


Slide  
1

**Basic Life Functions:  
Coordination**

*For even as the body is one  
and yet many members,  
and all the members of the body,  
though they are many,  
are one body, so also is Christ.*  
1 Corinthians 12:12



BIO 100 John E. Silvius, Professor of Biology

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Slide  
2

**COORDINATION**

“CONTROLLING INDIVIDUAL PROCESSES...  
e.g. NUTRITION, REPRODUCTION, etc.  
...TO PRODUCE A HARMONIOUS WHOLE”



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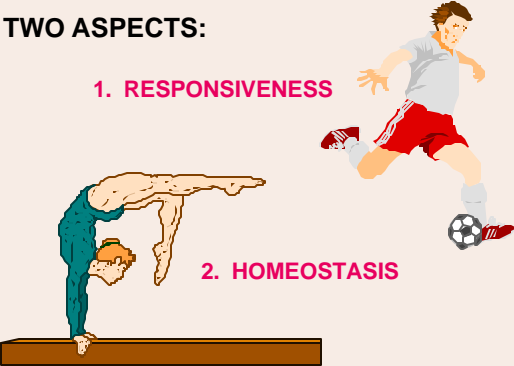
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**COORDINATION**

**TWO ASPECTS:**

**1. RESPONSIVENESS**

**2. HOMEOSTASIS**



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Slide  
4

**Coordination Systems -- Requirements:**

**A. SENSORY RECEPTORS** -- for detection of stimuli

- > External – light, temperature, sound, etc.
- > Internal -- muscle cramping, indigestion, etc.

**B. TRANSMISSION OF SIGNALS** – Two Paths:

- > NEURONS – nerve cells  
-- carry impulses (electrical)
- > BLOOD VESSELS -- carry hormones (chemical)

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Slide  
5

**Coordination Systems -- Requirements:**

**C. EFFECTORS** -- to bring about responses:

- > MUSCLES -- relax and contract
- > GLANDS – secrete hormones

**D. INFORMATION PROCESSING**

- by Central Nervous System

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**Neurons and Impulse Transmission:**

**A. THREE TYPES OF IMPULSE TRANSMISSION:**

1. Sensory Neurons  
> carry impulses from sensory cells to CNS
2. Motor Neurons – carry impulses from CNS to effectors
3. Interneurons – link the sensory and motor within CNS

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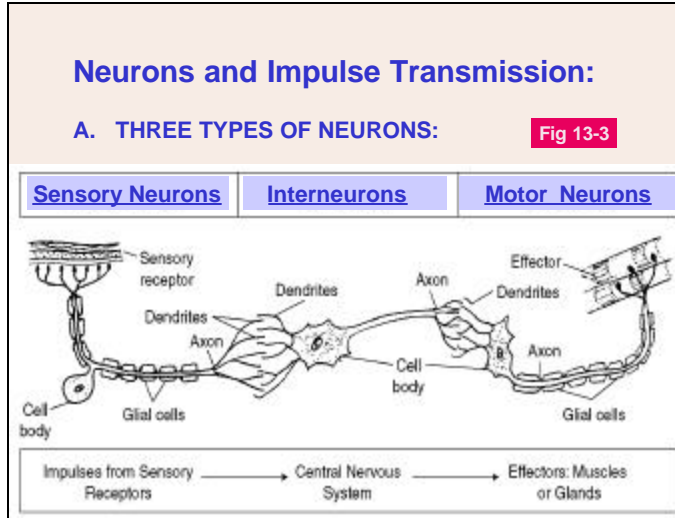
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Slide 7



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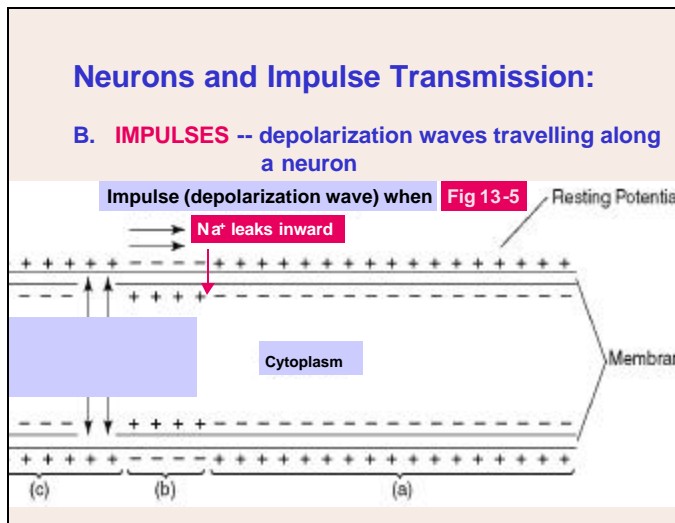
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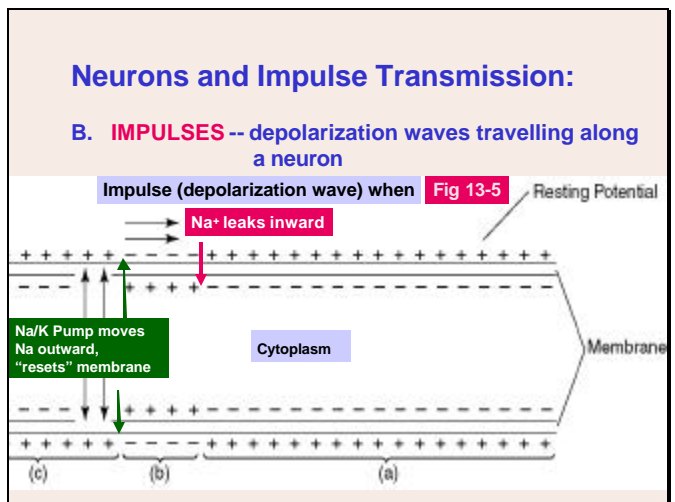
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Slide 10

### Neurons and Impulse Transmission:

#### C. SYNAPSE:

-- "gap" between AXON of presynaptic neuron and either:

1. Postsynaptic neuron
2. Muscle fiber
3. Endocrine gland

Fig 13-6




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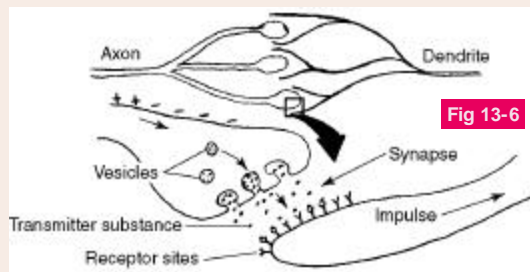
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### Neurons and Impulse Transmission:

#### C. SYNAPSE -- "gap"

- Function:
1. One-way transmission of impulses
  2. Integration of signals (memory)
  3. Altered by neurotoxins and drugs

Fig 13-6




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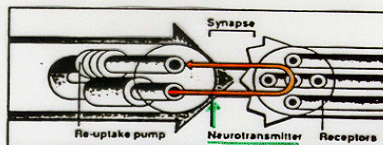
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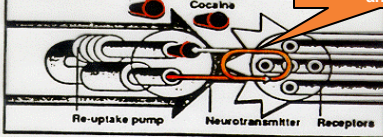
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### How cocaine affects the brain



**NORMAL NERVE ACTIVITY**  
Normally, the neurotransmitter moves from one nerve cell synapse to the next cell. It delivers an impulse, or message, to the next cell. The chemical transmitter is then pulled back into the cell by specialized pumps.

Repeated stimulation of receptors causes "high." Then comes depression, anxiety...



**COCAINE INTERFERENCE WITH NORMAL ACTIVITY**  
When cocaine is in the system, the "re-uptake" pumps are blocked and the neurotransmitter continues to stimulate the receptors of the receiving cell. The repeated stimulation causes the cocaine "high."

Once cocaine is absorbed into the bloodstream, it affects chemi...

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Slide 13

### Organization of Nervous Systems:

A. TRENDS AMONG ANIMAL GROUPS:

**Centralization** →

Fig 13-1

Hydra: Nerve net

Flatworm: Brain, Eye spot, Nerve cord

Earthworm: Brain, Pharynx, Ganglion

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### Bio-Jeopardy

1. Controlling individual processes to produce a harmonious whole. **What is coordination??**
2. Neurons that detect stimuli and relay impulses to central nervous system. **What are sensory neurons?**
3. A depolarization wave traveling along a neuron. **What is an impulse?**
4. A chemical substance secreted by the presynaptic neuron. **What is a transmitter substance?**

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### Human Nervous System

Fig 13-2

Brain

Cranial Nerves

Spinal Cord

Spinal Nerves - 31 pairs

Peripheral Nervous System

Central Nervous System

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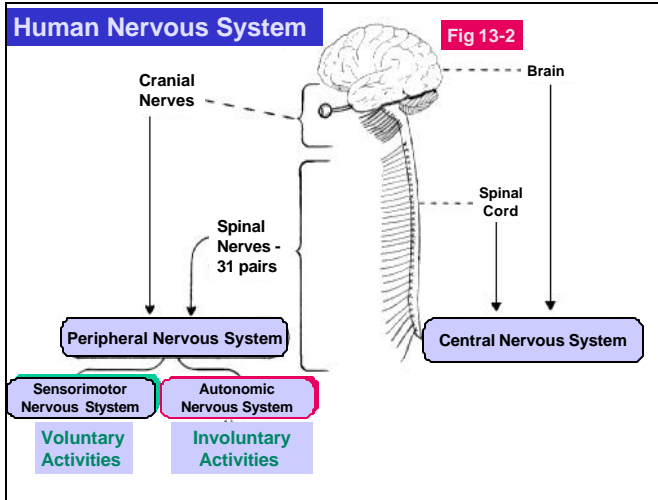
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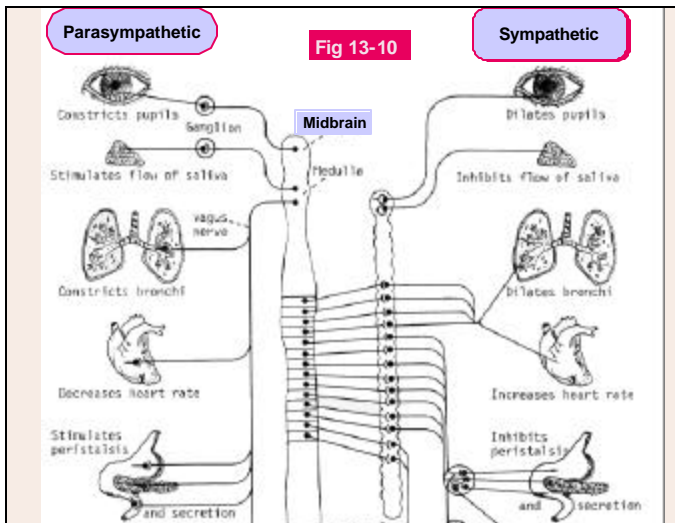
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