PHYLOGENETIC DISORDERS OF NERVOUS SYSTEM

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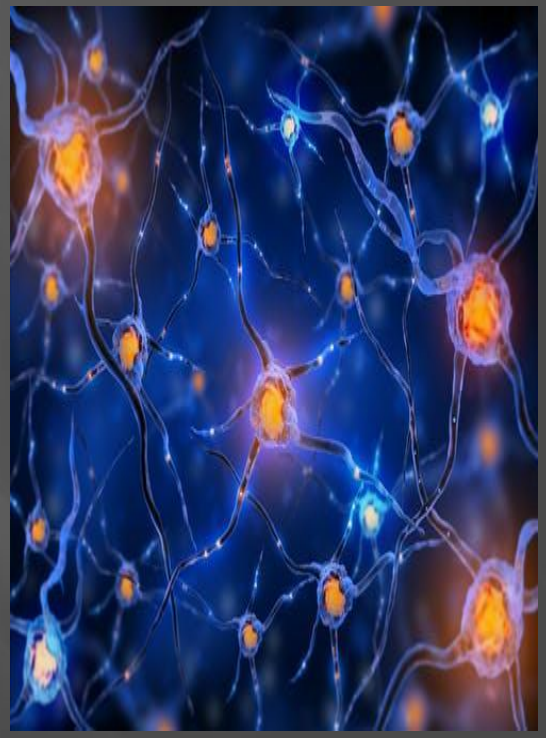
Nervous System

- Introduction to the Nervous System

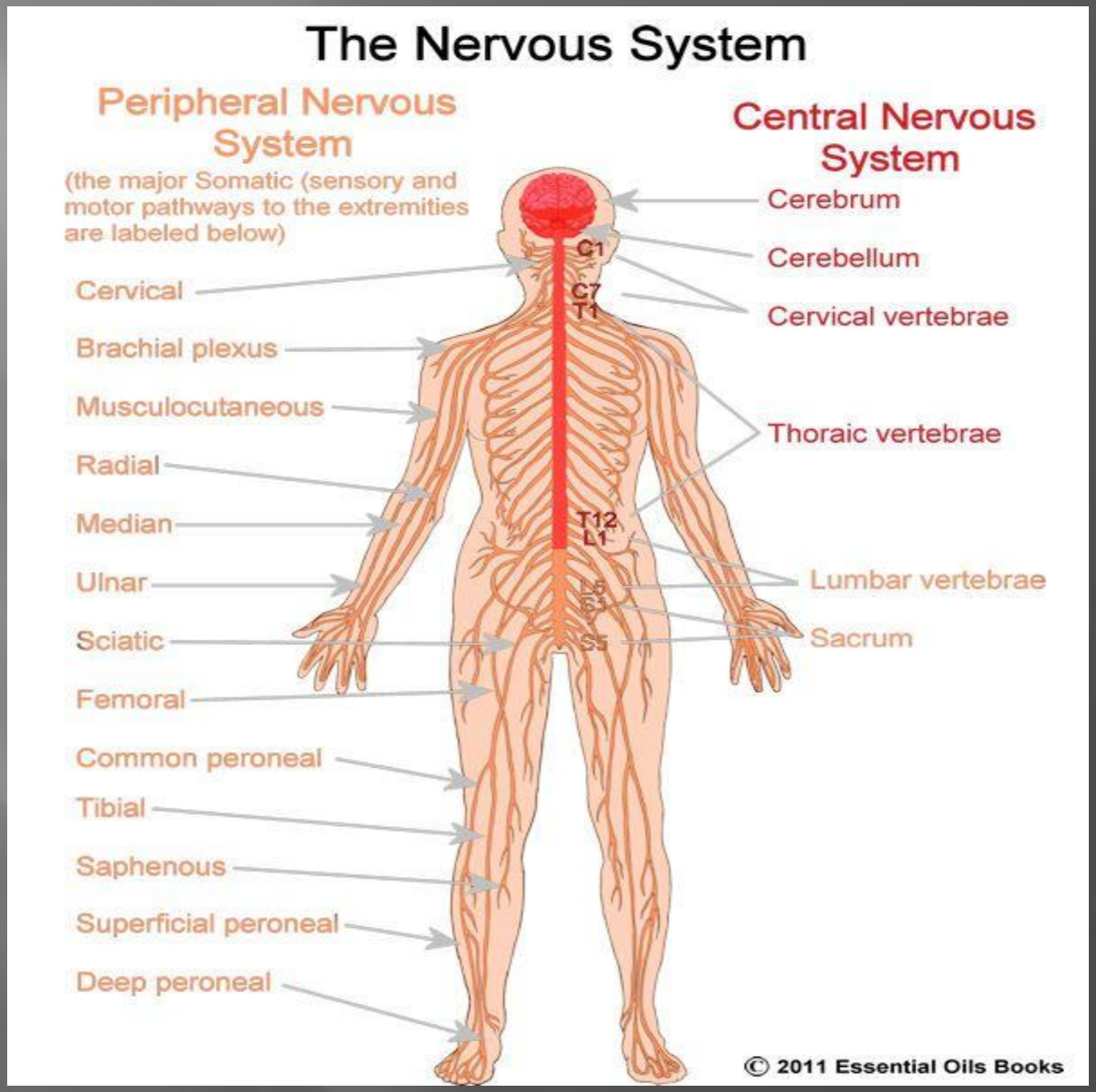
  The nervous system is the major controlling, regulatory, and communicating system in the body. It is the center of all mental activity including thought, learning, and memory. Together with the endocrine system, the nervous system is responsible for regulating and maintaining homeostasis. Through its receptors, the nervous system keeps us in touch with our environment, both external and internal.



Like other systems in the body, the nervous system is composed of organs, principally the brain, spinal cord, nerves, and ganglia. These, in turn, consist of various tissues, including nerve, blood, and connective tissue. Together these carry out the complex activities of the nervous system.

The various activities of the nervous system can be grouped together as three general, overlapping functions:

- Sensory
- Integrative
- Motor


The Nervous System
Peripheral Nervous System
(the major Somatic (sensory and motor pathways to the extremities are labeled below)
Cervical
Brachial plexus
Musculocutaneous
Radial
Median
Ulnar
Sciatic
Femoral
Common peroneal
Tibial
Saphenous
Superficial peroneal
Deep peroneal
Central Nervous System
Cerebrum
Cerebellum
Cervical vertebrae
Thoraic vertebrae
Lumbar vertebrae
Sacrum
C1
C7
T1
T12
L1
L5
S1
S5
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Types of nervous system

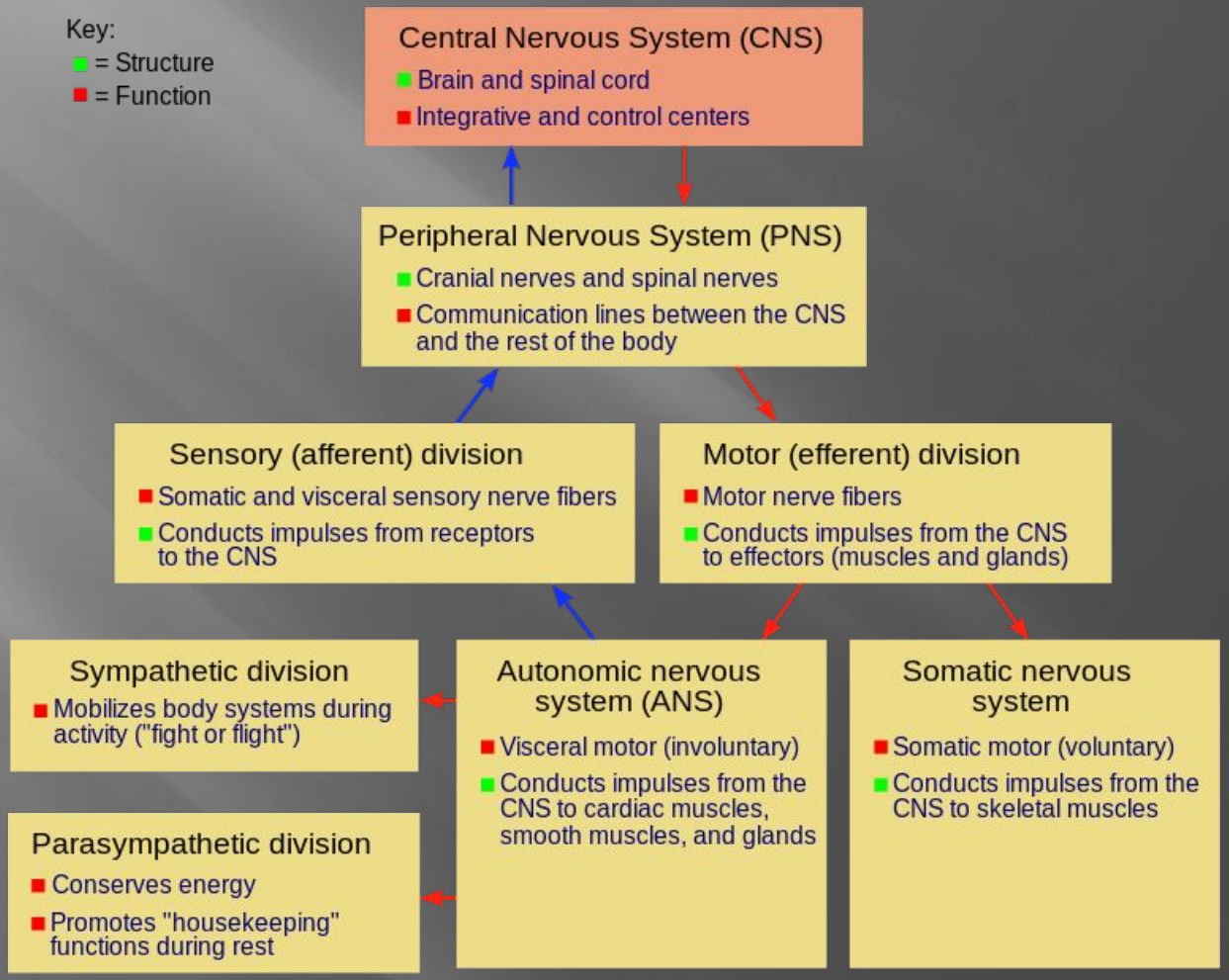
Choleric	Strong but unbalanced nerve processes characterized by predominance of excitation
Sanguine	Strong, well-balanced, highly mobile nerve processes
Phlegmatic	Strong, well-balanced, low mobile nerve processes
Melancholic	Extremely weak development of both excitation and inhibition, unbalanced, low mobile

Phylogenetic Evolution of Nervous System

- At the cellular level, the nervous system is defined by the presence of a special type of cell, called the neuron, also known as a "nerve cell". Neurons have special structures that allow them to send signals rapidly and precisely to other cells. They send these signals in the form of electrochemical waves traveling along thin fibers called axons, which cause chemicals called neurotransmitters to be released at junctions called synapses. A cell that receives a synaptic signal from a neuron may be excited, inhibited, or otherwise modulated. The connections between neurons can form neural pathways, neural circuits, and larger networks that generate an organism's perception of the world and determine its behavior. Along with neurons, the nervous system contains other specialized cells called glial cells (or simply glia), which provide structural and metabolic support.

- Nervous systems are found in most multicellular animals, but vary greatly in complexity. The only multicellular animals that have no nervous system at all are sponges, placozoans, and mesozoans, which have very simple body plans. The nervous systems of the radially symmetric organisms ctenophores (comb jellies) and cnidarians (which include anemones, hydras, corals and jellyfish)consist of a diffuse nerve net. All other animal species, with the exception of a few types of worm, have a nervous system containing a brain, a central cord (or two cords running in parallel), and nerves radiating from the brain and central cord. The size of the nervous system ranges from a few hundred cells in the simplest worms, to around 300 billion cells in African elephants.

Highly Complex Nervous System



Phylogenetic Disorder

- A few human diseases may be viewed from a phylogenetic perspective. Some metabolic or degenerative diseases selectively affect recently evolved or exclusively mammalian structures of the brain and spare the older structures. Some pathologic conditions in man are similar to normal anatomy in other species, although the mechanisms may differ. Congenital muscle fiber-type disproportion in rodents, Dandy-Walker cyst in birds, and agenesis of the corpus callosum in marsupials are representative of this category. Loss of basal dendritic spines from pyramidal cells in Pick's disease is reminiscent of certain large neurons normally found in the cortex of reptiles. Changes in metabolism in the evolution of mammals in general and of man in particular may explain some aspects of phylogenetic diseases. Some potential examples are the shift from predominantly phospholipids to galactolipids in myelin composition as mammals evolved, and the greater toxicity of cyanide and other poisons of oxidative metabolism in mammals than in other vertebrates because of less reliance on anaerobic metabolism as an alternative energy source.

Rare Disorder of Nervous System

- Krabbe's leukodystrophy
- olivopontocerebellar atrophy
- Friedreich's ataxia
- Pick's disease
- Leber's optic atrophy
- Dandy-Walker Malformation

Krabbe's leukodystrophy

- Krabbe's disease is a hereditary progressive neurologic disease of infancy related to deficiencies of galactocerebrosidebeta-galactosidase and psychosine galactosidase.The resultant accumulation of galactocerebroside and psychosine produces death of myelin-forming cells and degeneration of white matter of the central nervous system and of peripheral nerves

Leber's optic atrophy

- This rare hereditary disease results from progressive degeneration of retinal ganglion cells and secondary degeneration of optic nerve fibers from the macula, and lateral geniculate neurons. Other parts of the nervous system usually are not affected, but the disorder occasionally is associated with features of spinocerebellar degeneration or with additional signs and symptoms including seizures, mental retardation loss of proprioception, and spasticity

Spinocerebellar Degenerations

- Friedreich's ataxia and olivo-ponto-cerebellar atrophy are progressive diseases of the central nervous system affecting almost exclusively those structures of mammals either absent or rudimentary in lower vertebrates. The phylogenetically oldest portions of the cerebellar vermis (archicerebellum and paleocerebellum) are spared together with other old components of the cerebellar system, such as the dorsal and medial accessory olivary nuclei

General Classification of Disorder

- Disorders of the nervous system may involve the following:
- **Vascular disorders**, such as stroke, transient ischemic attack (TIA), subarachnoid hemorrhage, subdural hemorrhage and hematoma, and extradural hemorrhage
- **Infections**, such as meningitis, encephalitis, polio, and epidural abscess
- **Structural disorders**, such as brain or spinal cord injury, Bell's palsy, cervical spondylosis, carpal tunnel syndrome, brain or spinal cord tumors, peripheral neuropathy, and Guillain-Barré syndrome
- **Functional disorders**, such as headache, epilepsy, dizziness, and neuralgia
- **Degeneration**, such as Parkinson disease, multiple sclerosis, amyotrophic lateral sclerosis (ALS), Huntington chorea, and Alzheimer disease

How nervous system can be damaged ?

- The nervous system is vulnerable to various disorders. It can be damaged by the following:
- Trauma
- Infections
- Degeneration
- Structural defects
- Tumors
- Blood flow disruption
- Autoimmune disorders
- Disorders of

Signs and symptoms of nervous system disorders

- Persistent or sudden onset of a headache
- A headache that changes or is different
- Loss of feeling or tingling
- Weakness or loss of muscle strength
- Loss of sight or double vision
- Memory loss
- Impaired mental ability
- Lack of coordination
- Muscle rigidity
- Tremors and seizures
- Back pain which radiates to the feet, toes, or other parts of the body
- Muscle wasting and slurred speech
- New language impairment (expression or comprehension)

These are some branch of medicine that deals with such disorders

- Neurology
- Neurological surgery
- Neuroradiologists and interventional radiologists
- Rehabilitation for neurological disorders

Neurology

- The branch of medicine that manages nervous system disorders is called *neurology*. The medical healthcare providers who treat nervous system disorders are called neurologists. Some neurologists treat acute strokes and cerebral aneurysms using endovascular techniques.

Rehabilitation for neurological disorders

- The branch of medicine that provides rehabilitative care for patients with nervous system disorders is called physical medicine and rehabilitation. Healthcare providers who work with patients in the rehabilitation process are called physiatrists.

Thank You