Objectives

- To define neurotransmitters and provide examples of these unique chemicals.
- To understand neuronal circuits.
- To review fundamentals of the nervous system.

Neurotransmitters

- Most neurons make two or more neurotransmitters, which are released at different stimulation frequencies
- 50 or more neurotransmitters have been identified
- Classified by chemical structure and by function

Classes of Neurotransmitters

I. Acetylcholine (AcH)
   - Released at neuromuscular junctions and some ANS neurons

II. Biogenic Amines
   - Play roles in emotional behaviors and the biological clock
   - Examples:
     - Dopamine
     - Norepinephrine (NE) & epinephrine

III. Amino acids
   - e.g. Glutamate

Peptide Based Neurotransmitters

- Substance P
  - Mediator of pain signals
- Endorphins
  - Act as natural opiates; reduce pain perception
- Gut-brain peptides
  - Somatostatin
  - Cholecystokinin

Neuropeptides
**Types of Circuits**

I. Diverging circuit
- One incoming fiber
- Stimulates an ever-increasing number of fibers, often amplifying circuits
- Common in both sensory and motor systems

II. Converging circuit
- Opposite of diverging circuits, resulting in either strong stimulation or inhibition
- Also common in sensory and motor systems

**Patterns of Neural Processing**

I. Serial processing
- Input travels along one pathway to a specific destination
- Works in an all-or-none manner to produce a specific response e.g. reflexes

II. Parallel processing
- Input travels along several pathways
- One stimulus promotes numerous responses e.g. an odor triggers memories

**Amazing Facts**

Every neuron synapses with probably 60,000 other neurons.
Both inhibitory and excitatory neurons can converge on the same post-synaptic neuron.
When we are born we have somewhere between 20-200 billion neurons and thousands are lost daily, virtually none are replaced.

http://www.lumosity.combrain-games/attention-games