

Chapter 13

Nervous System and Psychologic Disorders

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Learning Objectives

1. Recognize or write the functions of the nervous system.
2. Recognize or write the meanings of Chapter 13 word parts and use them to build and analyze terms.
3. Write terms for selected structures of the nervous system or match them with their descriptions.
4. Write the names of the diagnostic terms and pathologies related to the nervous system when given their descriptions or match terms with their meanings.
5. Match the names of psychologic disorders with their descriptions.
6. Match surgical and therapeutic interventions for the nervous system or write the names of the interventions when given their descriptions.
7. Spell terms for the nervous system and psychologic disorders correctly.

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Nervous System

The study of behavior & the function and processes of the mind is called psychology

•(*psych/o*, mind, + *-logy*, study of)

The nervous system affects psychologic & physiologic functions.

Psychologic means pertaining to the mind.

Physiologic means pertaining to physiology (*physi/o*, nature), the study of the processes and function of the body.

Sensory (afferent) receptors detect changes that occur inside and outside the body and convey them to the brain.

Motor (efferent) signals are sent from the brain to muscles and glands to cause an effect.

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Nervous System

somatic nervous system- conscious or voluntary control
(*somat/o* = body; *nerv/o*, *neur/o* = nerve)

ex: doing a math problem

autonomic nervous system – involuntary or automatic
(*aut/o* = self)

ex: breathing

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Two Divisions of the Nervous System

The central nervous system (CNS), the control center, includes the brain and spinal cord.

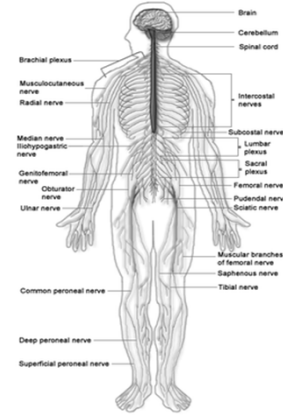
The peripheral nervous system (PNS) consists of the nerves that carry impulses:

toward the CNS (afferent/sensory) and away from the CNS (efferent/motor)

- (peri- = around) -Think nerve processes around or outside the brain and spinal cord=PNS

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- Central Nervous System is in red.
- Peripheral Nervous System in blue



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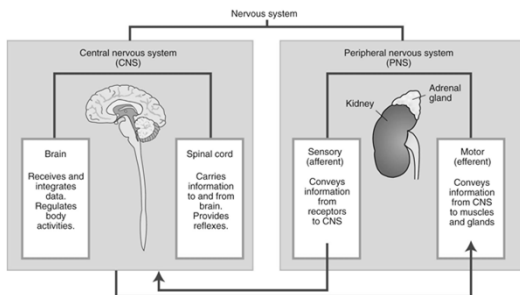


Fig. 13-1 Major divisions of nervous system. Note that the peripheral nervous system contains both afferent (sensory) and efferent (motor) nerves.

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Nervous System Cell Types and Function

1) Neurons conduct impulses either to or from the nervous system.

- Dendrites transmit impulses to the cell body (dendr/o=tree)
- Axon - carries impulses away from the cell body.

Many axons are surrounded by a white fatty covering called a myelin sheath. These fibers conduct nerve impulses faster than axons that lack the myelin sheath. The outermost layer of the axon is called the neurilemma.

2) neuroglia, (composed of glia cells) are the supporting tissue cells of the nervous system. These cells provide special support and protection. If glia cells are destroyed, they can replace themselves; however, if an axon is destroyed, it cannot be replaced.

(gli/o= neuroglia or a sticky substance)

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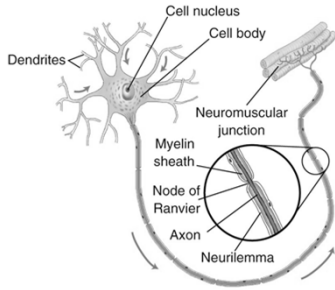


Fig. 13-2 Structure of a typical neuron.

dendr/o=tree (see how it looks like branches on a tree)

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The Central Nervous System

Protection comes from:

The brain and spinal cord are encased in bone,

- skull (cranium)- protects the brain (*crani/o* = skull or cranium)
- spinal column- protects the spinal cord
- Additional protection for the brain and spinal cord is provided by cerebrospinal fluid (CSF; *cerebr/o* = brain or cerebrum)
- and three membranes that are collectively called the meninges.

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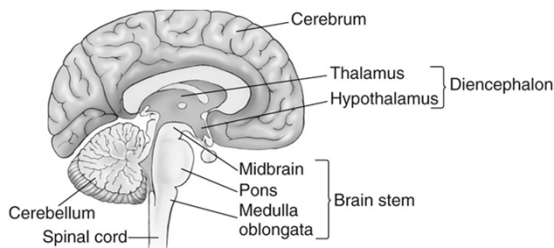


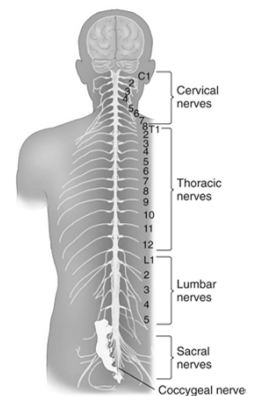
Fig. 13-3 Principal structures of the brain (midsagittal view).

The hypothalamus is below the thalamus.
(hypo- = beneath or below normal)

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Fig. 13-4 The spinal cord and emerging nerves. Thirty-one pairs of spinal nerves arise from the spinal cord and are named and numbered according to the region and level of the spinal cord from which they emerge.



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Combining Forms: The Nervous System

aut/o	self
cerebell/o	cerebellum
cerebr/o	brain
encephal/o	brain
● (think <i>en-</i> for inside + <i>cephal/o</i> = head)	
cervic/o	neck (or cervix uteri)
coccyg/o	coccyx (tailbone)
crani/o	cranium (skull)

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Combining Forms: The Nervous System, cont.

dendr/o	tree
dur/o	dura mater -outermost of the 3 meninges
gli/o	neuroglia or sticky substance (like glue)
kerat/o	cornea, hard or horny
lumb/o	lower back
mening/o	meninges (the 3 coverings of the brain)
ment/o	mind
psych/o	mind
myel/o	bone marrow or spinal cord

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Combining Forms: The Nervous System, cont.

nerv/o, neur/o	nerve
phren/o	mind or diaphragm
physi/o	nature (like physiology)
retin/o	retina
sacr/o	sacrum (forms part of pelvis)
spin/o	spine
vascul/o	vessel

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Other Word Parts: The Nervous System

agora-	open marketplace
● agoraphobia-panic disorder of open/public places	
-asthenia	weakness
● myasthenia = muscle weakness (my/o=muscle)	
-esthesia	sensation, perception
anesthesia= without feeling	
-lexia	words, phrases
● dyslexia=difficulty with words (dys=difficult)	

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Sense Organ Receptors

Special sense organs (the eyes, the ears, the skin, the mouth, and the nose) have receptors that detect sensations, and transmit information to the brain.

chemoreceptors – nerve endings that detect chemicals (chem/o=chemical)

ex: taste buds detect sweet/sour/bitter/salty

thermoreceptors- under the skin. Detect temp change (therm/o= heat)

photoreceptors – in the eyes. Responsible for vision. (phot/o=light)

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Quick Quiz!

The two major divisions of the nervous system are the

- A. autonomic and peripheral
- B. central and peripheral
- C. autonomic and somatic
- D. central and somatic

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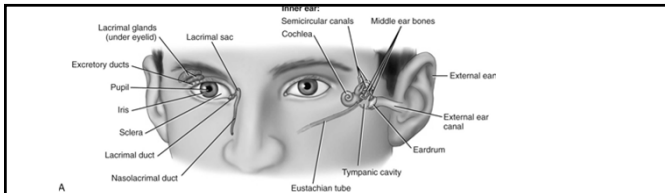


Fig. 13-5A Structures of the ear and eye.

- **Eustachian (auditory) tube**- joins the middle ear cavity & the back of the throat & serves to adjust the air pressure in the ear to the external pressure.
- The **outer ear** collects sound waves and directs them into the ear.
- The **middle ear** is an air-filled cavity and has the eardrum and three tiny bones that transmit vibrations of the eardrum to fluids in the inner ear.
- The **cochlea** in the inner ear contains receptors that enable us to hear.
- The **semicircular canals** enable us to maintain a sense of balance.
- **Lacrimal (lacrim/o, tear, + -al, pertaining to)** means pertaining to tears.
- **Lacrimation=crying**
- The **nasolacrimal duct** carries tears to the nasal cavity and explains why a runny nose often accompanies crying (nas/o=nose, lacrim/o=tears)

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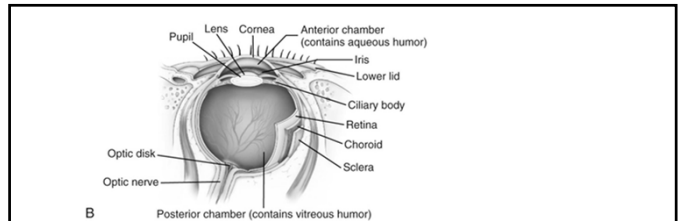


Fig. 13-5B B, Structures of the eyeball, transverse section.

The **cornea** is the convex, transparent structure at the front of the eyeball. (*kerat/o* is the combining form for cornea.)

- The **sclera** of the eye is so named because it is the tough white membrane covering much of the eyeball. (scler/o=hard)
- The **retina (retin/o)**, located in the posterior part of the eye, contains photoreceptors (rods and cones). It is continuous with the optic nerve, which carries the impulse to the cerebrum and enables vision.
- **Lacrimal (lacrim/o, tear, + -al, pertaining to)** means pertaining to tears.
- **Lacrimation=crying**
-

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Diagnostic Terms

electroencephalography-

electroencephalogram (EEG)-

electromyography- process of recording the contractions of a muscle as a result of electrical stimulation

electr/o=electric, my/o=muscle, graphy=process of recording

myelography - radiographic inspection of the spinal cord by injection of a radiopaque medium.

(myel/o=bone marrow or spinal cord)

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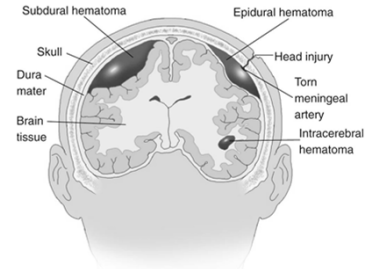


Fig. 13-6 Hematomas- localized collection of blood outside the blood vessels

Three types associated with head injuries:

epidural hematoma-accumulation of blood outside the dura mater (epi-,upon)

subdural hematoma- Accumulation of blood beneath the dura mater(sub-,under)

intracerebral hematoma. – bleeding occurs within the brain (intra-=within), cerebr/o=brain

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Diseases and Disorders

- cerebrovascular accident (CVA) – a stroke -normal blood supply to the brain is disrupted resulting in insufficient oxygen to the brain
- transient ischemic attack (TIA) – brief interruption in cerebral blood flow. Transient means temporary, Ischemic pertains to deficient blood circulation.
- hydrocephalus – abnormal accumulation of CSF in the skull

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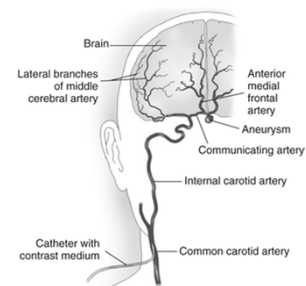
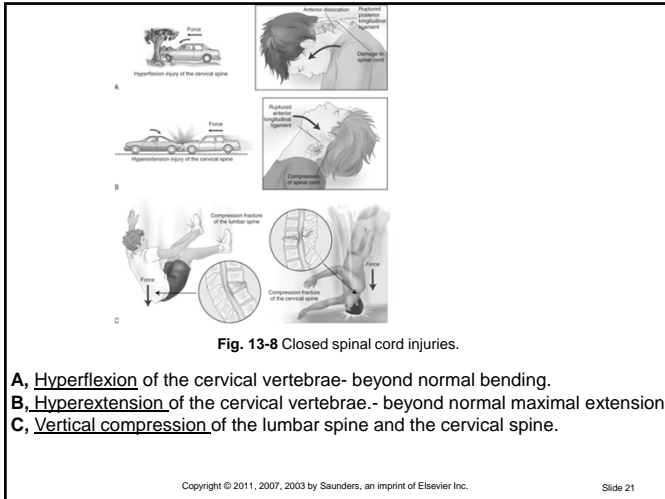


Fig. 13-7 Cerebral aneurysm. Diagram of an aneurysm and the major cerebral arteries visible in cerebral angiography.

cerebral aneurysm - a localized dilation of the wall of a cerebral artery, which can lead to rupture and hemorrhagic stroke. It may require cerebral angiography for diagnosis.

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Diseases and Disorders

kinesi/o=movement

akinesia-complete or partial loss of muscle movement
 (a- = no, kinesi/o=movement, -ia=condition)

bradykinesia - abnormal slowness of movement
 (brady- = slow, kinesi/o=movement, -ia=condition)

hyperkinesia - abnormally increased activity or motor function. (hyper- = excessive, kinesi/o=movement)

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Diseases and Disorders, cont.

aphagia - inability or refusal to swallow. It is characterized by abstention from eating because swallowing is painful. (a-, no, + -*phagia*, eating):

aphasia - absence or impairment of the ability to communicate through speech, writing, or signs; it results from a brain dysfunction. (-*phasia*, speech)

dysphasia- speech impairment caused by a lesion in the brain; characterized by lack of coordination and failure to arrange words properly.
 (dys-,difficult, -*phasia*, speech)

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Diseases and Disorders, cont.

cephalalgia (*cephal/o*, head, + *-algia*, pain): headache;

neuralgia- (*neur/o*, nerve): pain along the course of a nerve.

cerebral concussion- loss of consciousness, temporary or prolonged, as a result of a blow to the head.

cerebral contusion- bruising of brain tissue as a result of head injury.

cerebral hemorrhage- (*hem/o*, blood, + *-rrhage*, excessive bleeding): the result of the rupture of a sclerosed or diseased blood vessel in the brain.

coma -a state of unconsciousness from which the patient cannot be aroused, even by powerful stimulation

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Diseases and Disorders, cont.

-plegia = paralysis

diplegia- paralysis affecting like parts on both sides of the body. (*di-*, two, + *-plegia*, paralysis)

hemiplegia- paralysis of one side of the body (*hemi-*, half)

paraplegia, - paralysis of the legs and lower part of the body. (*para-*, near or beside)

quadriplegia - paralysis of all four extremities. This is also called tetraplegia. (*quadri-*, tetra- = four):

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Quick Quiz!

Akinesia is

- A. abnormal slowness of movement
- B. abnormal increased activity or motor function
- C. complete or partial loss of muscle movement
- D. pain along the course of a nerve

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Diseases and Disorders, cont.

cerebral palsy - a brain disorder characterized by paralysis & lack of muscle coordination; it results from developmental defects in the brain or trauma at birth.

epilepsy- (*-lepsy*, seizure): a group of neurologic disorders characterized by recurrent episodes of convulsive seizures, sensory disturbance, loss of consciousness, or all of these.

Parkinson disease- a chronic nervous disease characterized by a fine, slowly spreading tremor, muscular weakness, rigidity, and often a peculiar gait.

multiple sclerosis- (*scler/o*, hard, + *-osis*, condition): a chronic CNS disease with progressive destruction of the myelin sheaths of the neurons, interfering with the nerve pathways and causing muscular weakness, loss of coordination, and speech and visual disturbances.

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CNS Hernias

-cele=hernia

meningocele: herniation of the meninges through a defect in the skull or vertebral column.

(mening/o=meninges, -cele=hernia)

craniocoele: protrusion of the brain through a defect in the skull. (crani/o=skull, -cele=hernia)

encephalocoele: hernial protrusion of brain substance through a congenital or traumatic opening of the skull; craniocoele.

(encephal/o=brain, -cele=hernia)

(crani/o=skull, -cele=hernia)

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Fig. 13-9 Meningocele. (above) The spinal meninges have formed a hernial cyst that is filled with cerebrospinal fluid and is protruding through a defect in the vertebral column

encephalocele(below) – hernia of the brain through an opening of the skull



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Diseases and Disorders, cont.

Determine meaning of these words:

- meningitis
- encephalitis
- encephal meningitis
- neuritis
- myelitis
- encephalomalacia
- encephalopathy
- neuropathy

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Diseases and Disorders, cont.

Meniere disease- a chronic disease of the inner ear characterized by recurrent episodes of dizziness.

narcolepsy -(*narc/o*, sleep): a chronic ailment involving sudden attacks of sleep that occur at intervals.

shingles(herpes zoster): an acute, infectious eruption of vesicles, usually on the trunk of the body along a peripheral nerve.

tinnitus -subjective ringing of one or both ears

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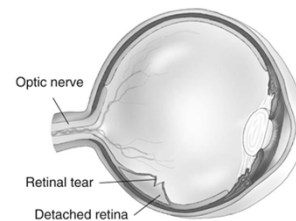


Fig. 13-10 Retinal detachment. The onset of separation of the retina from the back of the eye is usually sudden and painless. The person may experience bright flashes of light or floating dark spots in the affected eye. Sometimes there is loss of visual field, as though a curtain is being pulled over part of the visual field. Retinal detachments are usually visible using ophthalmoscopy.

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Diseases and Disorders: The Eye

retinopathy- any disease of the retina

astigmatism-(*stigma*, points or marks, + *-ism*, condition): uneven curvature of the cornea or lens of the eye that prevents the sharp focus of an image on the retina.

glaucoma- an abnormal condition of increased pressure within the eye

-opia=vision

diplopia -(*diplo*, double, + *-opia*, vision): double vision

hyperopia- (*-opia*, vision): farsightedness

myopia- nearsightedness

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Quick Quiz!

Myasthenia gravis is a

- disease characterized by muscle weakness and abnormal fatigue
- chronic disease of the central nervous system in which there is progressive destruction of the myelin sheaths of the neurons
- chronic ailment involving sudden attacks of sleep that occur at intervals
- chronic disease of the inner ear

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Psychologic Disorders

- often no change in body structure
- often no changes in chemistry
- can be psychosomatic - (*psych/o*, mind, + *somat/o*, body, + *-ic*, pertaining to) means pertaining to the mind-body relationship or having body symptoms of emotional origin.

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Psychosis

psychosis any major mental disorder characterized by a gross impairment in reality testing, inappropriate mood & diminished impulse control. May include hallucinations (false sensory perceptions), delusions (false beliefs), and strange behavior.

Ex:

- schizophrenia- gross distortion of reality, disorganization, and fragmentation of thought and emotional reaction, and withdrawal from social interaction)
- pyromania – excessive preoccupation with fire
- bipolar disorder- mania, depression or mixed moods

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Psychologic Disorders, cont.

clinical depression- abnormal emotional state characterized by exaggerated feelings of sadness, despair, emptiness, and hopelessness.

- neurosis

- > anxiety disorders

- panic attacks: intense apprehension or terror, accompanied by difficult breathing, sweating, chest pain, or racing of the heart.
 - obsessive-compulsive disorder: recurrent and persistent thoughts, ideas, or feelings (obsessions) or compulsions sufficiently severe to cause marked distress, repetitive acts (compulsions), or significantly interfere with the patient's functioning.

- > phobia - a persistent, irrational, intense fear of something specific

- agoraphobia - an intense, irrational fear of open spaces

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Psychologic Disorders, cont.

anorexia nervosa (*an-*, without, + *-orexia*, appetite) an eating disorder characterized by a prolonged refusal to eat, resulting in wasting of the body

neurasthenia - (*neur/o*, nerve, + *-asthenia*, weakness)

a nervous condition characterized by chronic weakness and fatigue

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Psychologic Disorders, cont.

autism-characterized by withdrawal and impaired development in social interaction and communication.

attention deficit disorder (ADD)- short attention span, poor communication

attention deficit hyperactivity disorder (ADHD) short attention span, poor communication & hyperactivity.

Alzheimer disease -progressive mental deterioration that causes confusion, memory failure, disorientation, restlessness, and inability to carry out purposeful movement.

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Surgical and Therapeutic Interventions

Determine the meaning:

- craniotomy
- cranioplasty
- neuroplasty
- neurorrhaphy
- neurolysis

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Quick Quiz!

Obsessive-compulsive disorder is

- A. a phobia
- B. a psychosis
- C. a panic attack
- D. an anxiety disorder

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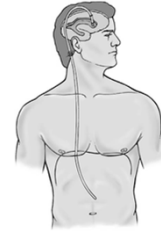


Fig. 13-11 Ventriculoperitoneal shunt. This type of shunt consists of plastic tubing between a cerebral ventricle and the peritoneum, to drain excess cerebrospinal fluid from the brain in hydrocephalus.

Ventriculoperitoneal shunts drain excess CSF from a cerebral ventricle to the peritoneum.

ventricul/o=ventricle, peritone/o=peritoneum, -al=pertaining to

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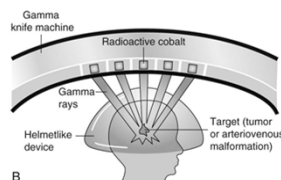


Fig. 13-12 Gamma “knife” treatment assisted by stereotaxis.

A, The stereotactic frame holds the patient’s head in a fixed position.

B, In a gamma knife treatment, beams are intense only at the targeted area.

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Pain Management

analgesics- relieve pain without causing loss of consciousness

hypnotics-used as sedatives to produce a calming effect.

anticonvulsants –agents that relieve or prevent convulsions

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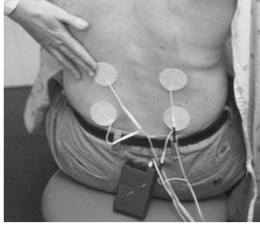


Fig. 13-13 Transcutaneous electrical nerve stimulation (TENS). The TENS unit is being used in this example to control low back pain. The electrical impulses block transmission of pain signals to the brain. TENS is nonaddictive and has no known side effects, but it is contraindicated in patients with artificial cardiac pacemakers.

trans- = across, cutane/o = skin, -ous = pertaining to

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