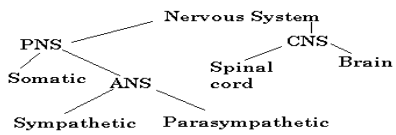


Biology & Behavior



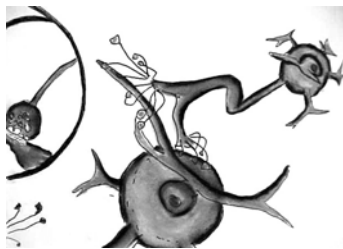
Slide # 1

Diagram of the Nervous System



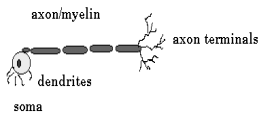
Slide # 2

Neurons



Slide # 3

Axons



- Thread-like extensions from the cell body
- Tube-like fibers that carry impulses away from the soma to the dendrites
- Myelin coating

Slide # 4

Multiple Sclerosis



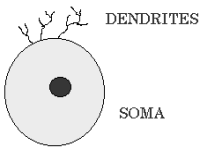
- MS destroys myelin sheaths of axons
- This can cause erratic and uncoordinated behavior

Slide # 5



Slide # 6

Dendrites



- Short, thin fibers that stick out from the cell body
- Dendrites receive impulses or messages from other neurons and send them to the cell body

Slide # 7

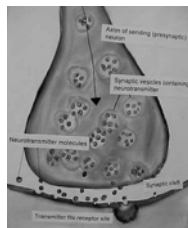
Characteristics of Neurons

- They cannot replace themselves
- Damage is permanent
- Threshold of excitation

Slide # 8

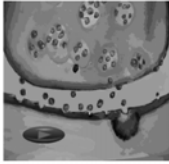
The Neuron Connection

- Synapse junction
- Neurotransmitters
- Open chemical "locks"
- Inhibition



Slide # 9

How a Neuron Fires



Slide # 10

Neurotransmitters

- Acetylcholine (memory, movement)
- Norepinephrine (memory, learning)
- Serotonin (sleep, appetite)
- Endorphins (inhibits pain)
- Dopamine (learning, emotions, movement)

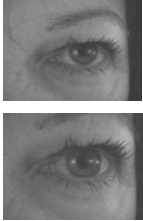
Slide # 11

Types of Neurons

- Ascending vs. descending tracts
- Afferent/Sensory neurons
- Efferent/Motor neurons
- Interneurons/Connecting neurons

Slide # 12

Voluntary vs. Involuntary



- Somatic nervous system (voluntary activities)
- Autonomic nervous system (involuntary activities)

Slide # 13

Divisions of the Autonomic Nervous System



- Sympathetic nervous system
- 1. Fight or flight
- 2. Speeds up heart rate/O² supply and blood pressure
- 3. It constricts some arteries, relaxes others

Slide # 14

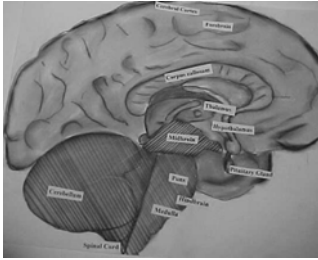
Parasympathetic Nervous System



- Works to conserve energy
- Helps us recover from strenuous activity
- Reduces heart rate and blood pressure
- Returns us to a normal resting state

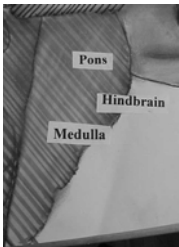
Slide # 15

The Brain



Slide # 16

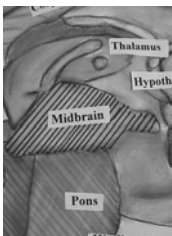
Divisions of the Brain



- Hindbrain, located at the rear base of the skull
- Contains the cerebellum, the medulla, the pons

Slide # 17

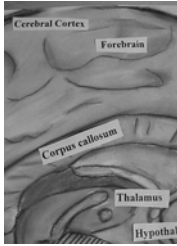
The Midbrain



- Located just above the pons
- Function: relays sensory information
- Brain stem and reticular activating system

Slide # 18

The Forebrain



- The hindbrain and forebrain compose the brain's central core
- Thalamus (information relay)
- Hypothalamus (motivation, emotion)
- Higher-thinking processes

Slide # 19

Higher-Thinking Processes



- Cerebral cortex
- Cerebrum

Slide # 20

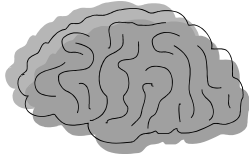
The Limbic System

- Found in the core of the forebrain
- It has a number of different parts:
 - 1. Thalamus
 - 2. Hypothalamus
 - 3. Amygdala
 - 4. Hippocampus

Slide # 21

Hemispheres of the Brain

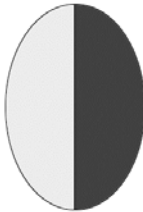
- The cerebrum has two hemispheres
- The corpus callosum



Slide # 22

Two Hemispheres

left
verbal
mathematical
analytical
rational
logical



right
nonverbal
spatial
holistic
emotional
intuitive

Slide # 23

Righthanded vs. Lefthanded



- Handedness—a preference for using one hand
- Not an absolute
- 90% of people in the U.S. are righthanded
- Theories: environmental vs. genetic

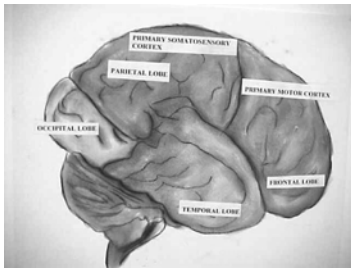
Slide # 24

Problems Associated With Being a Lefty

- Autism and dyslexia
- Schizophrenia
- Mental retardation
- Alcoholism
- Life expectancy

Slide # 25

Lobes of the Brain



Slide # 26

Lobes and Their Functions

- Frontal: planning of movements, working memory
- Temporal: hearing, advanced visual processing, memory
- Occipital: vision
- Parietal: body sensations
- Primary motor cortex: fine motor control

Slide # 27

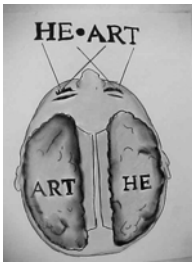
Split-Brain Surgery

- Pioneered by Roger Wolcott Sperry 1913–1994
- Used to correct epileptic seizures



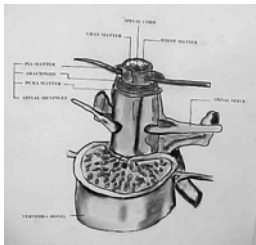
Slide # 28

Side Effects



Slide # 29

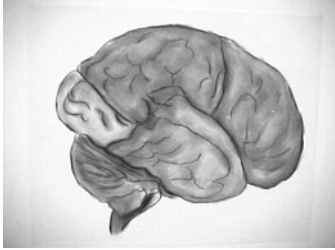
The Spinal Cord



- Dura matter
- Arachnoid
- Pia matter
- Cerebrospinal fluid
- Gray vs white matter

Slide # 30

Looking Inside the Brain



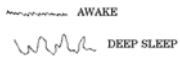
Slide # 31

Techniques Used to Look Inside the Brain

- Electrical recordings
- Lesioning
- Electrical stimulation
- Brain imaging

Slide # 32

Electrical Recordings



Electro-
encephalograph
(EEG)

Hans Berger
Brainwave patterns

Slide # 33

Lesioning



- Brain tumors, strokes, head injuries all cause brain damage
- H. Gardner, 1975
- Limitations/ experiments with animals

Slide # 34

Electrical Stimulation of the Brain

- ESB involves sending a weak electrical current into a brain structure in order to stimulate it
- The current mimics brain wave voltage
- Most ESB research is done on animals

Slide # 35

Brain Imaging Techniques

- CT (computerized tomography) scans
- PET (positron emission tomography) scans
- MRI (magnetic resonance imaging) scans

Slide # 36

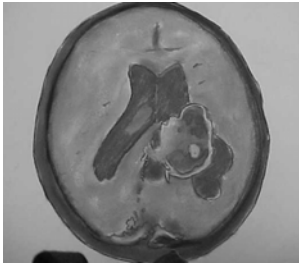
The CT Scan



- Computerized tomography (CT) scan: a computer-enhanced x-ray of brain structure
- Assembling the images
- CT/least expensive procedure

Slide # 37

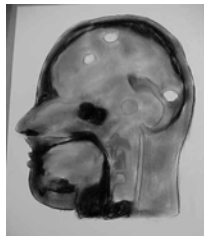
Image From a CT Scan



Slide # 38

PET Scans

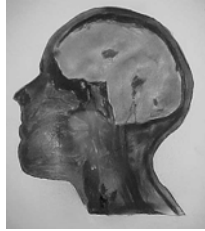
- Positron emission tomography (PET) scan
- Radioactive chemicals are used as markers
- Provides a color-coded map of the brain



Slide # 39

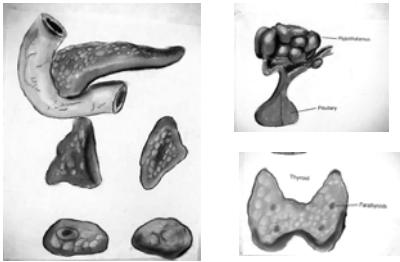
MRI Scans

- Magnetic resonance imaging (MRI) scan uses magnetic fields, radio waves, and computerized enhancement
- Much more detailed than a CT scan



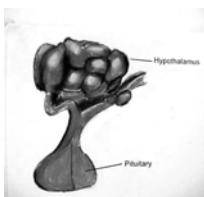
Slide # 40

The Endocrine System



Slide # 41

The Pituitary Gland



- Master gland of the body
- It contains 3 lobes
- The pituitary regulates metabolism by stimulating other glands

Slide # 42

Anterior Lobe/Pituitary Gland



- Somatotrophic hormones
- Midget
- Dwarf
- Giant
- Acromegaly

Slide # 43

Justin



Slide # 44

Other Pituitary Hormones

- TSH (thyroid stimulating hormone)
- ACTH (adrenocorticotrophic hormone)
- Gonadotrophic hormone

Slide # 45

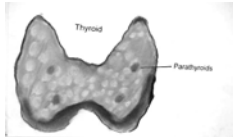
Posterior Lobe Hormones

- ADH (anti-diuretic hormone)
- Oxytocin

Slide # 46

The Thyroid Gland

- Largest gland in the endocrine system
- Located at the junction of the trachea and larynx
- Produces thyroxine



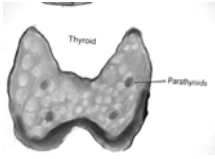
Slide # 47

Thyroid Disorders

- Cretinism
- Myxedema
- Goiter

Slide # 48

The Parathyroids



- The four smallest glands in the endocrine system
- They regulate the body's calcium and phosphorus balances
- Tetany

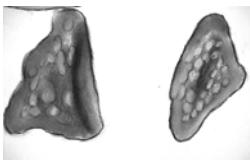
Slide # 49

The Thymus Gland

- Located behind the breastbone
- Its function is not clearly understood
- Immune system

Slide # 50

The Adrenal Gland



- Located on top of each kidney
- Composed of the adrenal cortex and the adrenal medulla
- Steroids, cortisone, aldosterone

Slide # 51

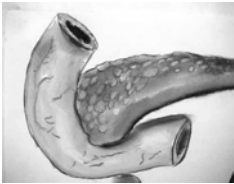
The Adrenal Medulla



- Depends on the hypothalamus and the autonomic nervous system for regulation
- Epinephrine/adrenaline
- Noradrenalin

Slide # 52

The Pancreas



- Produces insulin and glucagon to control sugar metabolism
- Diabetes

Slide # 53

Ovaries and Testes



- Testes in males, ovaries in females
- Testosterone
- Estrogen and progesterone

Slide # 54

Brain Injuries



Slide # 55

Brain Trauma



- A physical accident where the head receives a severe blow.
- Auto accidents, sports injuries

Slide # 56

Types of Head Trauma

- Concussion
- Contusion
- Laceration

Slide # 57

Concussion



- Temporary loss of consciousness
- Causes no permanent damage to skull or brain tissue
- Flaccid paralysis
- Symptoms

Slide # 58

Concussion



Slide # 59

Contusions

- Actual bruising of neural tissue
- May cause a coma
- Loss of speech, convulsions, disorientation, delusions

Slide # 60

Lacerations

- The most serious of brain injuries
- A foreign object such as a bullet enters the skull
- Brain tissue is destroyed



Slide # 61

James Brady

- Reagan's press secretary
- Shot March 30, 1981
- Wound to the head
- Brady Bill



Slide # 62

Cerebral Laceration

- The case of Phineas Gage



Slide # 63

Vascular Accidents

- Injuries to brain tissue resulting from blockage or breaking of cranial blood vessels
- Cerebral thrombosis/stroke
- Strokes are the most common CVAs
- Effects

Slide # 64

Cerebral Hemorrhages

- Blood vessels in the brain rupture (aneurysm)
- Blood spills directly onto the brain tissue
- Coma, convulsions

Slide # 65

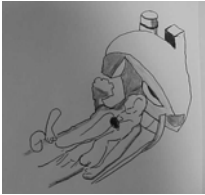
Brain Injuries Resulting from Surgery



- Techniques for neurosurgery
- Transorbital lobotomy
- Early lobotomy procedures
- Closed standard lobotomy

Slide # 66

New Neurosurgery Techniques



- A thin wire with a tiny magnet on its tip is inserted through the femoral artery into the brain
- Helmet-shaped overhead magnet
- Endovascular surgery

Slide # 67

Brain Infections

- Parkinson's disease
- Meningitis
- Encephalitis

Slide # 68

Parkinson's Disease



- Degenerative CNS disorder
- Rigidity, tremors, gait difficulties
- Onset
- Gender

Slide # 69

Two Types of Parkinson's Disease



- Idiopathic PD (primary)
- Secondary PD (trauma, cerebrovascular accidents, tumor, drug-induced)
- Stages
- Causes

Slide # 70

Meningitis

- An infection of the cerebrospinal fluid and the lining of the brain
- It spreads very rapidly, and can cause brain damage and kill in less than 24 hours
- Rifampin

Slide # 71

Symptoms of Meningitis

- In adults: vomiting, headaches, drowsiness, seizures, high fever, joint pain, stiff neck
- In children: arching back and neck, blank stare, refusal to eat, cold hands and feet, vomiting
- Diagnosis/spinal tap

Slide # 72

Encephalitis

- Inflammation of the brain by a virus
- Herpes simplex virus (HSV)
- Transmission
- Milder forms of encephalitis

Slide # 73

Symptoms of Encephalitis

- Fever, headache, poor appetite, loss of energy
- Severe symptoms also include nausea, vomiting, stiff neck, pupils of different sizes, personality changes, seizures, problems with speech and hearing, double vision, memory loss, and coma.

Slide # 74

Preventing Encephalitis

- Proper childhood immunizations
- Avoiding insect bites
- Eliminate standing water around the house

Slide # 75

Paresis

Syphilis of the brain

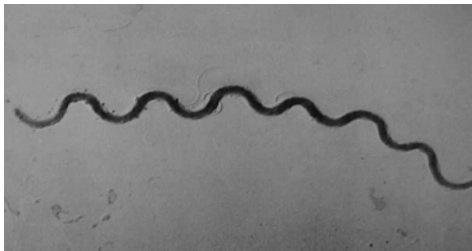
Slide # 76

Causes of Paresis



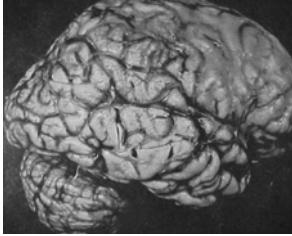
Slide # 77

Spirochete



Slide # 78

The Stages of Syphilis



Slide # 79

Diagnosis

- Chancre (A small sore that appears on the lips or sex organs; disappears without treatment)
- Causes rashes, skin infections, flu-like symptoms, hair loss
- Diagnosis of cerebrospinal fluid

Slide # 80

Symptoms of Paresis

- Pupil of eye does not respond to light
- Tremors of fingers, tongue, eyes
- Loss of motor control
- Shuffling gait
- Personality changes

Slide # 81

Nature vs. Nurture

- Heredity: the genetic transmission of characteristics from parents to offspring (nature)
- Nurture (environment and learning)
- Sir Francis Galton
- John Watson

Slide # 82

Genes and Behavior



- The basic units of heredity are the genes
- Genes are inherited

Slide # 83

Twin Studies



- Identical twins develop from a single fertilized egg (monozygotic) and share the same genes
- Twins reared in different environments

Slide # 84

Fraternal Twins

- Develop from two fertilized eggs (dizygotic)
- Their genes are no more similar than those of siblings
- Twins grow up in same environment



Slide # 85

University of Minnesota Experiment

- Identical twins separated at birth and reared in different environments
- From phobias to hobbies
- Heredity may contribute more than we ever believed



Slide # 86

Hal and Jerry



Slide # 87
