer – 3 types

- **Basal cell carcinoma**
  - From rapidly dividing cells deep in the epidermis

- **Squamous cell carcinoma**
  - From newly formed cells as they flatten

- **Melanoma**
  - From melanocytes, far more dangerous than other skin cancers

**Melanoma ABCDEs**

A. Asymmetry
B. Border is uneven
C. Color is inconsistent
D. Diameter is greater than ¼ inch
E. Evolving/changing in appearance

Figure 4.A
Three skin cancers
Melanoma in the United States – 2005 Estimates
Ref: the American Cancer Society

<table>
<thead>
<tr>
<th>New Cases</th>
<th>59,600</th>
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<tbody>
<tr>
<td>Deaths Per Year</td>
<td>7,800</td>
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<tr>
<td>5-Year Overall Survival Rate</td>
<td>91%</td>
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<tr>
<td>5-Year Localized Survival Rate</td>
<td>98%</td>
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<tr>
<td>5-Year regional Survival Rate</td>
<td>60%</td>
</tr>
<tr>
<td>5-Year distant Survival Rate</td>
<td>14%</td>
</tr>
</tbody>
</table>

Review Question

• What cells found in the skin produce pigments?

Important Concepts

• How does negative and positive feedback work?
  – Be able to describe the examples of negative and positive feedback given in class and in the textbook
  – Identify the sensor, control center and effector for each example

• What are the three types of skin cancer?
  – Where do they originate?
  – Which is more likely to spread to other parts of the body?

• What are melanocytes? What is their function?
Definitions

- Tissue
- Organ
- Organ system
- Tight junctions
- Adhesion junctions
- Gap junctions
- Exocrine glands
- Endocrine glands
- Homeostasis
- Hormones
- Hypodermis
- Diaphragm
- Sebum
- Sebaceous glands
- Keratin
- Basement membrane
- Lacunae
- Voluntary control
- Involuntary control
- Hyperthermia
- Hypothermia
- Melanin
- Hypodermis

The End

Image from: http://www.northrup.org/photos/peacock/

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