Sensory Nervous System

Objectives:

- Describe the process of sensory transduction in general
- List the stimuli to which we have receptors and, for each, identify the general type of receptor
- Distinguish receptor potential from action potential
- Distinguish tonic and phasic receptor function

Somatic senses

fine touch, deep touch, pressure, temp, pain, joint and muscle position, muscle stretch

Visceral senses

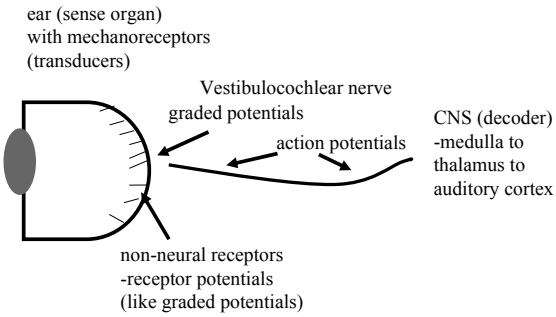
pH, O_2, CO_2, OsM, glucose, blood pressure, lung inflation, stomach stretch

Special senses

olfaction, gustation, hearing, equilibrium, vision

Receptors are transducers, neural or non-neural

Types: chemo-, mechano-, photo-, thermo-, noci-



coding: which receptors are activated and AP frequency

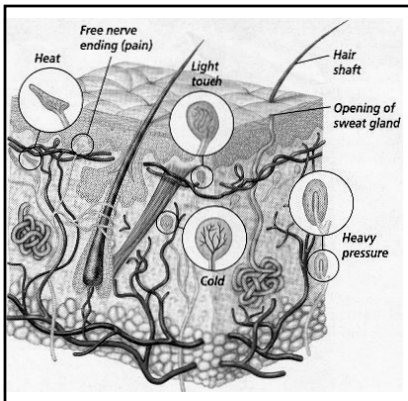
General principles of sensory function

1. Each sensory organ and receptor is specialized to convert one form of stimulus into sensory neuron action potentials.
2. Each modality has a discrete pathway to the brain.
3. The specific sensation and location of stimulus perceived is determined by area of brain activated.
4. 'Intensity' is coded by frequency of action potentials and number of receptors activated.

Group the following senses according to whether they use chemical or mechanical receptors.

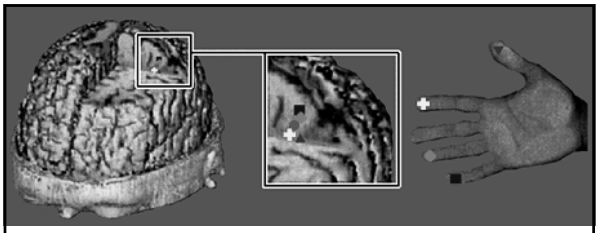
taste (gustation)	-chem
pain (nociception)	-chem and mech
smell (olfaction)	-chem
touch	-mech
vibration	-mech
vision	-neither
oxygen levels	-chem
pressure (baroreception)	-mech

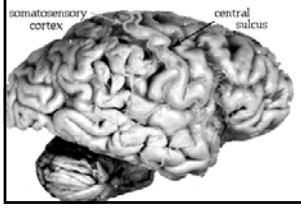
Which one can be both and which one is neither?



A somatic sense: touch

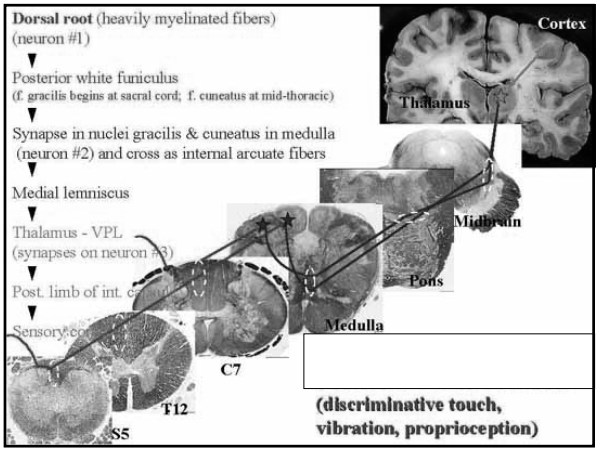
- Free nerve endings
- Meissner's corpuscle (light)
- Pacinian corpuscles (deep)

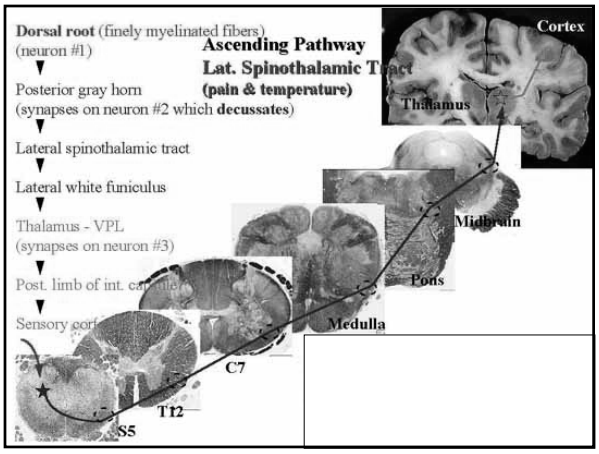




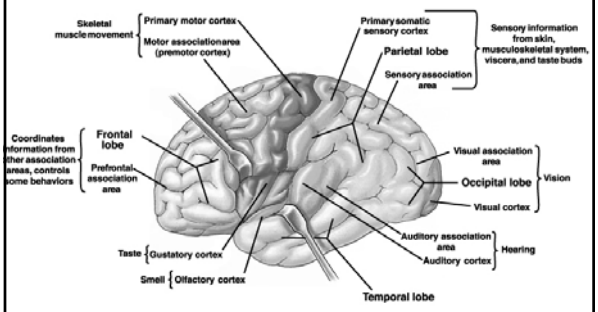
Example sensory pathway: touch

(receptor cell)
→ sensory neuron
→ to spinal cord or brainstem
→ to thalamus
→ to somatosensory cortex

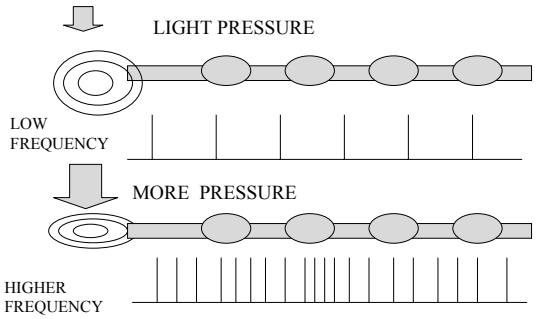




The specific sensation and location of stimulus perceived is determined by area of brain activated.



'Intensity' is coded by <u>frequency of action potentials</u> and number of receptors activated.



'Intensity' is coded by frequency of action potentials and <u>number of receptors activated</u>.