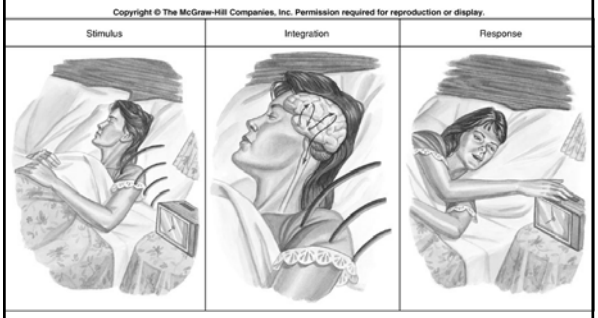
Topic 6: Homeostasis – Control & Integration

SCI141

Objectives

Rapid Responses

- We have an ability to respond to stimuli
  - In our environment
  - In response to internal needs



The Problem

- We are limited to crude senses
  - Light waves
  - Sound waves
  - Odors
  - Touch information
  - Basic taste information

Integration

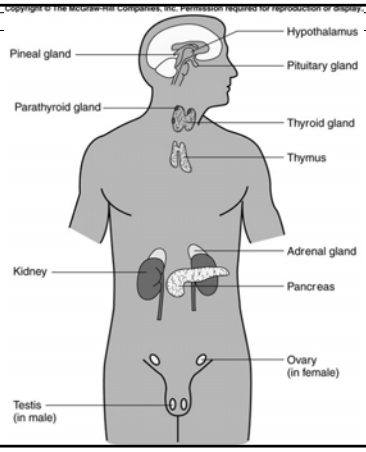
- Combining sensory information with past experiences and creating responses.

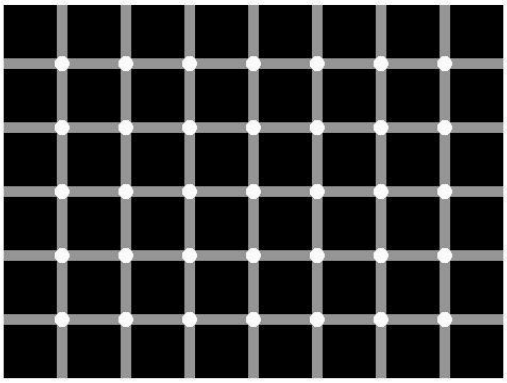
Integration

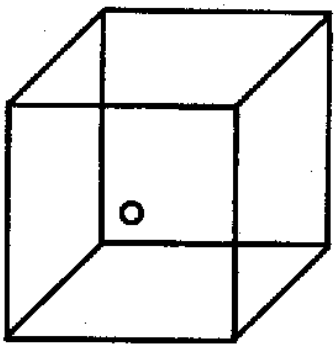
- Nervous System
  - Rapid responses
  - Electrical communication
  - Short duration responses

Integration

- Endocrine System
  - Slow responses, delayed onset
  - Chemical messages sent throughout the body
  - Long durations



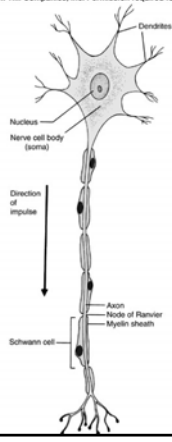




movement

Pictures

How does the brain work?

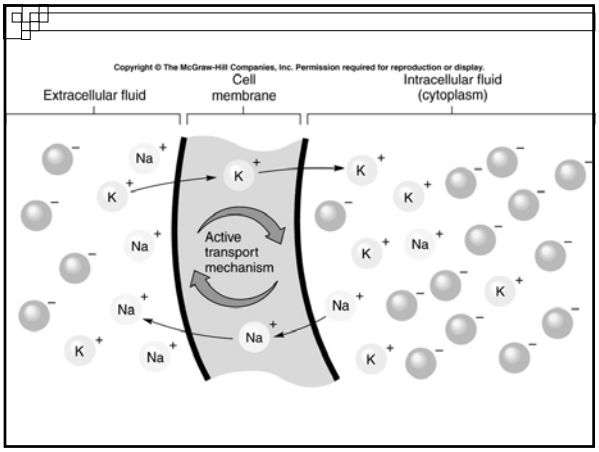


Generating Electricity

- Requirements for generating electricity in the nervous system:
  - Ions (Sodium, Potassium)
  - Membrane Transport mechanisms
    - Diffusion
    - Active Transport
  - Stimulus

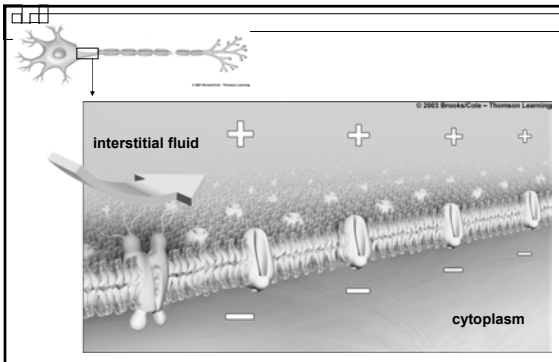
Generating Electricity

- Normal Ion Distribution:
  - Sodium (Na) is found in the extracellular space
  - Potassium (K) is found in the intracellular space



Generating Electricity

- Creating a battery:
  - Na is normally being pumped out of the neuron
  - K will diffuse out across the membrane faster than Na will diffuse in
  - There are large, negatively charged proteins inside the cell

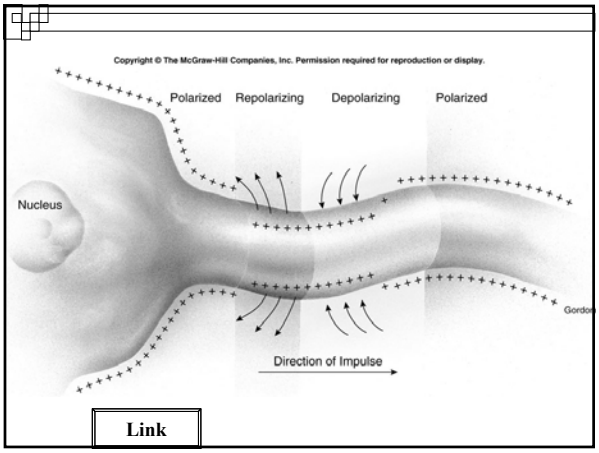


Link

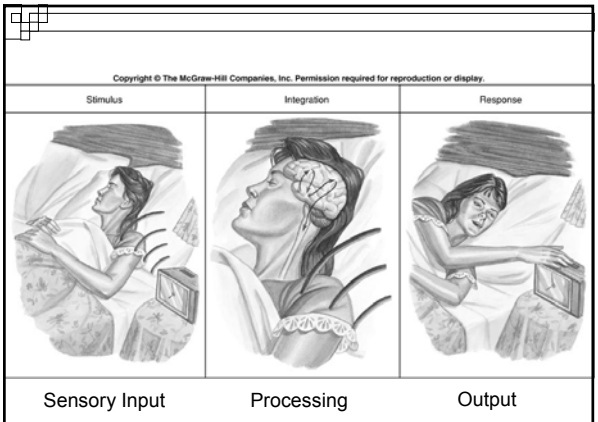
Generating Electricity

- Generating electricity

1. Create a battery in the membrane
2. Stimulate Neuron
3. Na rushes into cell
4. Electricity!



Link

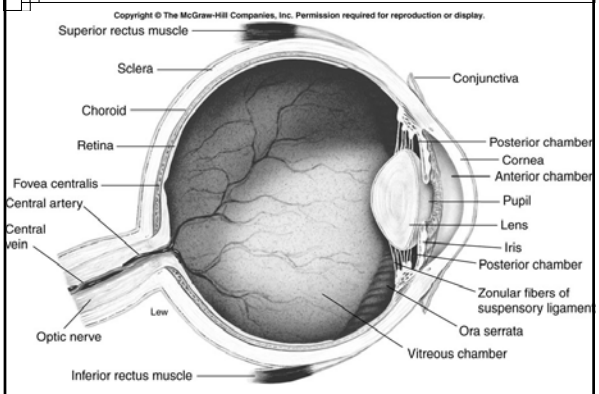


Vision

- Sensitivity to light does not equal vision
- Vision requires two components
  - Eyes
  - Capacity for image formation in the brain

Visual system

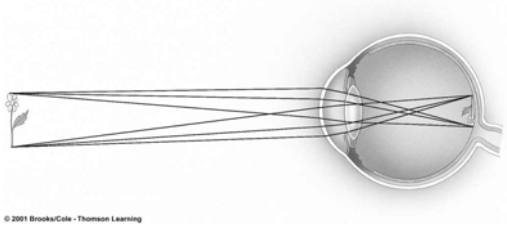
- Convert light energy into electricity:
  - Form image in eye
  - Photoreceptors in eye
  - Processing in brain

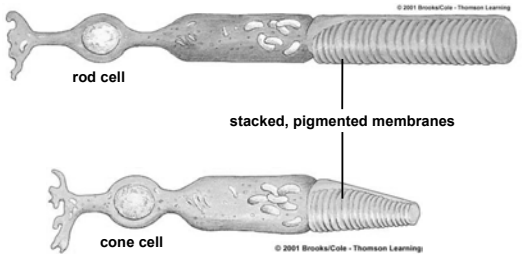


Pattern of Stimulation

- Light rays pass through lens and converge on retina at back of eye
- The image that forms on the retina is upside down and reversed right to left compared with the stimulus
- Brain accounts for this during processing

Pattern of Stimulation





The Photoreceptors

- Rods
  - Detect very dim light, changes in light intensity
- Cones
  - Three kinds; detect red, blue, or green
  - Provide color sense and daytime vision

Retina to Brain