

NEUROSCIENCE

Neural communication

Resting potential
-70 mV inside
Neuron is **polarized**
Action potential (all-or-none)
Neurotransmitters bind to dendrites
Neuron reaches -55 mV
Becomes **depolarized**
Sodium/potassium ions
Signal moves down the axon
Neurotransmitters release to synapse
Must **repolarize**
Reuptake of neurotransmitters
Return to -70 mV
Refractory period (can't fire)

Myelin sheath
Insulates motor neurons
Speeds message
Decay of myelin sheath
- multiple sclerosis
Intelligence

Excitatory neurotransmitters
Acetylcholine (skeletal muscles)
Serotonin (depression/general well-being)
Dopamine (high - schizophrenia; low—depression)
Norepinephrine (Alertness, linked to fight-or-flight)
Endorphins (pain relief)
Inhibitory neurotransmitter (GABA)
Effect of agonists/antagonists

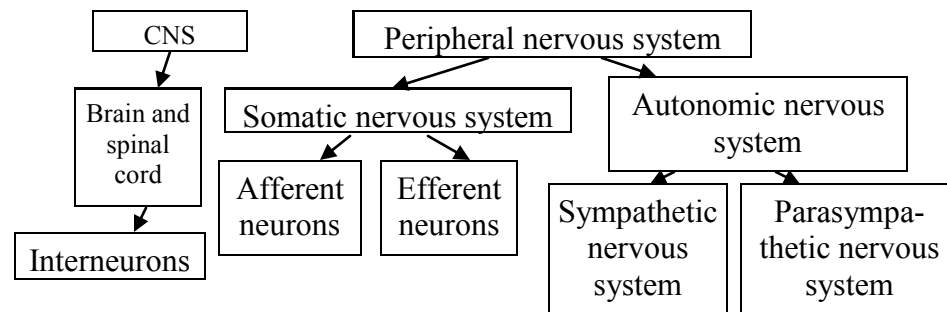
The brain

Plasticity—neurons can be used for new purposes

Hindbrain:
Cerebellum—coordination
Medulla—breathing, heartbeat
Pons—sleep, arousal, dreams
Reticular formation—arousal
Midbrain:
At the intersection of forebrain & hindbrain (spatial awareness)

Forebrain:
Thalamus—sensory switchboard
Limbic system—emotion
Hippocampus (memory)
Amygdala (fear, anger)
Hypothalamus (biological needs, e.g. hunger, sex, thirst)
Cerebrum/cerebral cortex
Prefrontal cortex (planning, or ganization, risk assessment)
Frontal lobes (motor cortex, mirror neurons)
* Broca's area (speech)
Parietal lobes (somatosensory cortex)
* Angular gyrus
Temporal lobes (auditory cortex)
* Wernicke's area
Occipital lobes (visual cortex)

Organization of the nervous system



Hemispheric specialization

Split-brain surgery (corpus callosum severed)
*Used to treat uncontrolled seizures
Seen in left visual field, processed in rt. hemisphere

Left hemisphere
Language/logic

Right hemisphere
Nonverbal/spatial/
musical/recognition

Methods of study

Structure
Lesions
CT scan
MRI

Function
EEG
PET scan
fMRI

The endocrine system

Pituitary—master gland (directed by the hypothalamus)
Biochemically the same as neurotransmitters
Adrenal gland—stress hormones