

An Herbalist's View of the Nervous System

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Major Divisions of the Nervous System

Central nervous system (CNS) – brain, spinal cord

Peripheral nervous system (PNS) – cranial nerves, spinal nerves

Somatic nervous system (SNS) – skeletal muscle, voluntary

Autonomic nervous system (ANS) – smooth and cardiac muscle, glands, involuntary

Sympathetic division

Parasympathetic division

Afferent (sensory) neurons – transmit nerve impulses to CNS

Efferent (motor) neurons – transmit nerve impulses away from CNS

Association (interneuron) neurons – carry nerve impulses entirely within CNS

Neuron Anatomy

Cell body

Nucleus

Dendrite

Axon

Axon collaterals

Axon hillock

Axon terminal

Terminal knob

Presynaptic membrane

Synaptic cleft

Postsynaptic membrane

Schwann cell

Myelin sheath

Node of Ranvier

Synaptic vesicle

Receptor

Neurotransmitter

Sodium-potassium pump

Chemical-gated channel

Voltage-gated channel

Neuron Physiology

Action potential

Axonal transport

Depolarization

Innervation

Nerve impulse

Polarization

Propagation (conduction)

Resting membrane potential (RMP)

Summation

Threshold

Principal Types of Cells

▶ Neurons – carry nerve impulses

▶ Neuroglial (glia) cells – support neurons. There are 10-50 times the amount of glial cells than neurons

Types of Neuroglia

In Central Nervous System

1. Astrocytes – support and maintain neurons, and attach them to blood vessels
2. Oligodendrocyte – support neurons and produce a myelin sheath around their axons

3. Microglia – CNS macrophages
4. Ependymal cells – line ventricles of CNS

In Peripheral Nervous System

1. Satellite cells – support neurons in ganglia of PNS
2. Schwann cells (neurolemmocytes) – wrap themselves as a myelin sheath around axons and help with rapidity of nerve impulse and regeneration of injured axon

Other Terminology

Adrenergic	Neurohormone
Agonist	Neuromodulator
Antagonist	Neuropeptide
Anticholinergic	Neuropharmacology
Brain	Neuropsychopharmacology
Cerebrospinal fluid	Nicotinic receptor
Cholinergic	Nociceptors
Dermatomes	Reuptake
Enzyme	Secondary messenger
Ganglia	Tolerance
Muscarinic receptor	Vagus nerve

Major Neurotransmitters

Type A Small-Molecule Rapidly Acting Transmitters

Class I

- * Acetylcholine – widely used; generally excitatory but occasionally inhibitory as with the vagus nerve and the heart

Class II: The amines

- * Catecholamines – derived from tyrosine
 - Dopamine – generally inhibitory
 - Norepinephrine (noradrenaline) (NE) – widely used; excitatory and inhibitory
 - Epinephrine (adrenaline) (E)
- * Serotonin – 5 hydroxytryptamine (5-HT) – derived from tryptophan; found in the brain (as a neurotransmitter) and spinal cord. Affects mood, pain, sleep and sensory perception
- * Histamine – derived from histidine; acts as a neurotransmitter in the brain

Class III: Amino acids

- * Gamma-Aminobutyric Acid (GABA) – found primarily in the brain and spinal cord; primary inhibitory neurotransmitter in the brain
- * Glycine – found primarily in the spinal cord where it is the major inhibitory neurotransmitter
- * Glutamate – primary excitatory neurotransmitter in the brain
- * Aspartate – excitatory neurotransmitter in the brain

Class IV

* Nitric oxide (NO) – a neurotransmitter and neuromodulator in the brain. A gas.

Type B A few Neuropeptides: slower acting neurotransmitters

Opiate Peptides – widely found in the brain and are inhibitory

- * Beta Endorphin
- * Enkephalins
- * Dynorphins

Gut-brain Peptides – found in both brain and intestine

- * Substance P – found widely in the body; a slowly released pain transmitter
- * Vasoactive intestinal polypeptide (VIP) – excitatory neurotransmitter and modulator in the brain. Broad action in the GI tract as a hormone
- * Cholecystokinin (CCK)
- * Neurotensin (NT)
- * Insulin

Categories of Therapeutics

Adaptogen – helps the body adapt to stress

Analeptic – increases activity of the central nervous system

Analgesic – relieves pain

Anesthetic – produces a partial or complete loss of nerve sensation

Anticholinergic – inhibits the impulses of acetylcholine

Anticonvulsant – preventing or reducing the severity of epilepsy or other seizures

Antidepressant – helps prevent or alleviate depression

Antispasmodic – relieves smooth muscle spasms

Antistress – reduces stressful feelings or actions

Anxiolytic – reduces anxiety or nervousness

Calmative – promotes a feeling of calm, relaxation

Excitant – agent eliciting excitation of specific body functions, i.e. Cerebral or motor

Hypnotic – induces sleep

Narcotic – producing sleep or stupor, or an opium derived drug

Nervine – nourishes and treats nervous system related disorders

Psychotropic – affecting psychic function, i.e. Behavior and experience

Relaxant – reduces tension

Restorative – general term for agents that help regain strength and health

Sedative – increases rate of activity of a body system

Skeletal muscle relaxant – relaxes muscles of the musculo-skeletal system

Soporific – produces a deep sleep

Disorders

Affective (mood) disorders
 Alzheimer syndrome
 Anxiety
 Aphasia
 Attention deficit disorder (ADD)
 Bipolar (manic depressive) disorder
 Caffeinism
 Cognitive deficiency
 Dementia
 Depression
 Digestive disorders
 Dyslexia
 Epilepsy
 Headache
 Insomnia

Multiple sclerosis (MS)
 Myasthenia gravis
 Neuralgia
 Neuropathy
 Pain
 Panic attacks
 Parkinson's disease
 Post-traumatic stress disorder
 Schizophrenia
 Seasonal affective disorder (SADs)
 Shingles
 Stress
 Tay-Sachs disease
 Tinnitus
 Vertigo

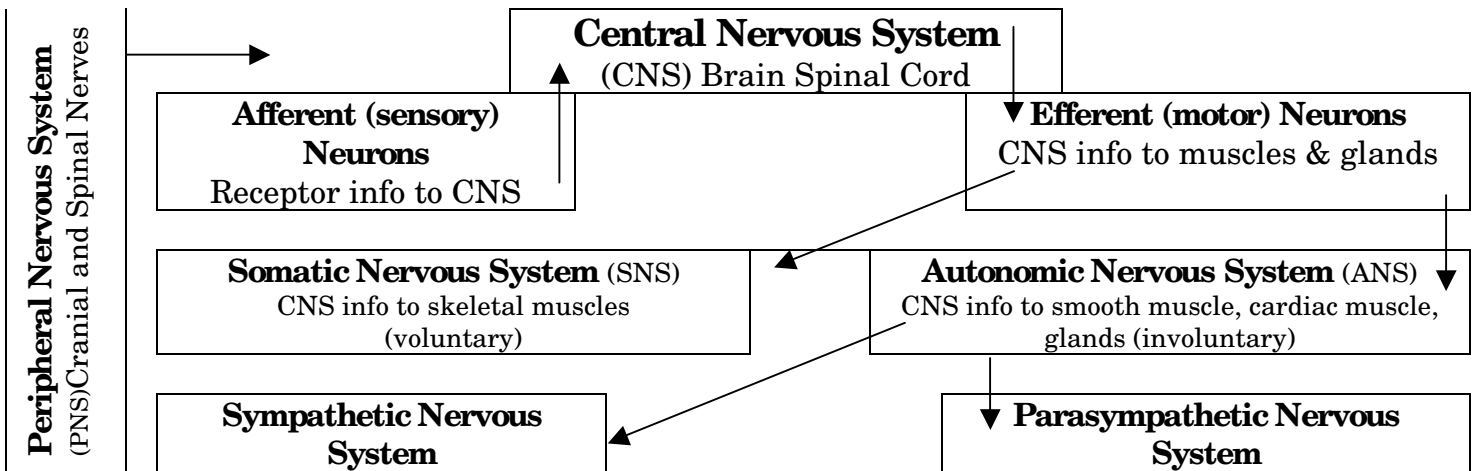
Drugs and Drug Therapies

Anticholinergics
 Antipsychotics
 Benzodiazepines
 L-Dopa
 Lithium

Monoamine oxidase (MAO) inhibitors
 Second-generation antidepressants
 Serotonin reuptake inhibitors
 Tricyclic antidepressants
 Tropane alkaloids

Considerations

Alcohol	Excitability	Mood alterants
Anxiety	Exercise	Mood swings
Breathe	Habits	Occupation
Caffeine	Insomnia	Relaxation
Diet	Lifestyle	Stress
Drug use	Meditation	Work hard/play hard



Herbs

American ginseng – *Panax quinquefolius*
Ayahuasca – *Banisteriopsis caapi*/B. spp.
Belladonna – *Atropa belladonna*
Black cohosh – *Cimicifuga racemosa*
Blue vervain – *Verbena hastata*
Bugleweed – *Lycopus* spp.
Calamus – *Acorus calamus*
California poppy – *Eschscholtzia* spp.
Coca – *Erythroxylum coca*
Coffee – *Coffea arabica*/C. spp.
Cola – *Cola acuminata*/C. *nitida*
Corydalis – *Corydalis aurea*
Coyote weed – *Thamnosma texana*
Damiana – *Turnera diffusa*/T. spp.
Dicentra – *Dicentra canadensis*/D. spp.
Epipactis – *Epipactis helleborine*
German chamomile – *Matricaria recutita*
Ginger – *Zingiber officinale*
Gingko – *Gingko biloba*
Gotu kola – *Centella asiatica*
Guarana – *Paullinia cupana*
Henbane – *Hyoscyamus niger*
Hops – *Humulus lupulus*
Jamaican dogwood – *Piscidia piscipula*
Jimsonweed – *Datura stramonium*/D. spp.
Kava kava – *Piper methysticum*
Khat – *Catha edulis*
Lemon balm – *Melissa officinalis*
Lavender – *Lavandula* spp.
Linden – *Tilia europaea*
Lobelia – *Lobelia inflata*
Marijuana – *Cannabis sativa*
Mistletoe – *Viscum album*
Monkshood – *Aconitum columbianum*
Motherwort – *Leonurus cardiaca*
Mountain laurel – *Kalmia latifolia*
Nux vomica – *Strychnos nux-vomica*
Oats – *Avena sativa*/A. spp.
Passionflower – *Passiflora incarnata*
Peppermint – *Mentha piperita*
Peyote – *Lophophora williamsii*
Poison hemlock – *Conium maculatum*
Poppy – *Papaver somniferum*
Pulsatilla – *Anemone pulsatilla*/A. spp.
Rauwolfia – *Rauwolfia serpentina*
Rosemary – *Rosmarinus* spp.
St. Johnswort – *Hypericum perforatum*
Siberian ginseng – *Eleutherococcus senticosus*
Skullcap – *Scutellaria lateriflora*/S. spp.
Syrian rue – *Peganum harmala*
Tea – *Camellia (Thea) sinensis*
Tobacco – *Nicotiana tabacum*/N. *rusticana*
Valerian – *Valeriana officinalis*/V. spp.
Vervain – *Verbena officinalis*
Wild lettuce – *Lactuca* spp.
Wood betony – *Stachys officinalis*
Yellow jessamine – *Gelsemium sempervirens*
Yerba mate – *Ilex paraguariensis*
Yohimbe – *Corynanthe yohimbe*