NERVOUS SYSTEM GUIDE

The Nervous System:

- Coordinates all of the many activities of the body

Neuron:

- Basic structural unit of the nervous system
- Parts of neuron
  - Cell body
  - Nerve fibers (dendrites, axon)
Nerves:
- Combination of nerve fibers
- Afferent—
- Efferent—
- Associative—

Nervous System:

Consists of two main divisions:
Central nervous system (CNS)
Brain and spinal cord

Peripheral nervous system:
Somatic nervous system
Autonomic nervous system

Central Nervous System
The Brain:
- Cerebrum
- Diencephalon
- Pons
Central Nervous System

The Spinal Cord:
- Continues down from medulla oblongata
- Responsible for many reflex actions
- Carries motor (efferent) message from the brain

Peripheral Nervous System:
- Cranial nerves
- Autonomic nervous system
  - Parasympathetic
The major components and functions of the nervous system

Central Nervous System

- The central nervous system (CNS) consists of the brain and spinal cord and is responsible for integrating, processing, and coordinating sensory data and motor commands.

Peripheral Nervous System

- The peripheral nervous system (PNS) includes all the neural tissue outside the CNS.

1. **Receptors**
   - Receptors are sensory structures that detect changes in the internal or external environment.
   - Somatic sensory receptors provide position, touch, pressure, pain, and temperature sensations.
   - Special sensory receptors provide sensations of smell, taste, vision, balance, and hearing.
   - Visceral sensory receptors monitor internal organs.

2. **The sensory division of the PNS**
   - Brings information to the CNS from receptors in peripheral tissues and organs.

3. **Information processing**
   - Includes the integration and distribution of information in the CNS.

4. **The motor division of the PNS**
   - Carries motor commands from the CNS to peripheral tissues and systems.
   - Includes the somatic nervous system (SNS) which controls skeletal muscle contractions.
   - The autonomic nervous system (ANS) provides automatic regulation of smooth muscle, cardiac muscle, glands, and adipose tissue.

5. **Effectors**
   - Are target organs whose activities change in response to neural commands.
   - Skeletal muscle
   - Smooth muscle
   - Cardiac muscle
   - Glands
   - Adipose tissue
Nervous System Disorders:
When wiring short circuits!

Amyotrophic lateral sclerosis (ALS):
- Also known as Lou Gherig's Disease
- Cause is unknown:
  - Or- viral immune factors are suspected
Nerves cells in the CNS that control voluntary movement, degenerate, resulting in weakening (atrophy) or wasting away of the muscles they control
  - Initial symptoms include:
    - Abnormal reflexes
    - Impaired hand and arm movement
    - As the disease progresses, more muscles are affected, resulting in total body paralysis
• Later stages:
  • Patient loses all ability to communicate, eat, breathe, and move
  • There is no treatment however, there are drugs to slow progress

Carpal Tunnel Syndrome:

• Repetitive movement of wrist causes swelling around this tunnel, which puts pressure on nerves and tendons
• Symptoms include:
  • Pain
  •
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  • Classic chief complaint of pt: Pain and numbness and tingling in the thumb, ring finger, and middle finger
• Treatment:
  • Anti-inflammatory drugs
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  • Severe cases require surgery to enlarge the tunnel to allow more space for the tendons and nerve
Cerebral Palsy:
- Disturbance in voluntary muscle action
- Caused by brain damage:
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- Infections
- Three forms:
- Spastic is the most common
- Symptoms:
  - Tense muscles and development of contracture
  - Spasms and tremors
- Treatment: No cure
- Muscle relaxants and anticonvulsive drugs
- Orthopedic surgery for severe contracture

Cerebrovascular Accident CVA:
- Blood flow to the brain is impaired resulting in a lack of oxygen and destruction of brain tissue
Causes:
- Occlusion or blockage caused by atherosclerosis or a blood clot
CVA: Factors that cause strokes:
- Smoking
- Obesity
CVA: Symptoms:

- Symptoms vary depending on the area of the brain affected and brain tissue damaged
  - Weakness or vertigo
  - Dysphagia or difficulty swallowing
  - Mental confusion
  - Incontinence

Quick Guide to Symptoms:

- Treatment:
  - Care during the first 3 hours can prevent brain damage
  - Angioplasty of cerebral arteries
  - Dependant on damage:
    - Physical, occupational, and speech therapy
Encephalitis:

OR

Complications from chicken pox, measles, or mumps
- Virus is commonly contacted from mosquito bite
- Symptoms vary but may include:
  - Fever
  - Visual disturbances
  - Stiff neck
  - Seizures
  - Coma

Treatment:
- Antiviral Drugs
- Monitoring respiratory and kidney function

Epilepsy or Seizure Syndrome:
- Causes can include:
  - Birth trauma
  - Infections
  - Many cases are idiopathic
- Two Types:
  - Absence or Petit Mal Seizure
    - Characterized by a loss of consciousness lasting only a few seconds
  - Generalized tonic-clonic or Grand Mal Seizure
    - Most Severe
    - Convulsions are violent shaking and thrashing movements
    - Loss of body functions
    - Some people experience an aura
Examples include:

- Visual disturbances
- Tingling in fingers or toes
- Treatment includes anticonvulsant drugs

Hydrocephalus:
- Excessive accumulation of cerebrospinal fluid in the ventricles and, in some cases, the subarachnoid space

Symptoms:
- Abnormally enlarged head, prominent forehead, with bulging eyes
- Distended scalp veins

Hydroencephalus Treatment:

Meningitis:
- Inflammation of the meninges of the brain and/or spinal cord

Causes:

- Virus or Fungus
Symptoms may also include:
- Delirium
- Convulsions

Meningitis: treatment
- Antibiotics
- Medications for Pain and Cerebral edema

Multiple Sclerosis: MS
- Chronic, progressive disabling condition resulting from degeneration of myelin sheath in the CNS
• Cause is unknown, but can be:

MS: progression
• Progresses at different rates and has periods of remission
• Early symptoms include visual disturbances such as diplopia (double vision)
  • Tingling and Numbness
  • Fatigue

• Later Symptoms include:
  • Paralysis
  • Emotional swings
  • Incontinence
**MS: Treatment:**

- Treatments include:
  - Muscle relaxants
  - Psychological counseling

**Neuralgia:**

- Nerve pain
  - Treatment is directed towards eliminating the cause

**Paralysis:**

- There is no cure, but there is much research directed towards repairing the spinal cord
Types of Paralysis:
- Hemiplegia:
- Paraplegia:
- Quadriplegia:

Parkinson's Disease:
Chronic progressive condition involving degeneration of brain cells, usually in people over 50 yoa

Parkinson's Disease: Symptoms
- Difficulty of stopping while walking
- Mood swings and frequent depressions
Parkinson's Disease: Treatment
- There is no cure but a few treatments
- Levodopa is used to relieve the symptoms
- PT

Shingles or Herpes Zoster:
- Usually occurs in the thoracic area on one side of body and follows the pathway of the affected nerve
Shingles: Symptoms:
- Fluid filled vesicles
- Severe pain
- Redness

Shingles: Treatment:
- Aimed at relieving pain and itching
- Also inflammation
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