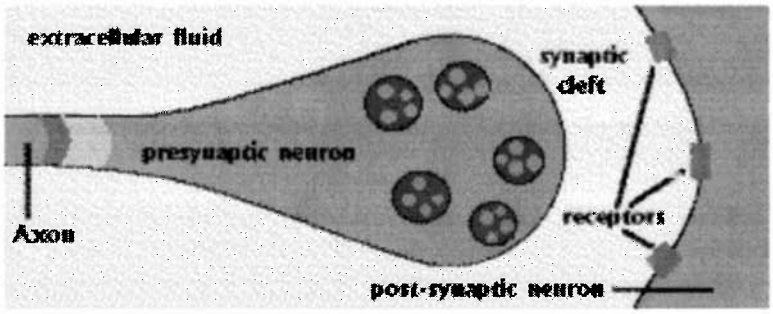
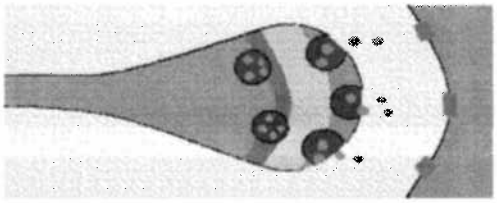
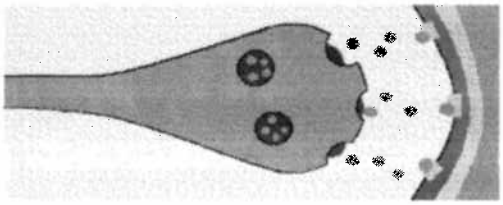
SYNAPTIC TRANSMISSION



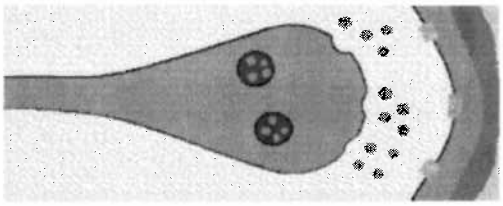
- **Step 1**: The neurotransmitter is manufactured by the neuron and stored in vesicles at the axon terminal.

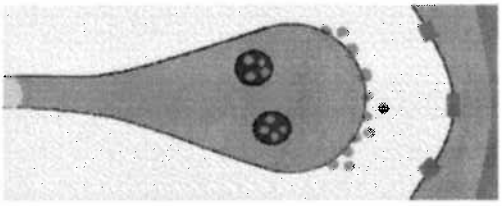


- **Step 2**: When the action potential reaches the axon terminal, it causes the vesicles to release the neurotransmitter molecules into the synaptic gap

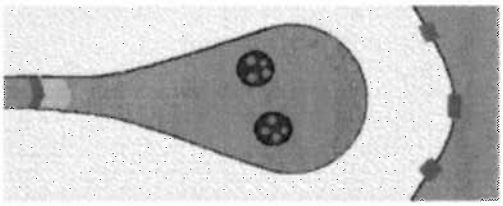


- **Step 3**: The neurotransmitter spreads across the gap and bind to receptors on the postsynaptic cell.
- **Step 4**: The activated receptors cause changes in the activity of the postsynaptic neuron.





- **Step 5**: The neurotransmitter molecules are released from the receptors and spread back into the synaptic gap.



- **Step 6:** The neurotransmitter is reabsorbed by the presynaptic neuron (a process called reuptake) or destroyed.

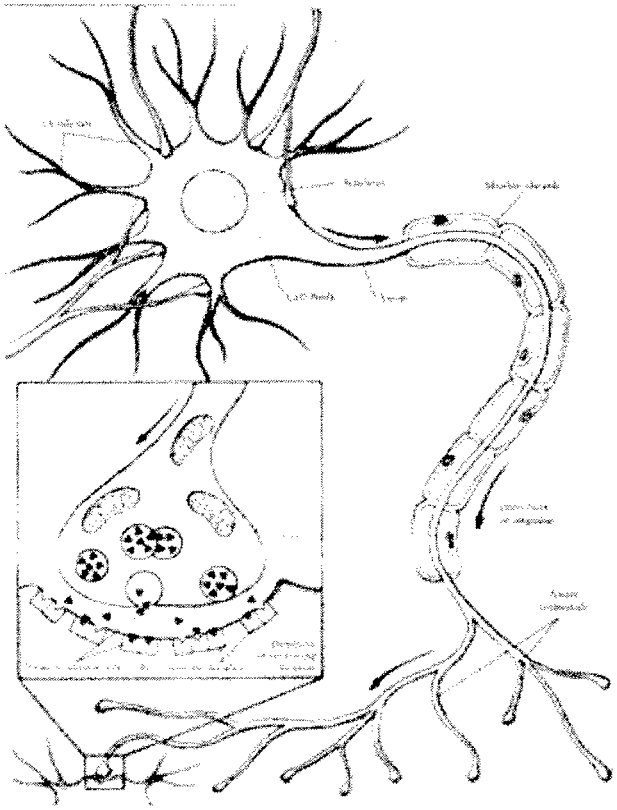
http://www.wnet.org/closetohome/animation/neuron-main.html

How Do Nerve Cells Communicate?

You are so repulsed by broccoli that you detect its bitter taste buried in a vegetable medley and spit it into your napkin. Backstage, your brain and nervous system carry out actions such as this one through a wave of communication between it's billions of nerve cells or neurons.

Each neuron that makes up the communication line, itself, resembles broccoli. Incoming messages are received in the dendrites, which mirror the branching buds of the veggie. The chemical messages pass down these sprouts into the cell body and then through one main long stalk or axon of the neuron. Finally the signal heads out to connected neurons.

Neurons vary in the amount of information they receive and transmit. Some have an extremely large social circle and receive and transmit thousands of messages. Others have only a few connections.



A larger, higher resolution version of the graphic is available here (137k). Illustration by Lydia Kibiuk, Copyright © 1996 Lydia Kibiuk.

All messages, however, are passed to connected neurons in the form of chemicals called neurotransmitters. They flow from a message-sending neuron across a gap called a synapse and onto target neurons. The chemicals attach to a slot on the surface of the receiving neuron -- a protein called a receptor site. Many scientists compare the union to a key fitting in a lock. Once attached, different neurotransmitters either trigger "go" signals that allow the message to be passed to the next neuron in the communication line or produce "stop" signals that prevent the message from being forwarded. The signals are in the form of charged particles or ions. A large concentration of positively-charged particles entering a receiving neuron tells it to pass on the message. On the other hand, a large concentration of negatively-charged particles entering the neuron will inhibit it from passing on the message.

The brain keeps tight control of this message delivery system to avoid communication chaos. A single receiving neuron has thousands of receptor sites and may receive many different messages and passwords at once. Each neuron adds up the incoming signals and determines whether or not to pass the information along to other cells. Neuron communication is under intense investigation by researchers because when it goes out of balance ailments ranging from epilepsy to memory disorders can occur.

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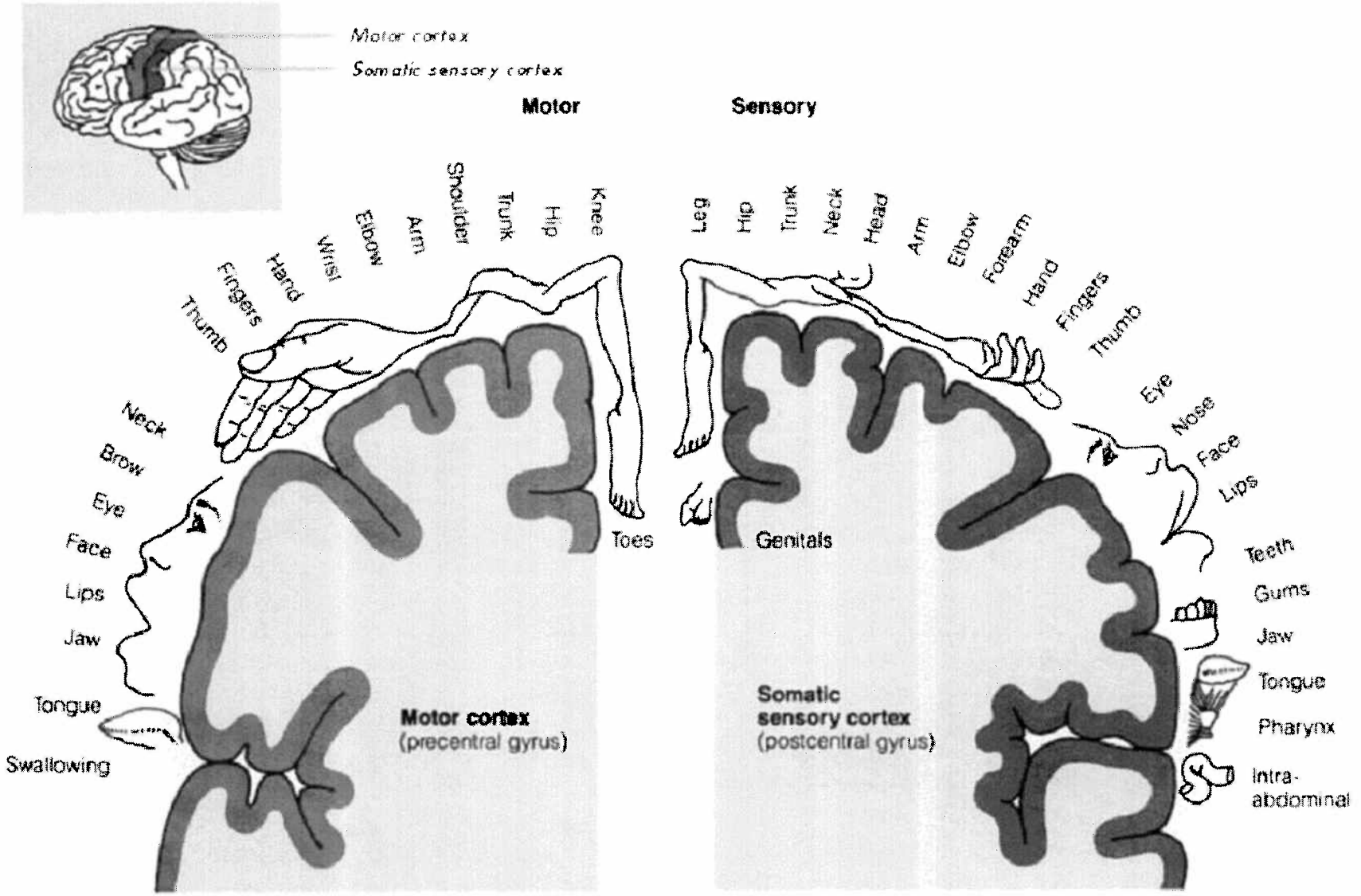
The Autonomic Nervous System

Structure	Sympathetic Stimulation	Parasympathetic Stimulation
Iris (eye muscle)	Pupil dilation	Pupil constriction
Salivary Glands	Saliva production reduced	Saliva production increased
Oral/Nasal Mucosa	Mucus production reduced	Mucus production increased
Heart	Heart rate and force increased	Heart rate and force decreased
Lung	Bronchial muscle relaxed	Bronchial muscle contracted
Stomach	Peristalsis reduced	Gastric juice secreted; motility increased
Small Intestine	Motility reduced	Digestion increased
Large Intestine	Motility reduced	Secretions and motility increased
Liver	Increased conversion of glycogen to glucose	
Kidney	Decreased urine secretion	Increased urine secretion
Adrenal medulla	Norepinephrine and epinephrine secreted	
Bladder	Wall relaxed Sphincter closed	Wall contracted Sphincter relaxed

http://faculty.washington.edu/chudler/auto.html


Motor cortex
Somatic sensory cortex
Motor
Sensory
Thumb
Fingers
Hand
Wrist
Elbow
Arm
Shoulder
Trunk
Hip
Knee
Toes
Neck
Brow
Eye
Face
Lips
Jaw
Tongue
Swallowing
Motor cortex
(precentral gyrus)
Leg
Hip
Trunk
Neck
Head
Arm
Elbow
Forearm
Hand
Fingers
Thumb
Eye
Nose
Face
Lips
Genitals
Teeth
Gums
Jaw
Tongue
Pharynx
Intra-abdominal
Somatic sensory cortex
(postcentral gyrus)