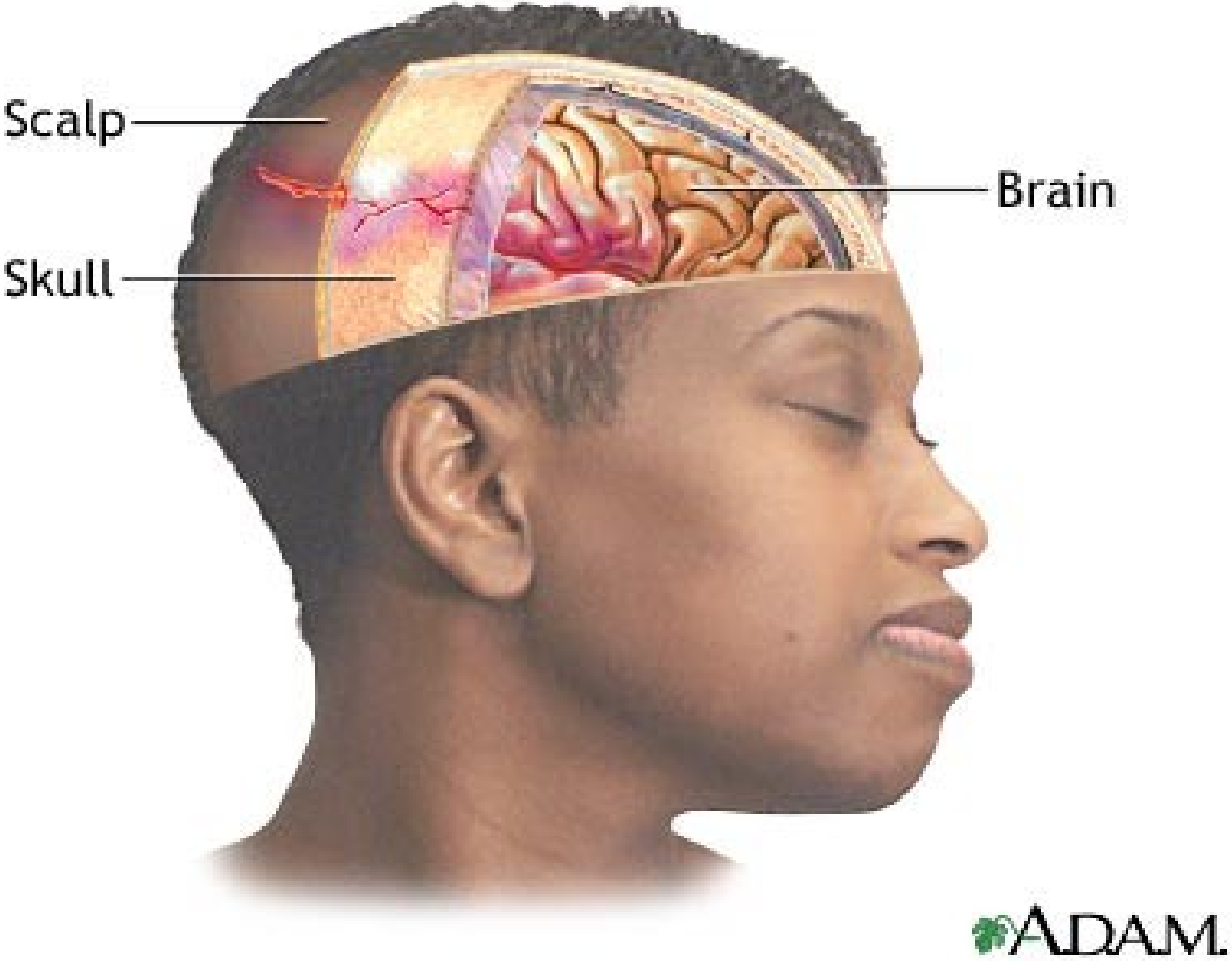
Neurological Nursing

By

Syed Yousaf Shah

Increased ICP and Head Injury


Scalp
Skull
Brain
ADAM.

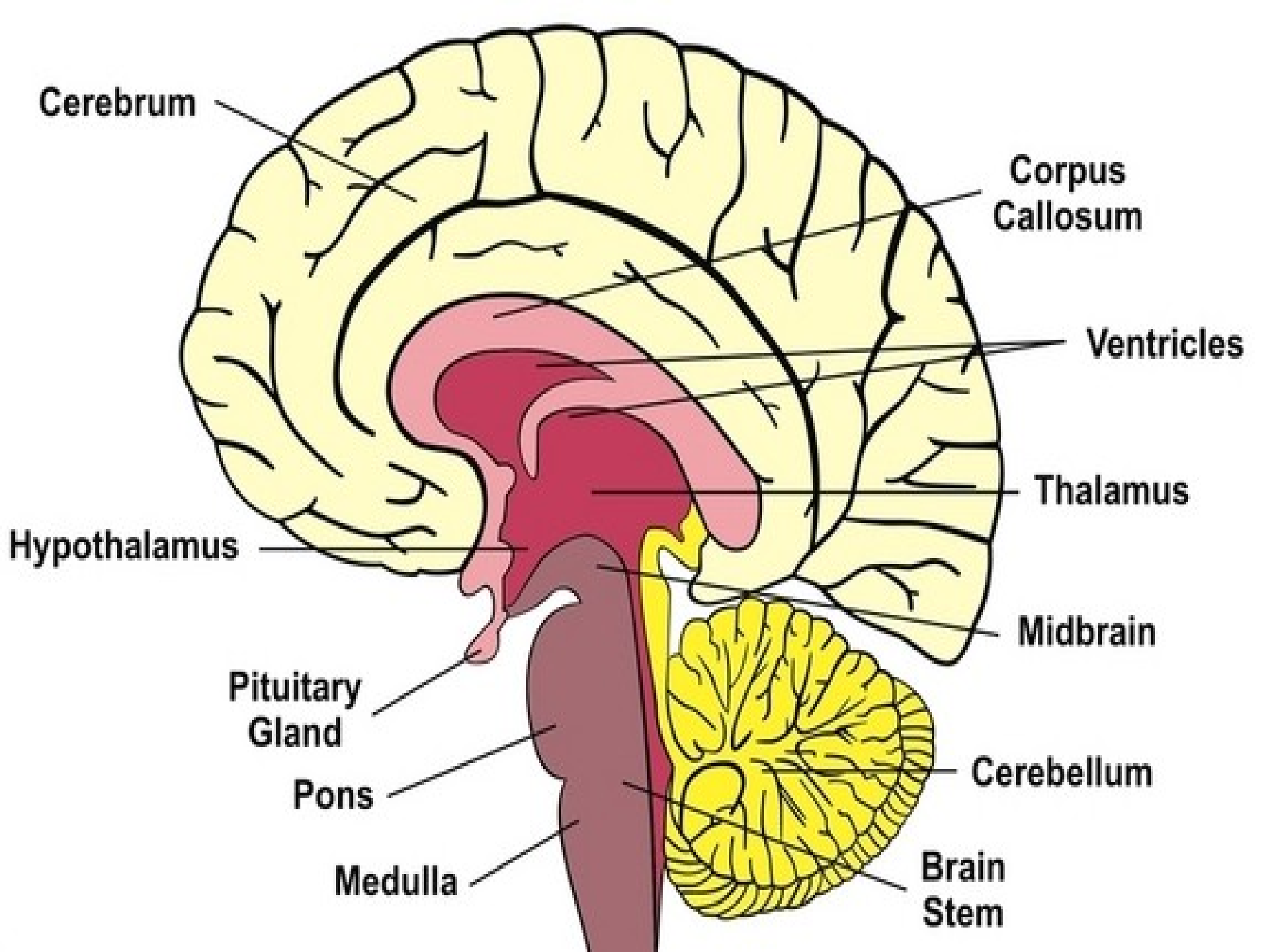
Objectives

- By the end of this unit the learners will be able to:

1. Review anatomy and physiology of brain and its protective structures.
2. Differentiate between primary and secondary head injuries and demonstrate an understanding of the related pathophysiology.
3. Anticipate major complications that may result from head injuries.
4. Utilize nursing process in caring for a patient, with head injury.

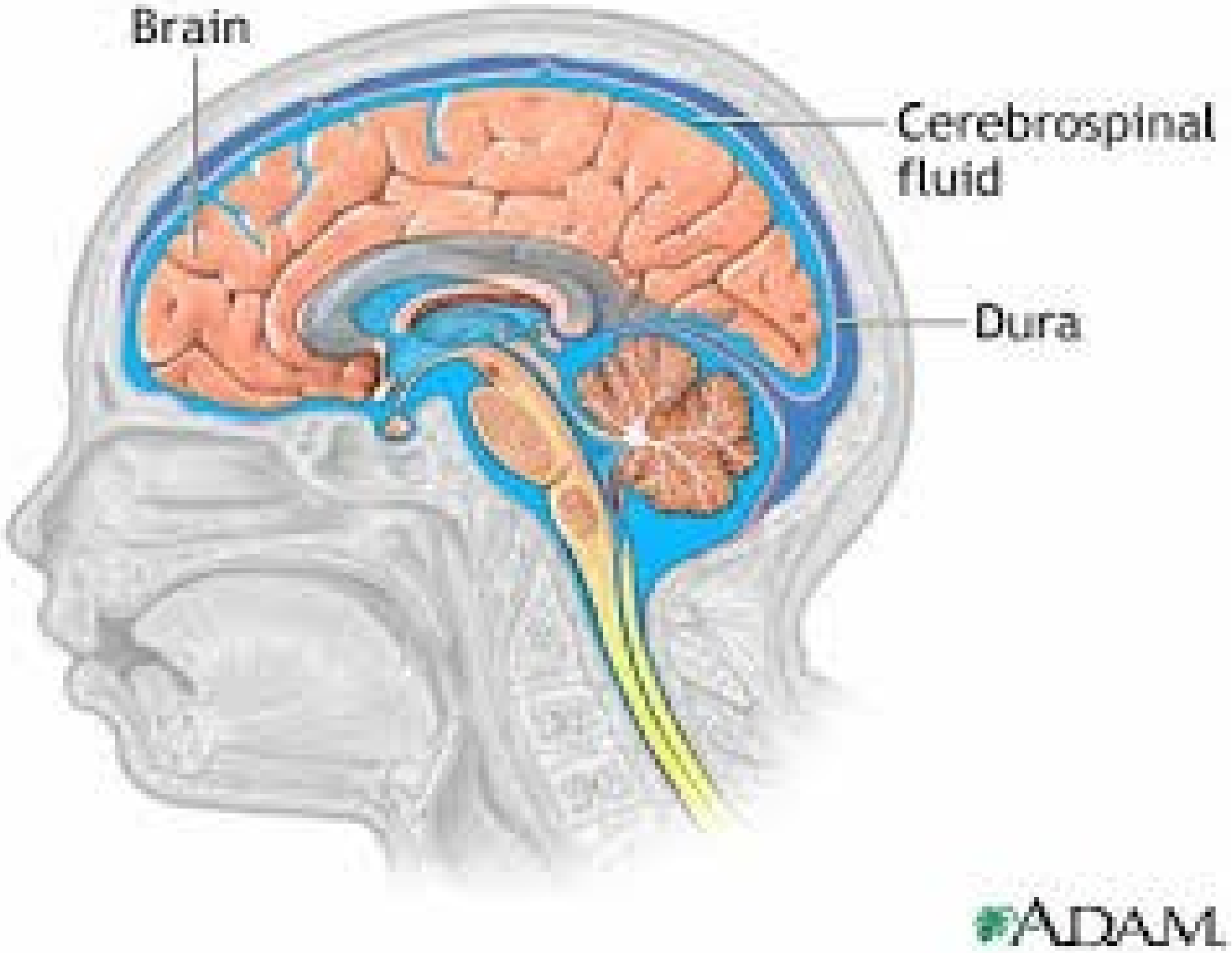
Structure and Function of the Brain

- The brain is the body's control Centre.
- It constantly receives and interprets nerve signals from the body and responds based on this information.
- Different parts of the brain control movement, speech, emotions, consciousness and internal body functions, such as heart rate, breathing and body temperature.
- The brain has 3 main parts: cerebrum, cerebellum and brain stem.


Cerebrum
Corpus Callosum
Ventricles
Thalamus
Hypothalamus
Midbrain
Pituitary Gland
Cerebellum
Pons
Medulla
Brain Stem

Cerebrospinal Fluid (CSF)

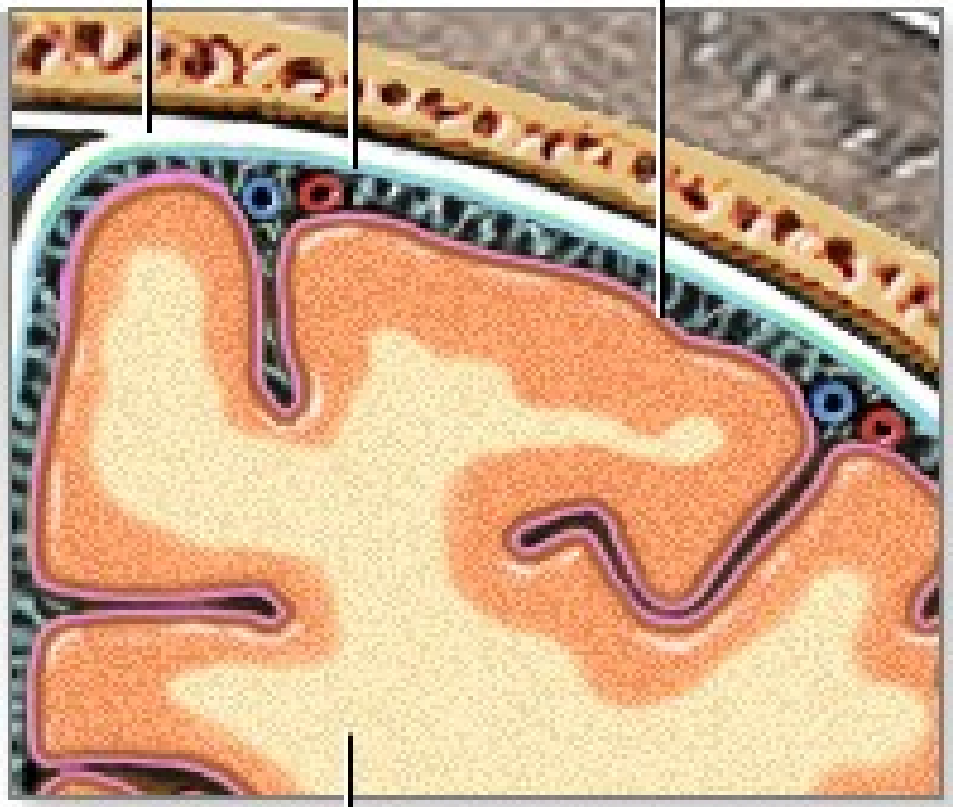
- The cerebrospinal fluid (CSF) is a clear, watery liquid that surrounds, cushions and protects the brain and spinal cord.
- The CSF also carries nutrients from the blood to, and removes waste products from, the brain.
- It circulates through chambers called ventricles and over the surface of the brain and spinal cord.
- The brain controls the level of CSF in the body.


Brain
Cerebrospinal fluid
Dura
ADAM.

Meninges

- The brain and spinal cord are covered and protected by 3 thin layers of tissue (membranes) called the meninges:
- Dura mater – thickest outer layer
- Arachnoid layer – middle, thin membrane
- Pia mater – inner, thin membrane

The meninges are the membranes covering the brain and spinal cord

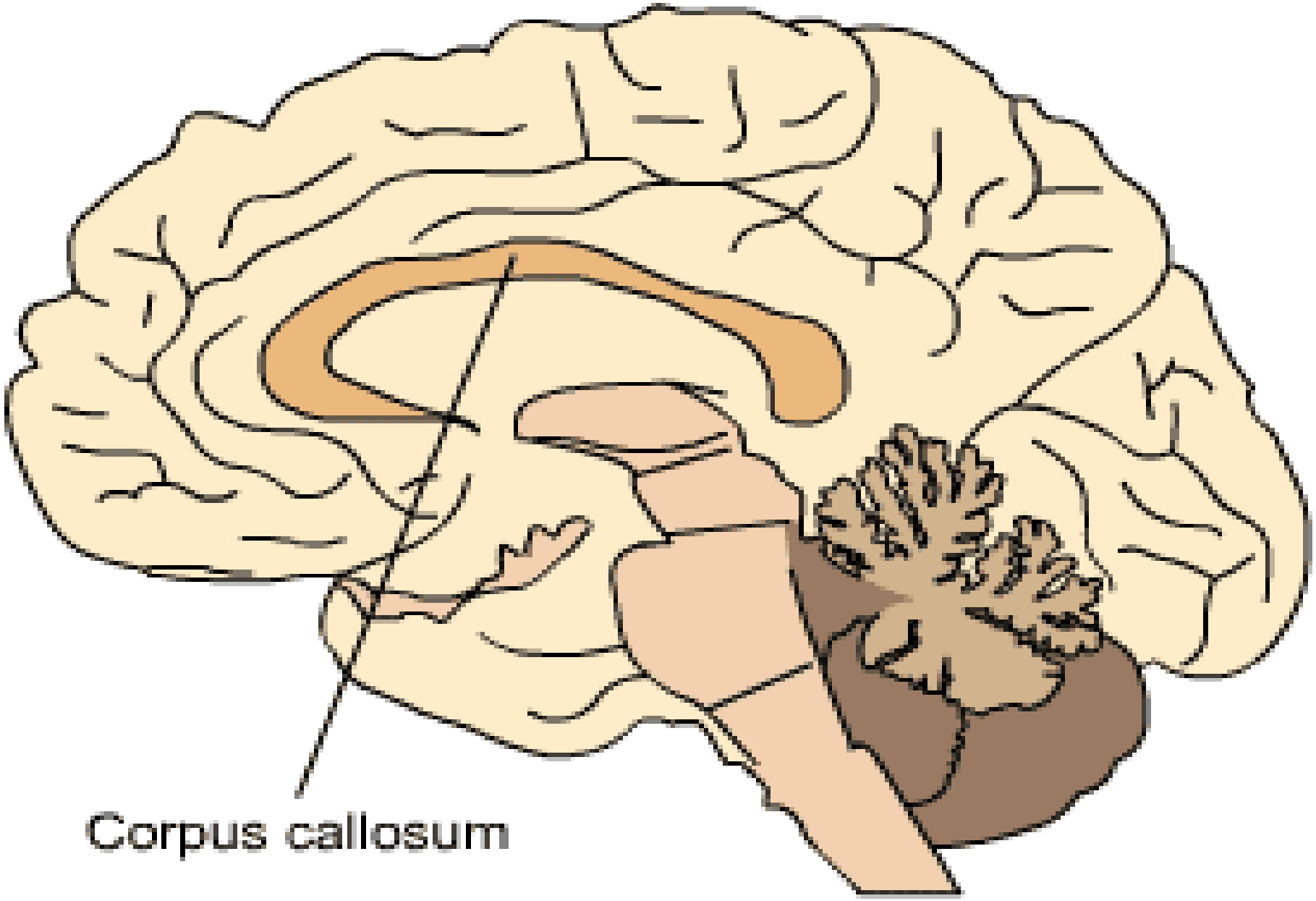


Corpus Callosum

- The corpus callosum is a bundle of nerve fibres between the 2 cerebral hemispheres.

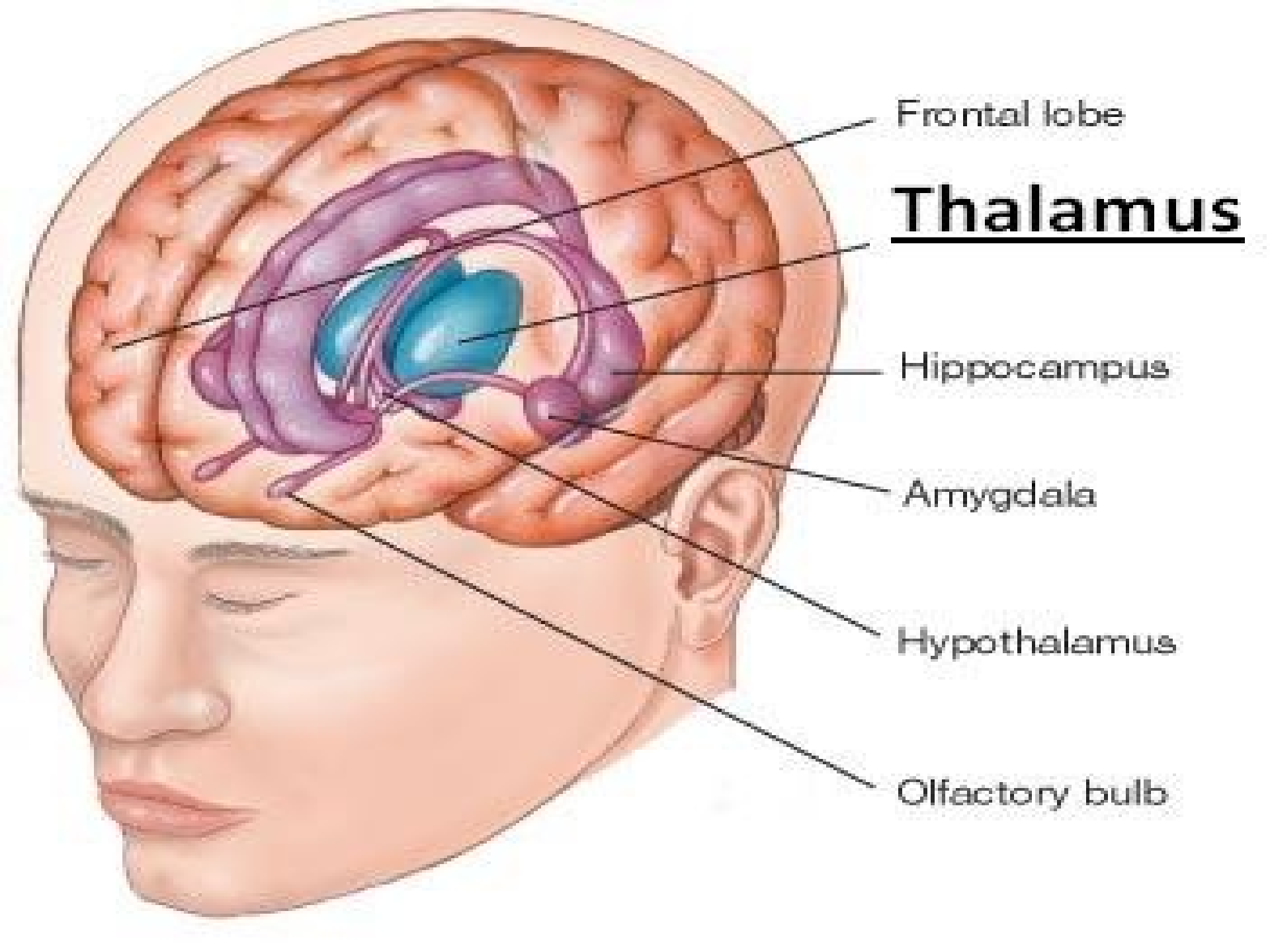
- It connects and allows communication between both hemispheres.

Figure AB-10: Corpus Callosum



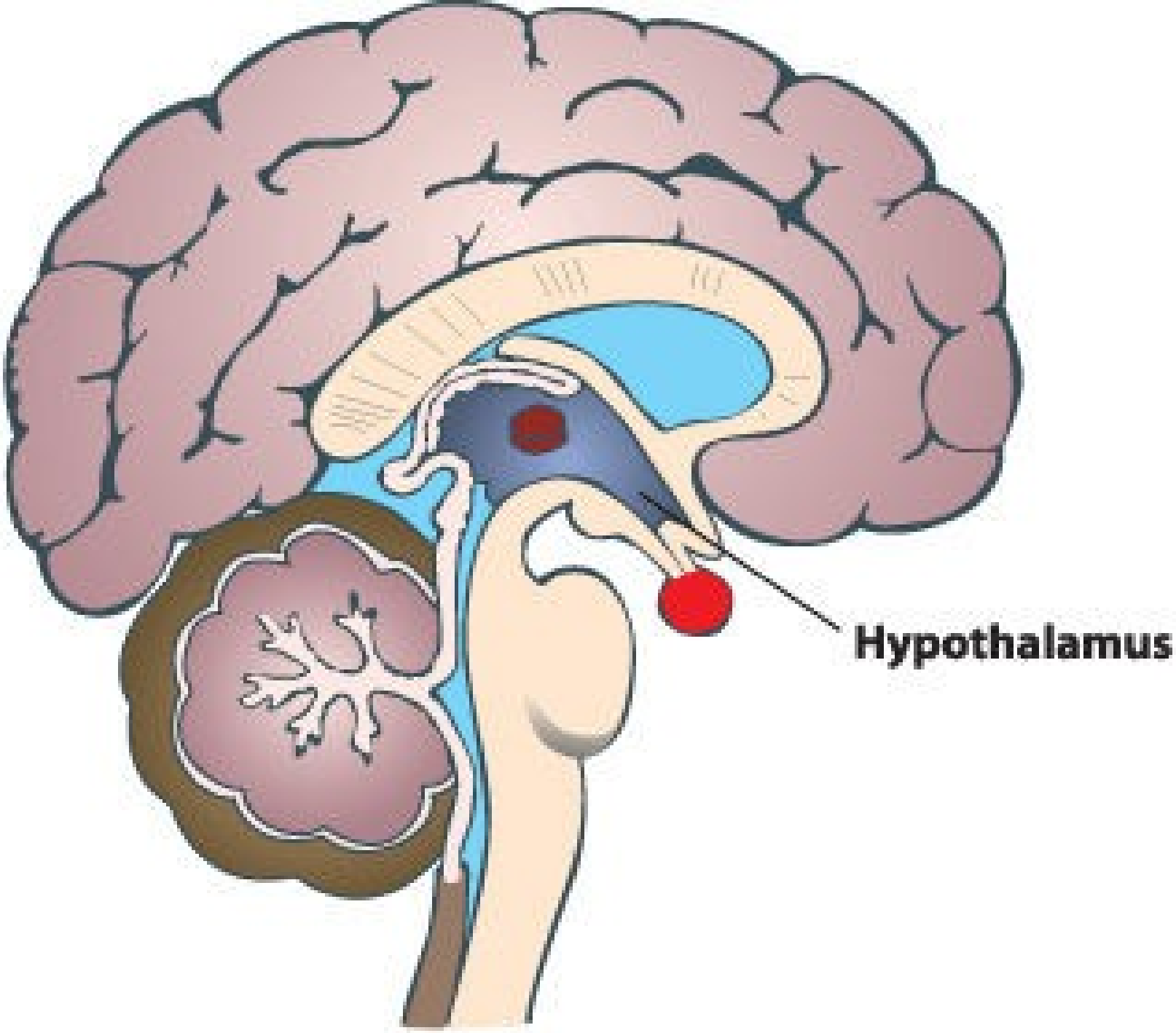
Thalamus

- The thalamus is a structure in the middle of the brain that has 2 lobes or sections.
- It acts as a relay station for almost all information that comes and goes between the brain and the rest of the nervous system in the body.


Frontal lobe
Thalamus
Hippocampus
Amygdala
Hypothalamus
Olfactory bulb

Hypothalamus

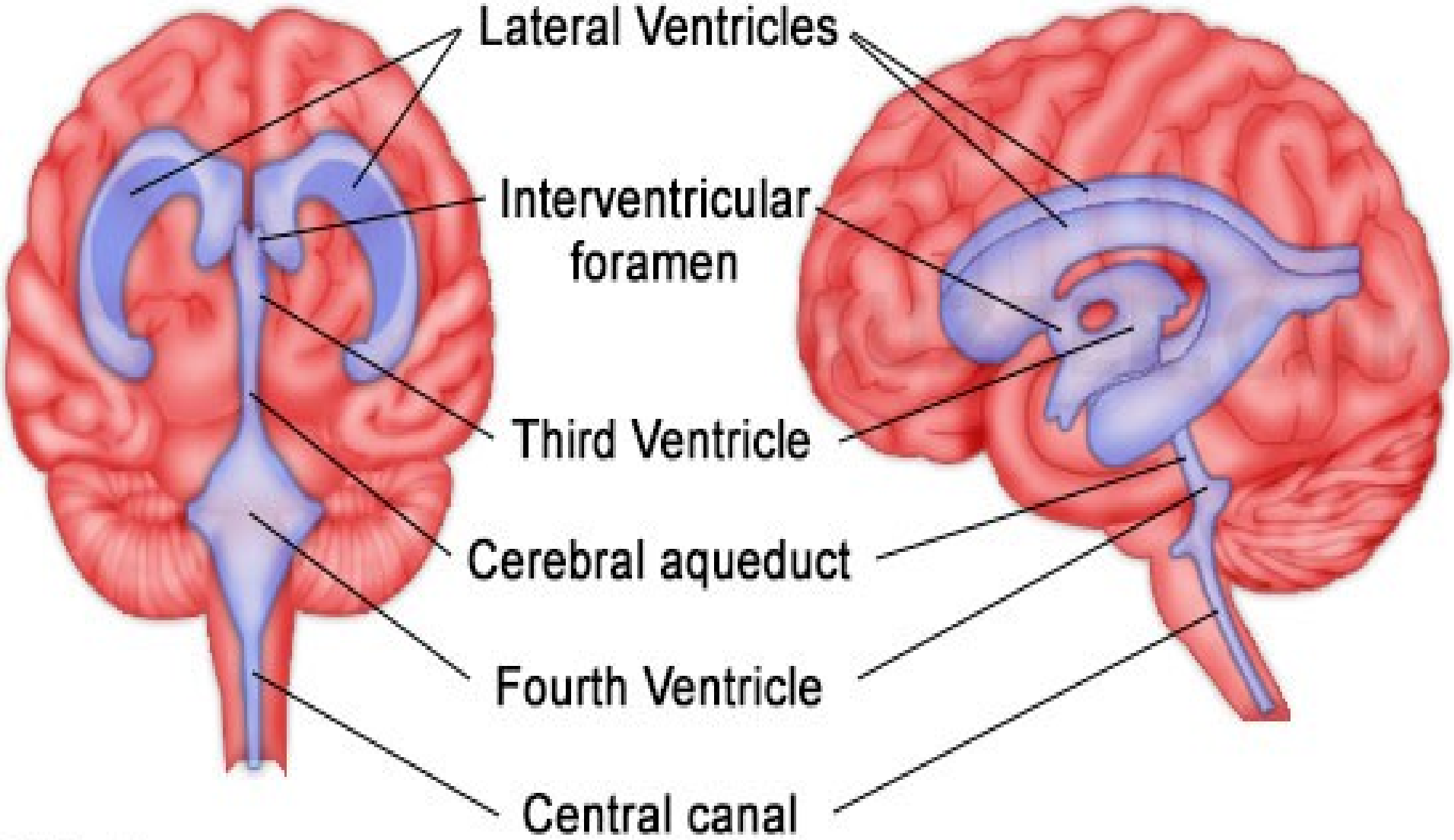
- The hypothalamus is a small structure in the middle of the brain below the thalamus.
- It plays a part in controlling body temperature, hormone secretion, blood pressure, emotions, appetite, and sleep patterns.


Hypothalamus

Ventricles

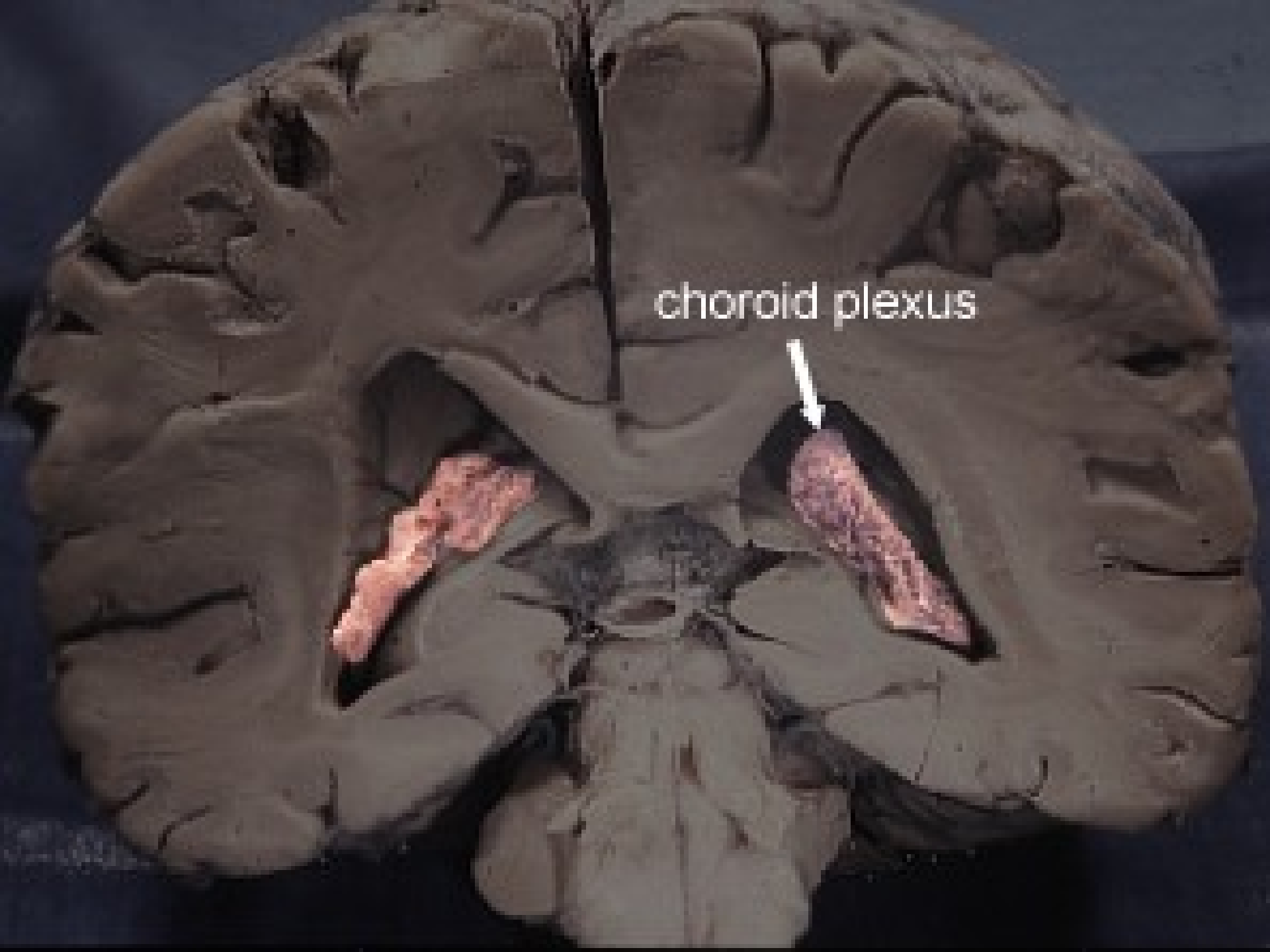
- The ventricles are fluid-filled spaces (cavities) within the brain. There are 4 ventricles:
- The first and second ventricles are in the cerebral hemispheres. They are called lateral ventricles.
- The third ventricle is in the centre of the brain, surrounded by the thalamus and hypothalamus.
- The fourth ventricle is at the back of the brain between the brain stem and the cerebellum.

Ventricles of the Brain



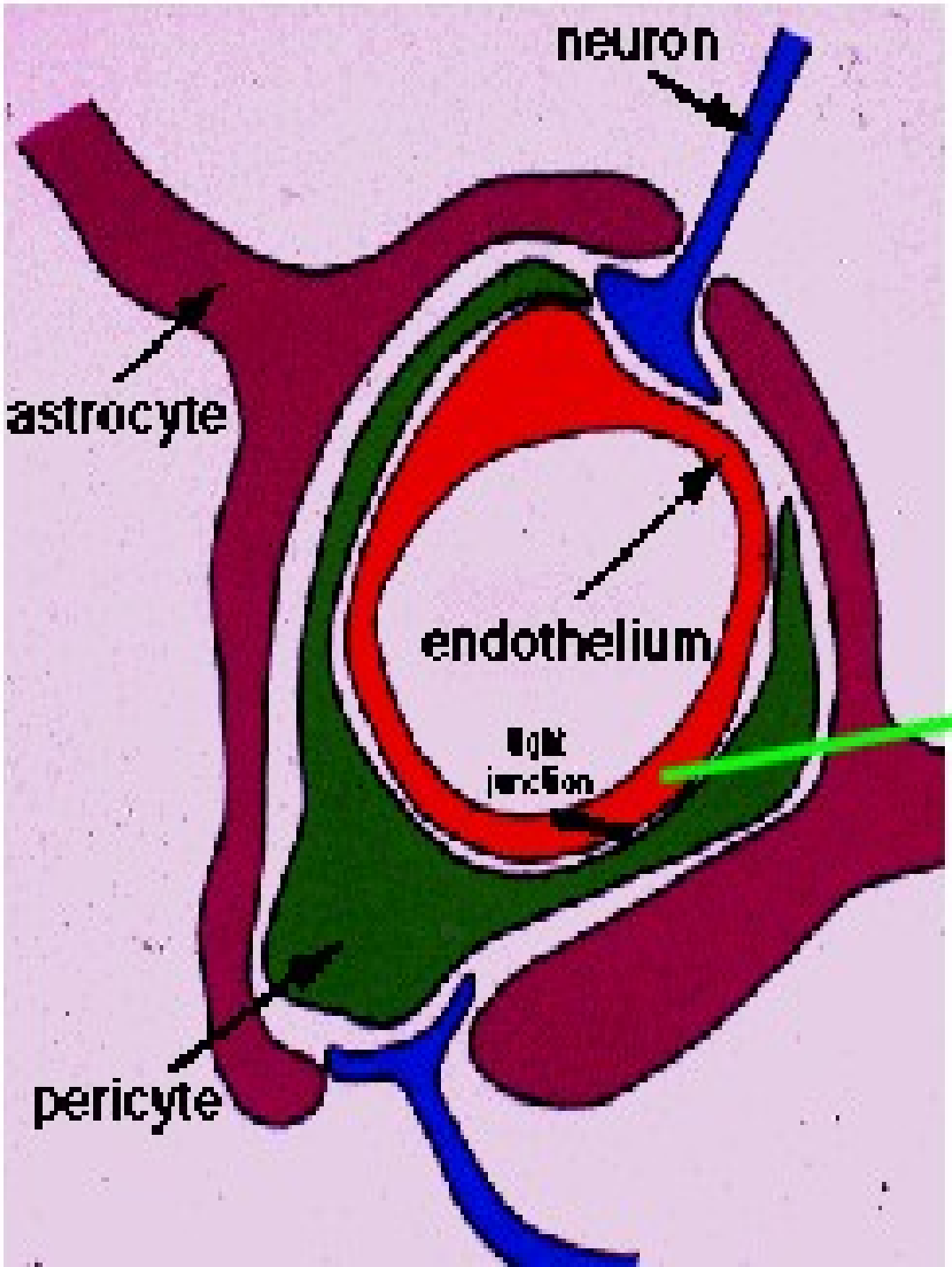
Choroid Plexus

- The choroid plexus is a small organ in the ventricles that makes CSF.


choroid plexus

Blood-Brain Barrier

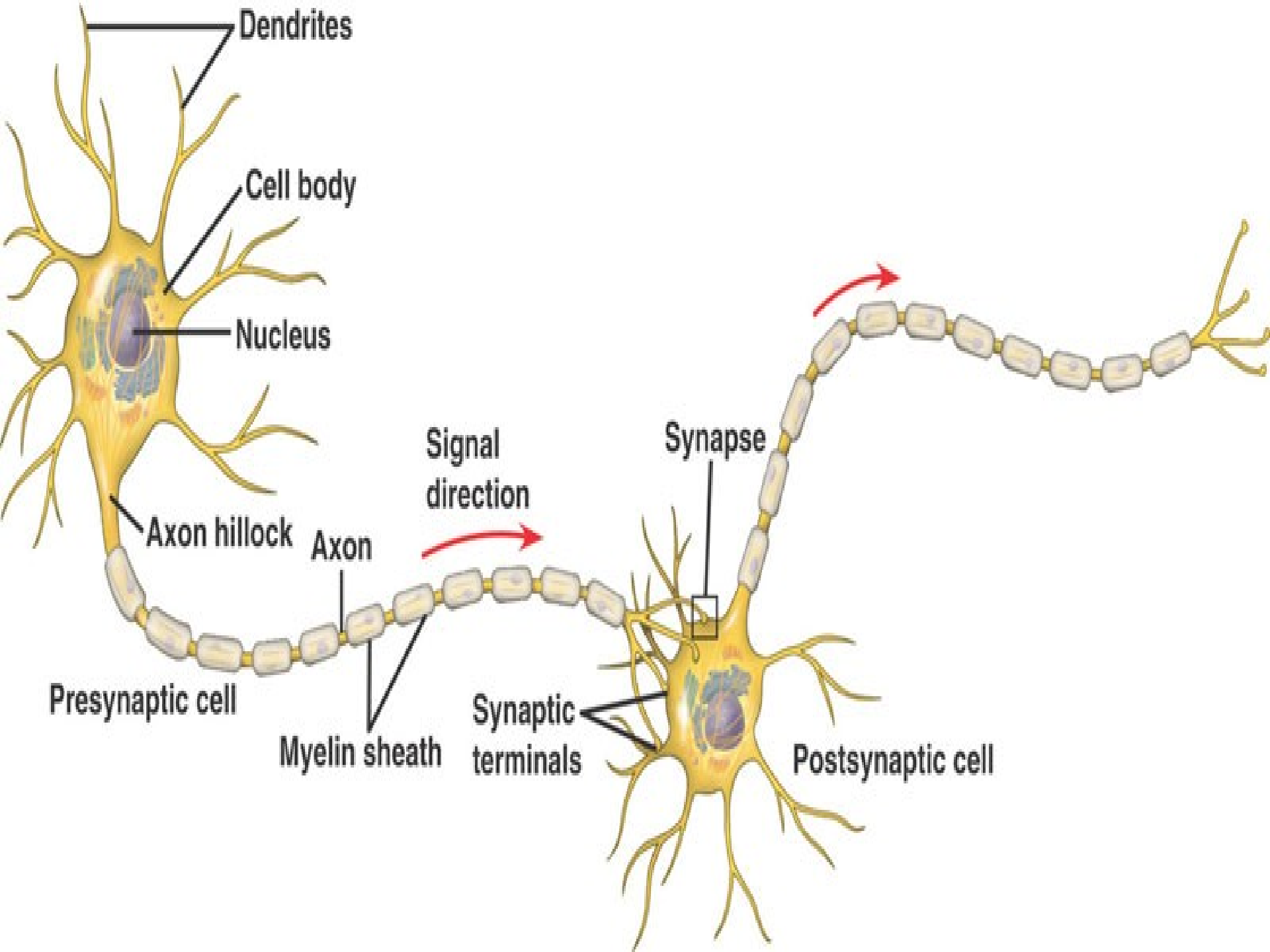
- The blood-brain barrier is a specialized system of blood vessels and enzymes that protect the brain from chemicals or toxins produced by bacteria.
- It helps maintain a constant environment for the brain.



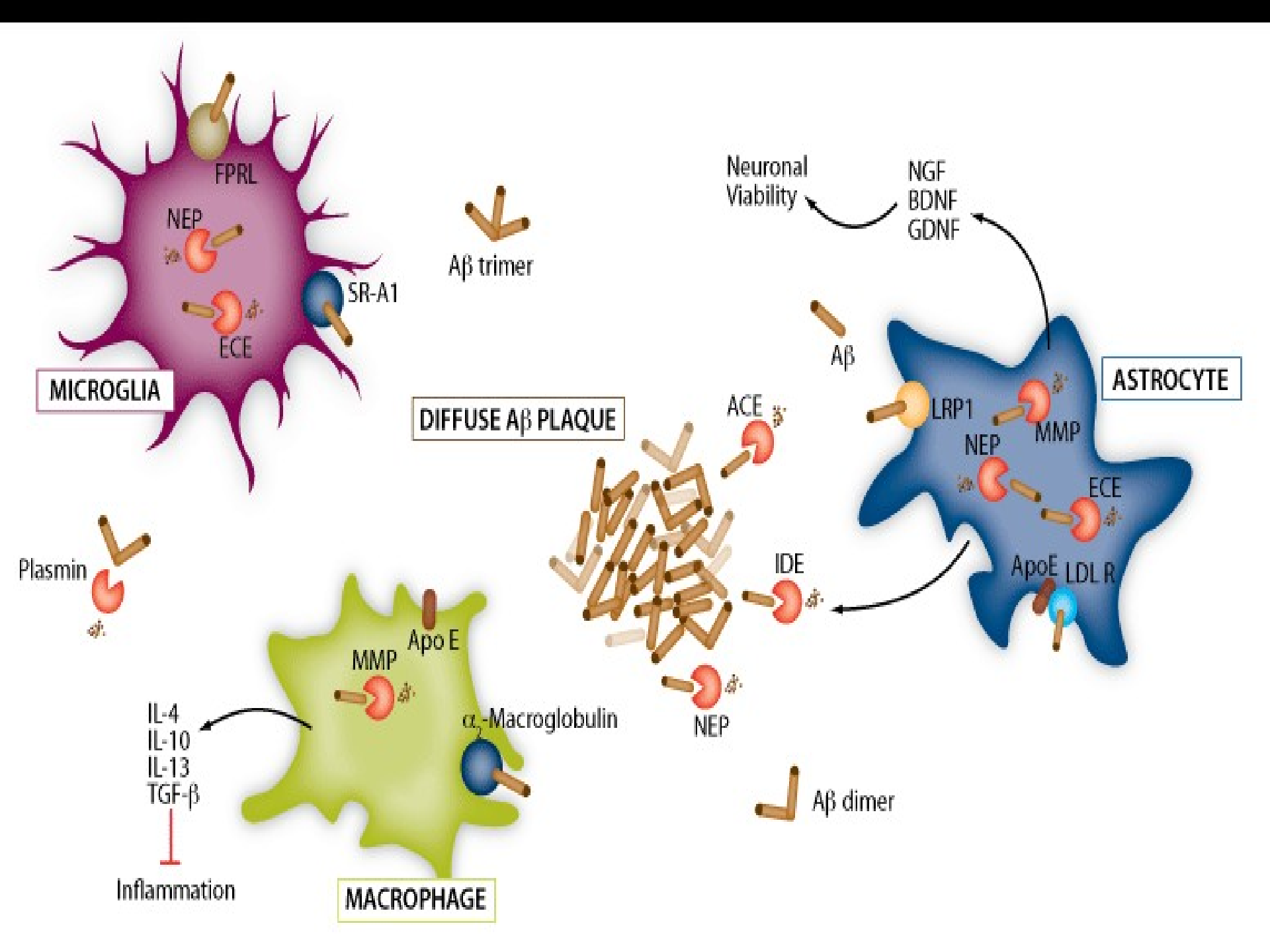
Brain Capillary Wall

Types of Cells in the Brain

- The brain is made up of neurons and glial cells:
- **Neurons**:
- These cells carry the signals that make the nervous system work.
- They cannot be replaced or repaired if they are damaged.

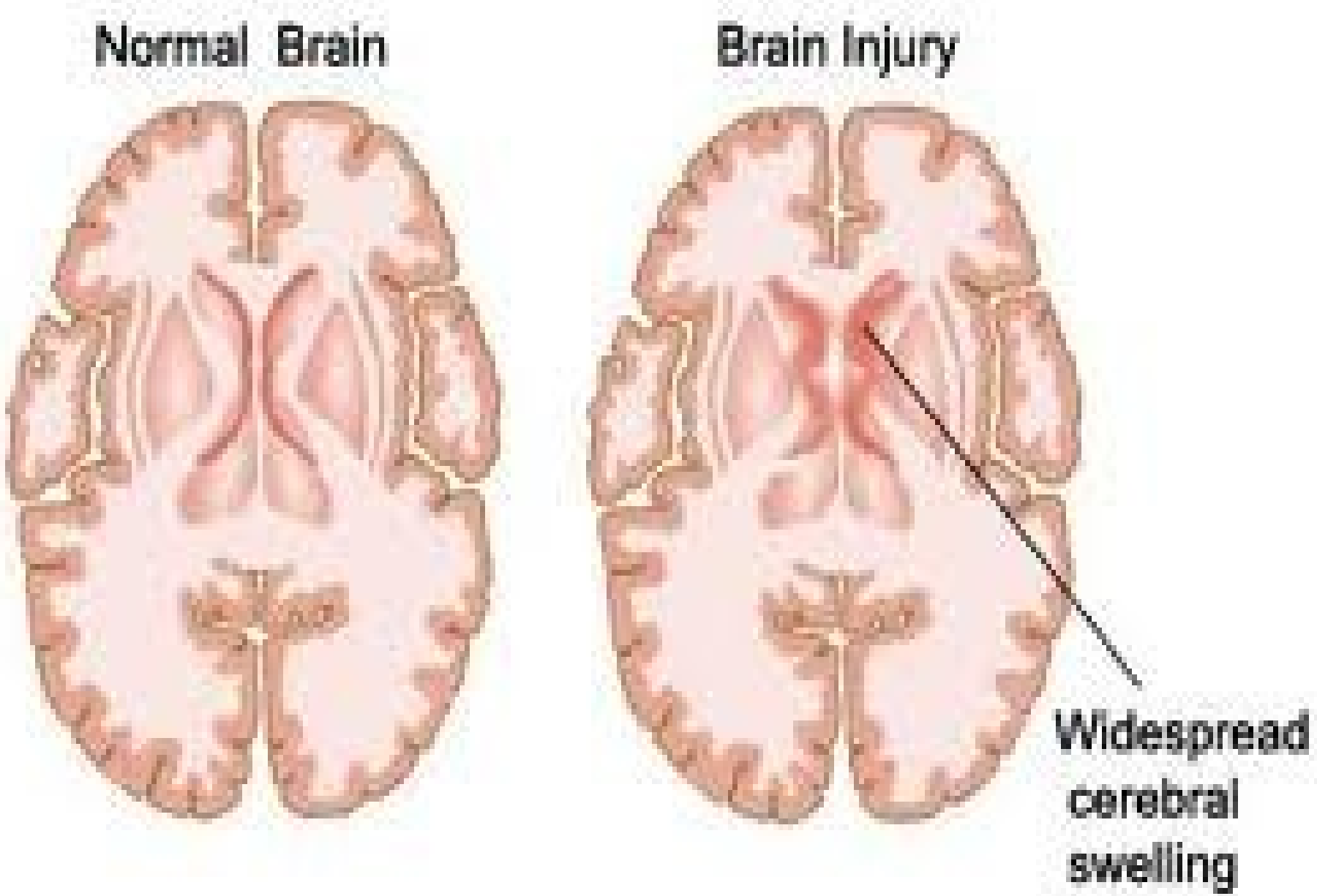

Dendrites
Cell body
Nucleus
Axon hillock
Axon
Signal direction
Synapse
Presynaptic cell
Myelin sheath
Synaptic terminals
Postsynaptic cell

- **Glial cells (neuroglial cells):**
- These cells support, feed and protect the neurons.
- The different types of glial cells are:
- Astrocytes
- Oligodendrocytes
- Ependymal cells
- Microglial cells


FPRL
NEP
ECE
SR-A1
MICROGLIA
Aβ trimer
Neuronal Viability
NGF
BDNF
GDNF
Aβ
ASTROCYTE
LRP1
MMP
NEP
ECE
ApoE
LDL R
DIFFUSE Aβ PLAQUE
ACE
IDE
NEP
Plasmin
Apo E
MMP
α2-Macroglobulin
IL-4
IL-10
IL-13
TGF-β
Inflammation
MACROPHAGE
Aβ dimer

Head Injuries

- Head injury is a broad classification that includes injury to the scalp, skull, or brain.
- Traumatic brain injury is the most serious form of head injury.
- The most common causes of traumatic brain injury are motor vehicle crashes, violence, and falls.


Normal Brain
Brain Injury
Widespread
cerebral
swelling

Pathophysiology

- Research suggests that not all brain damage occurs at the moment of impact.
- Damage to the brain from traumatic injury takes two forms:
- Primary injury and secondary injury.

Primary injury

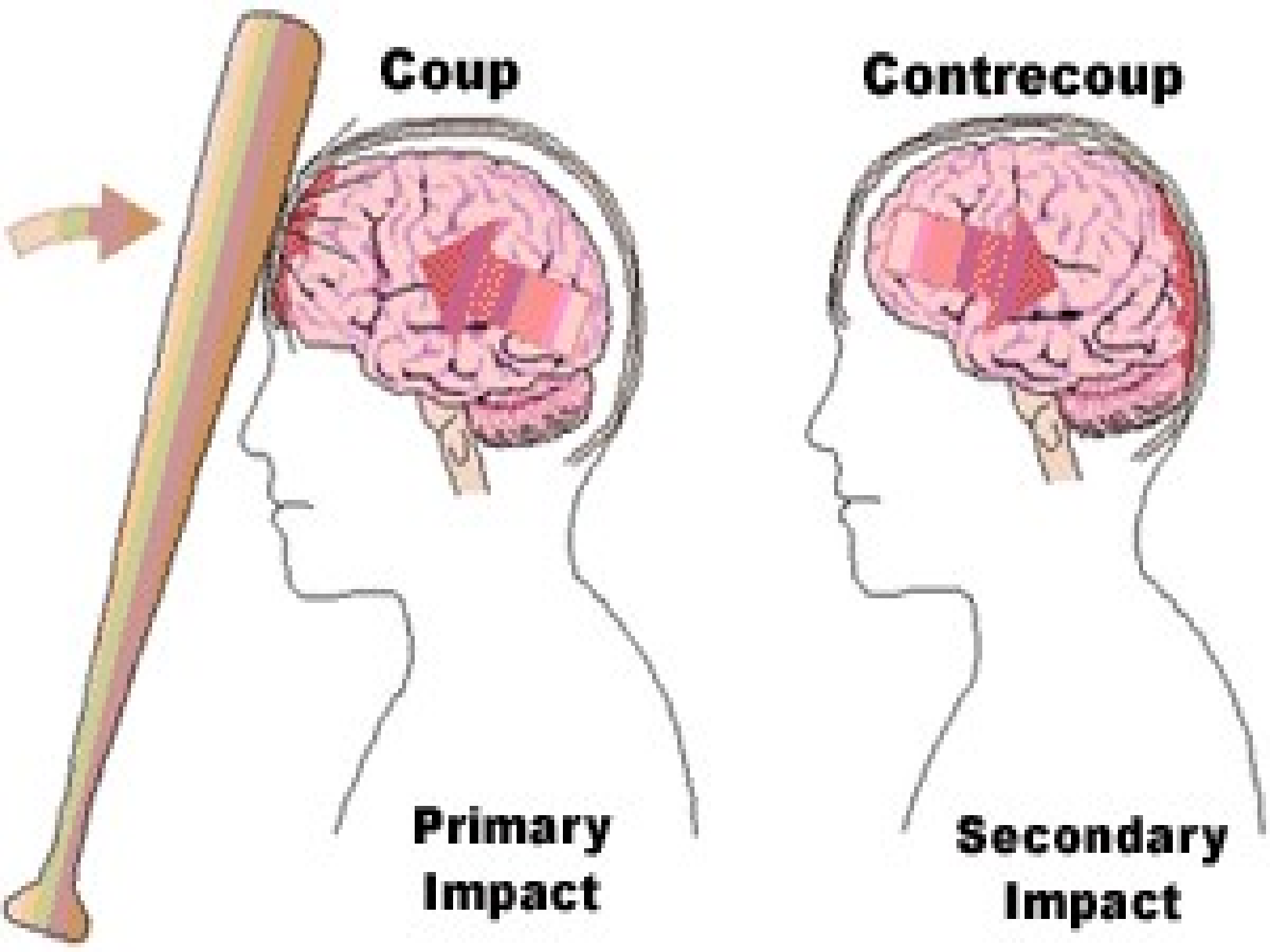
- Primary injury is the initial damage to the brain that results from the traumatic event.
- This may include contusions, lacerations, and torn blood vessels from impact, acceleration/deceleration, or foreign object penetration.

(Blank-Reid & Reid, 2000; Porth, 2002)

Secondary injury

- Secondary injury evolves over the ensuing hours and days after the initial injury and

  is due primarily to brain swelling or ongoing bleeding.


Coup
Contrecoup
Primary
Impact
Secondary
Impact

Physiology/Pathophysiology

- Brain suffers traumatic injury
- Brain swelling or bleeding
- increases intracranial volume
- Rigid cranium allows no room for expansion

of contents so intracranial pressure increases

- Pressure on blood vessels within the brain
- causes blood flow to the brain to slow

- Cerebral hypoxia and ischemia occur
- Intracranial pressure continues to rise.
- Brain may herniate
- Cerebral blood flow ceases

Complications

- Altered consciousness
- Seizures
- Fluid buildup
- Infections
- Blood vessel damage
- Nerve damage
- Intellectual problems
- Behavioral changes

NURSING PROCESS
THE PATIENT WITH A BRAIN INJURY

- **Assessment**
- Depending on the patient's neurologic status, the nurse may elicit information from the patient, family, or witnesses or from emergency rescue personnel (Munro, 2000).

Glasgow Coma Scale

- The Glasgow Coma Scale is a tool for assessing a patient's response to stimuli.
- Scores range from 3 (deep coma) to 15 (normal).

- **Eye opening response Spontaneous 4**
- To voice 3
- To pain 2
- None 1

- **Best verbal response Oriented 5**
- Confused 4
- Inappropriate words 3
- Incomprehensible sounds 2
- None 1

- **Best motor response Obeys command 6**
- Localizes pain 5
- Withdraws 4
- Flexion 3
- Extension 2
- None 1

Total 3 to 15

Glasgow Coma Score

Eye Opening (E)	Verbal Response (V)	Motor Response (M)
4=Spontaneous 3=To voice 2=To pain 1=None	5=Normal conversation 4=Disoriented conversation 3=Words, but not coherent 2=No words.....only sounds 1=None	6=Normal 5=Localizes to pain 4=Withdraws to pain 3=Decorticate posture 2=Decerebrate 1=None
		Total = E+V+M

Diagnosis

- Based on the assessment data, the patient's major nursing diagnoses may include the following:
- Ineffective airway clearance and impaired gas exchange related to brain injury.

- Ineffective cerebral tissue perfusion related to increased ICP and decreased CPP.

Planning and Goals

The goals for the patient may include maintenance of a patent airway, adequate CPP, fluid and electrolyte balance, adequate

nutritional status, prevention of secondary injury, maintenance of normal body temperature, maintenance of skin integrity, improvement.

Nursing Interventions

- The nursing interventions for the patient with a head injury are extensive and diverse; they include making nursing assessments, setting priorities for nursing interventions, anticipating needs and complications, and initiating rehabilitation.

Controlling ICP in Severely Brain-Injured Patients

- Elevate the head of bed 30 degrees.
- Maintain the patient's head and neck in neutral alignment (no twisting).
- Initiate measures to prevent the Valsalva maneuver (eg, stool softeners).

- Maintain normal body temperature.
- Maintain fluid balance with normal saline solution.
- Avoid noxious stimuli (eg, excessive suctioning, painful procedures).
- Administer sedation to reduce agitation.
- Maintain cerebral perfusion pressure > 70 mm Hg.

Spinal Cord Injury

Objectives

1. Review basic anatomy and physiology of spinal cord and its protective structures.
2. Describe various mechanisms of injury that may be involved in spinal cord injury.
3. Relate pathophysiological changes that take place after a partial or complete cord transaction.
4. Identify life threatening complications that may result from spinal cord injury.

5. Appreciate the need for prompt interventions in case of a patient with spinal shock and autonomic dysreflexia.

6. Describe the nursing care of a patient with spinal cord injury in an emergency and acute care setting.

7. Explain briefly the rehabilitative needs of patients with Spinal cord injury.

8. Identify the causes and mechanism of injury involved in intervertebral disc herniation.

9. Describe the role of nurses in surgical and non-surgical management of a patient with intervertebral disc herniation.

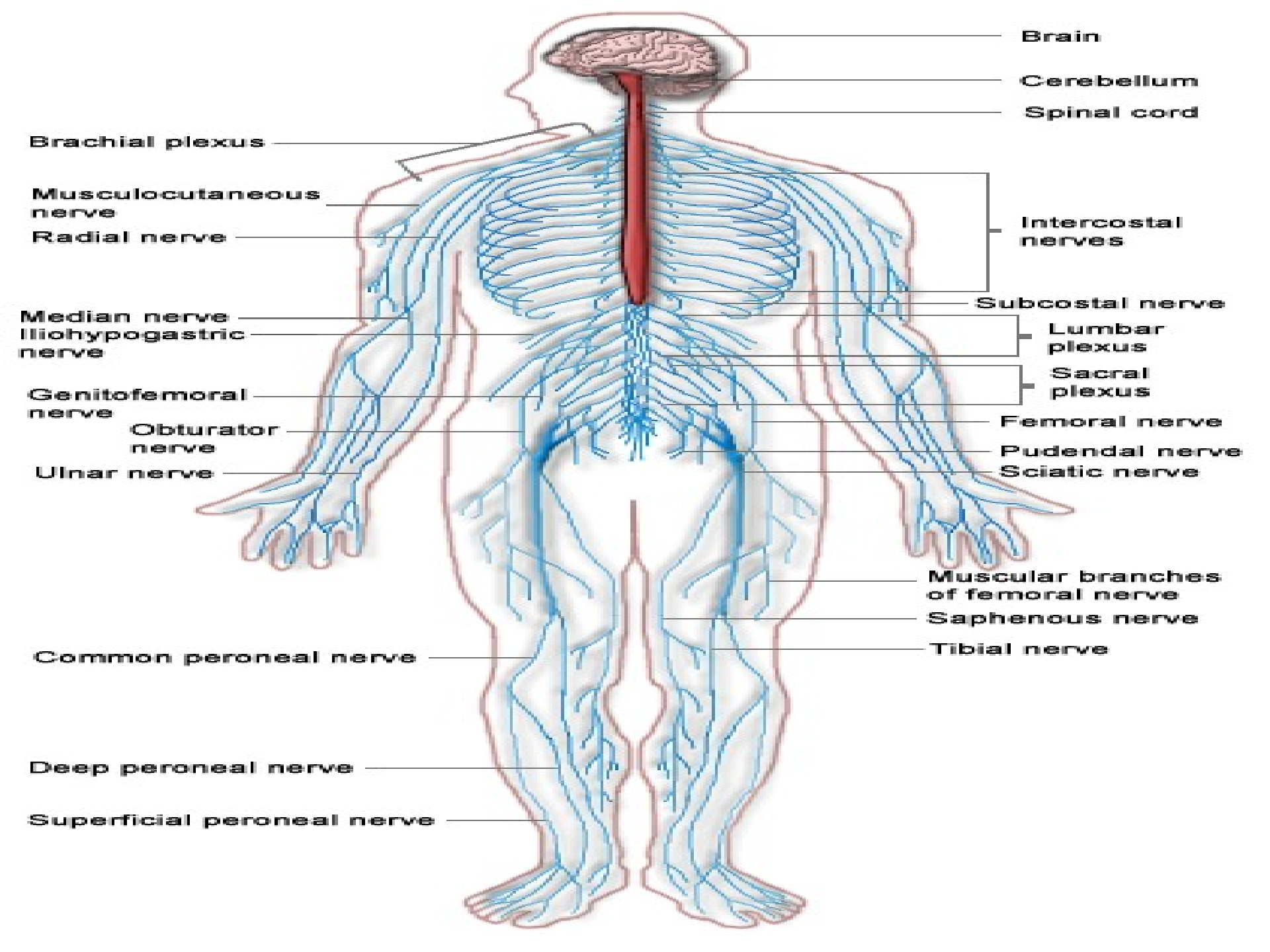
10. Discuss the importance of maintaining proper body mechanics in preventing intervertebral disc herniation.

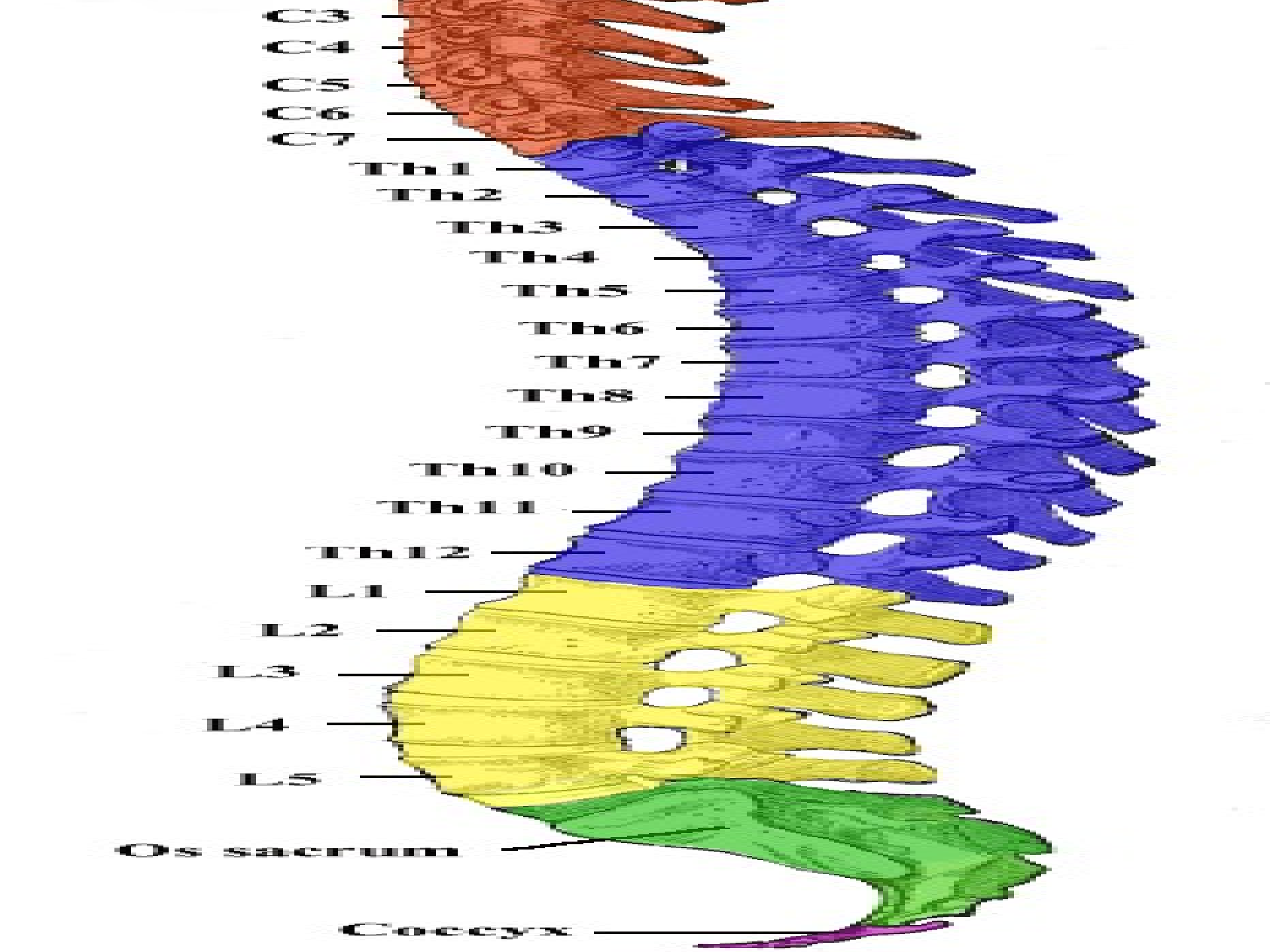
Spinal Cord?

- The spinal cord is a long, thin, tubular bundle of nervous tissue and support cells that extends from the brain (the medulla oblongata specifically).
- The brain and spinal cord together make up the central nervous system (CNS).
- The spinal cord begins at the occipital bone and extends down to the space between the first and second lumbar vertebrae

- It is around 45 cm (18 in) in men and around 43 cm (17 in) long in women.
- Also, the spinal cord has a varying width, ranging from 13 mm (1⁄2 in) thick in the cervical and lumbar regions to 6.4 mm (1⁄4 in) thick in the thoracic area.
- The enclosing bony vertebral column protects the relatively shorter spinal cord.

- The spinal cord has three major functions: as a conduit for motor information, which travels down the spinal cord, as a conduit for sensory information in the reverse direction, and finally as a center for coordinating certain reflexes.

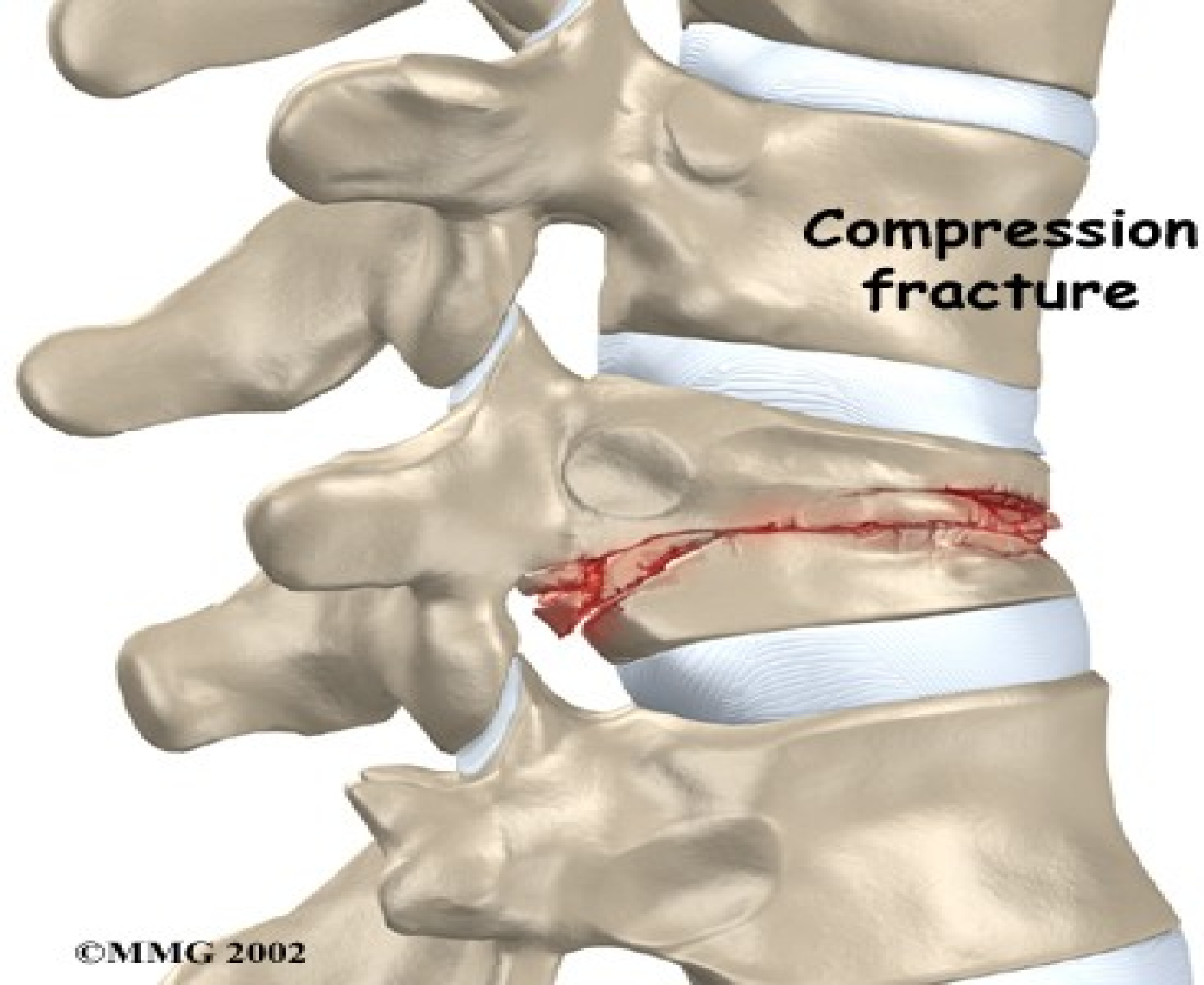

Brain
Cerebellum
Spinal cord
Brachial plexus
Musculocutaneous nerve
Radial nerve
Intercostal nerves
Subcostal nerve
Median nerve
Iliohypogastric nerve
Lumbar plexus
Sacral plexus
Genitofemoral nerve
Obturator nerve
Femoral nerve
Pudendal nerve
Ulnar nerve
Sciatic nerve
Muscular branches of femoral nerve
Saphenous nerve
Common peroneal nerve
Tibial nerve
Deep peroneal nerve
Superficial peroneal nerve


C3
C4
C5
C6
C7
Th1
Th2
Th3
Th4
Th5
Th6
Th7
Th8
Th9
Th10
Th11
Th12
L1
L2
L3
L4
L5
Os sacrum
Coccyx

Spinal Cord Injury and Compression

- The spinal cord extends from the base of the skull and terminates near the lower margin of the L1 vertebral body.
- Below L1, the spinal canal contains the lumbar, sacral and coccygeal spinal nerves that comprise the cauda equina.

- injuries below L1 involve the segmental spinal nerves and/or cauda equina.
- Injuries above the termination of the spinal cord at L1 often involve both spinal cord lesions and segmental root or spinal nerve injuries.


Compression
fracture
©MMG 2002

Types of Spinal Cord Injury

- Spinal cord injuries may be primary or secondary:
- Primary injuries arise from a variety of mechanisms, including mechanical disruption, transection, penetrating injuries due to bullets or weapons, vertebral fracture/subluxation or displaced bony fragments causing penetrating spinal cord and/or segmental spinal nerve injuries.

- The primary traumatic impact initiates vascular and chemical processes leading to oedema and ischaemia which can lead to secondary injuries.
- Secondary injuries are mostly caused by arterial disruption, thrombosis or hypoperfusion due to shock.

Risk factors for spinal injury

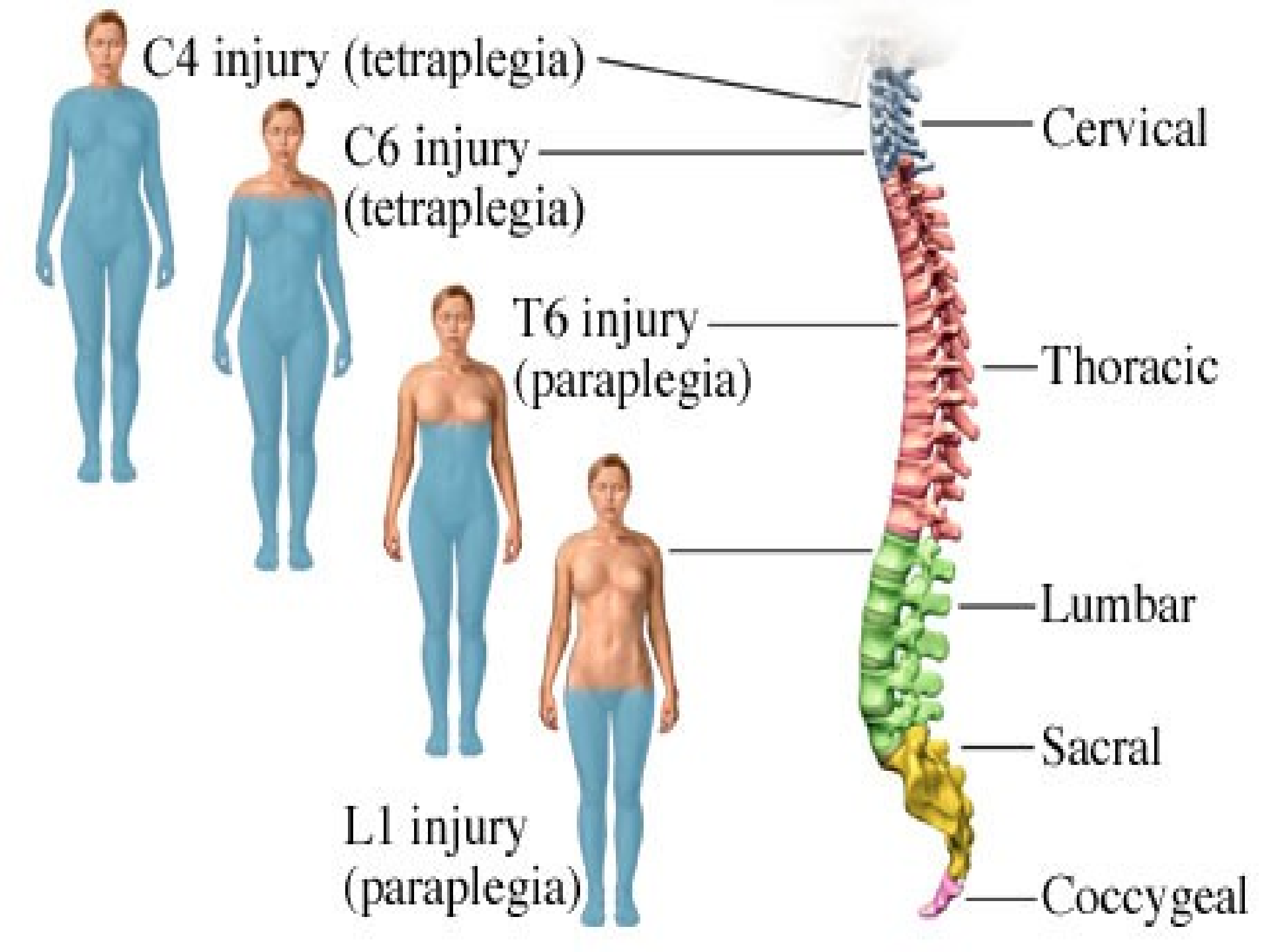
- Major trauma - eg, motor vehicle accidents, violent assaults, gunshot wounds, falls, sports and recreation injuries.
- Suggestive mechanism of injury.
- Spinal pain or neurological symptoms/signs.
- Altered consciousness.

Causes of Spinal Cord Compression

- Trauma
- Tumours
- A prolapsed intervertebral disc
- An epidural or subdural haematoma
- Inflammatory disease, especially rheumatoid arthritis.
- Infection

Clinical Features

- fatigue and disturbance of gait.
- root pain in the legs.
- Thoracic spine lesions produce paraplegia.
- Sensory symptoms can include sensory loss and paraesthesia. Light touch, proprioception and joint position sense are reduced.
- There may be loss of autonomic activity with lack of sweating below the level, loss of thermoregulation and drop in peripheral resistance causing hypotension.


C4 injury (tetraplegia)
C6 injury (tetraplegia)
T6 injury (paraplegia)
L1 injury (paraplegia)
Cervical
Thoracic
Lumbar
Sacral
Coccygeal

Patterns of Injury

- Complete cord injury
- Anterior cord syndrome
- Brown-Séquard's syndrome
- Central cord syndrome
- Posterior cord syndrome
- Spinal cord concussion
- Spinal shock

Investigations

- Haemoglobin and haematocrit levels should be measured initially and monitored serially to monitor blood loss.
- Renal function and electrolytes: dehydration.
- Perform urinalysis to detect associated genitourinary injury.
- X-rays
- CT scan
- MRI

Initial management

- Maintaining stability of the spine
- Resuscitation
- Stabilise and immobilise the spine
- Airway management
- Breathing

Further Treatment

- Immediate referral to a neurosurgeon and any other specialties depending on the nature of the injuries, especially an orthopaedic trauma specialist and general surgeon.
- Emergency decompression of the spinal cord is recommended for patients with extradural lesions, such as epidural haematomas.

Complications

- cephalic extension of the sensory deficit.
- Autonomic dysreflexia
- Pressure sores
- Potential lung complications include aspiration, pneumonia, acute respiratory distress syndrome.
- Chronic musculoskeletal pain
- Depression.

Prognosis

- The spinal cord has very limited powers of regeneration.
- Patients with a complete cord injury have a very low chance of recovery, especially if paralysis persists for longer than 72 hours.
- The prognosis is much better for the incomplete cord syndromes.

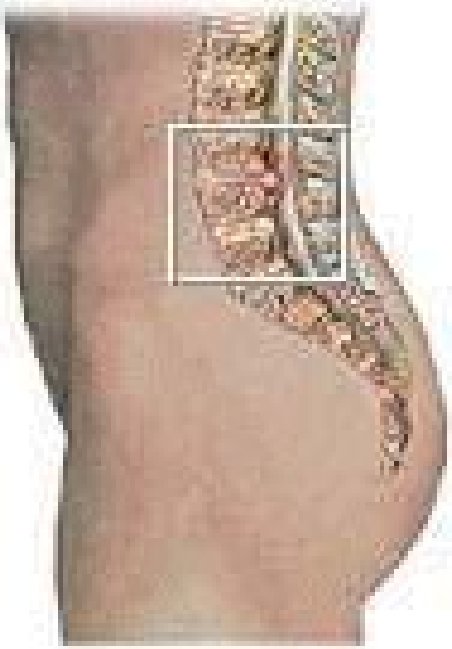
- The prognosis for cervical spine fractures and dislocations is very variable, depending on the degree of neurological disability.
- Prognosis for neurological deficit depends on the magnitude of the spinal cord damage present at the onset.

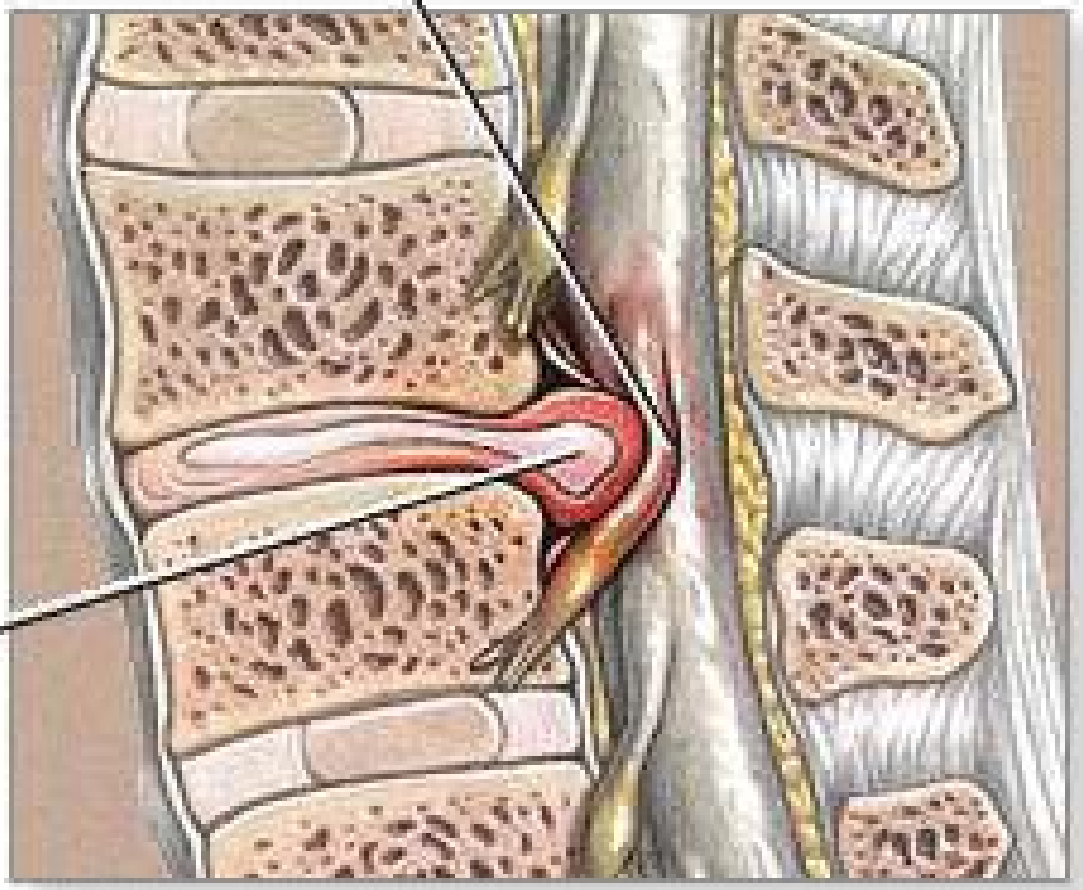
Prevention

- Avoidance of excess alcohol intake.
- Road safety.
- Encourage adherence to rules and safety regulations with high-risk activities - eg, rugby, equestrian pursuits, hang-gliding.

Spinal Disc Herniation

- a medical condition affecting the spine in which a tear in the outer, fibrous ring (anulus fibrosus) of an intervertebral disc (discus intervertebralis) allows the soft, central portion (nucleus pulposus) to bulge out beyond the damaged outer rings.





Terminology

- Some of the terms commonly used to describe the condition include herniated disc, prolapsed disc, ruptured disc and slipped disc. Other phenomena that are closely related include disc protrusion, pinched nerves, sciatica, disc disease, disc degeneration, degenerative disc disease, and black disc

Signs and symptoms

- Undefined pains in the thighs, knees, or feet.
- Numbness
- Tingling,
- Muscular weakness,
- Paralysis, paresthesia,
- Affection of reflexes

Causes

- Degeneration of the intervertebral disc as the major cause of spinal disc herniation and cite trauma as a low cause.

Pathophysiology

- The majority of spinal disc herniation cases occur in lumbar region (95% in L4-L5 or L5-S1). [23] The second most common site is the cervical region (C5-C6, C6-C7).
- The thoracic region accounts for only 0.15% to 4.0% of cases.
- Herniations usually occur posterolaterally, where the anulus fibrosus is relatively thin and is not reinforced by the posterior or anterior longitudinal ligament

- In the cervical spinal cord, a symptomatic posterolateral herniation between two vertebrae will impinge on the nerve which exits the spinal canal between those two vertebrae on that side.
- So for example, a right posterolateral herniation of the disc between vertebrae C5 and C6 will impinge on the right C6 spinal nerve.

Diagnosis

- Diagnosis is made by a practitioner based on the history, symptoms, and physical examination.

Prevention

- Prevention must come from multiple sources such as education, proper body mechanics, and physical fitness.

Treatment

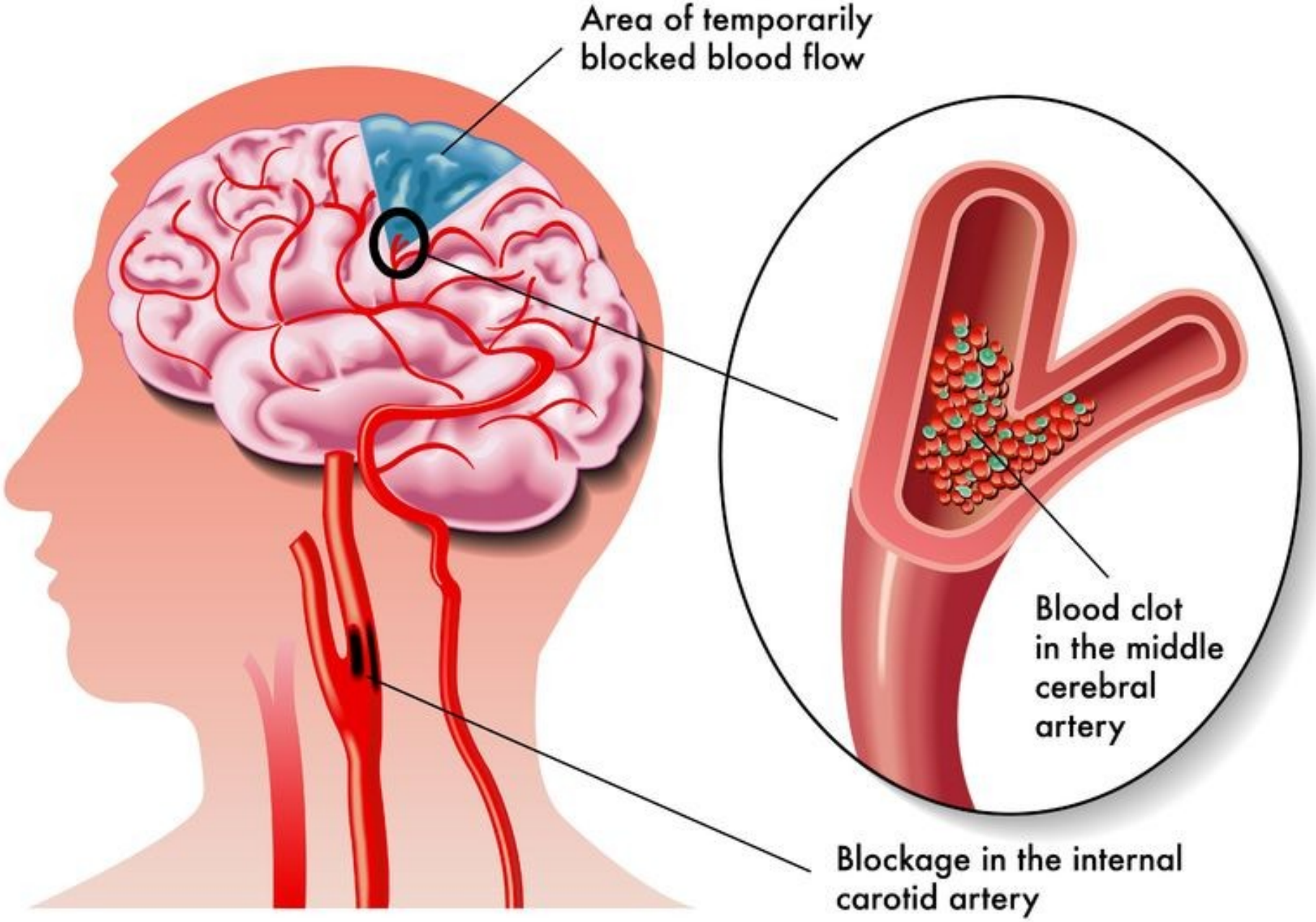
- Initial treatment usually consists of non-steroidal anti-inflammatory pain medication (NSAIDs).
- Epidural corticosteroid injections provide a slight and questionable short-term improvement in those with sciatica but are of no long term benefit.

Cerebro Vasular Accident (CVA)

Objectives

- By the end of this unit the learners will be able to:

1. Utilize nursing process in caring for the patient with CVA.


Area of temporarily blocked blood flow
Blood clot in the middle cerebral artery
Blockage in the internal carotid artery

Definition

- Cerebrovascular accident (stroke) refers to any functional or structural abnormality of the brain caused by a pathological condition of the cerebral vessels or of the entire cerebrovascular system.
- This pathology either causes hemorrhage from a tear in the vessel wall or impairs the cerebral circulation by a partial or complete occlusion of the vessel lumen with transient or permanent effects.

- Thrombosis, embolism, and hemorrhage are the primary causes for CVA, with thrombosis being the main cause of both CVAs and transient ischemic attacks (TIAs).
- The most common vessels involved are the carotid arteries and those of the vertebrobasilar system at the base of the brain.

Nursing care Plan

- **Impaired Physical Mobility**
- **Nursing Diagnosis: Impaired Physical Mobility**
- May be related to:

Neuromuscular involvement: weakness, paresthesia; flaccid/hypotonic paralysis (initially); spastic paralysis

Possibly evidenced by:

Inability to purposefully move within the physical environment; impaired coordination; limited range of motion; decreased muscle strength/control

Desired Outcomes

- Maintain/increase strength and function of affected or compensatory body part.
- Maintain optimal position of function as evidenced by absence of contractures, footdrop.
- Demonstrate techniques/behaviors that enable resumption of activities.
- Maintain skin integrity.

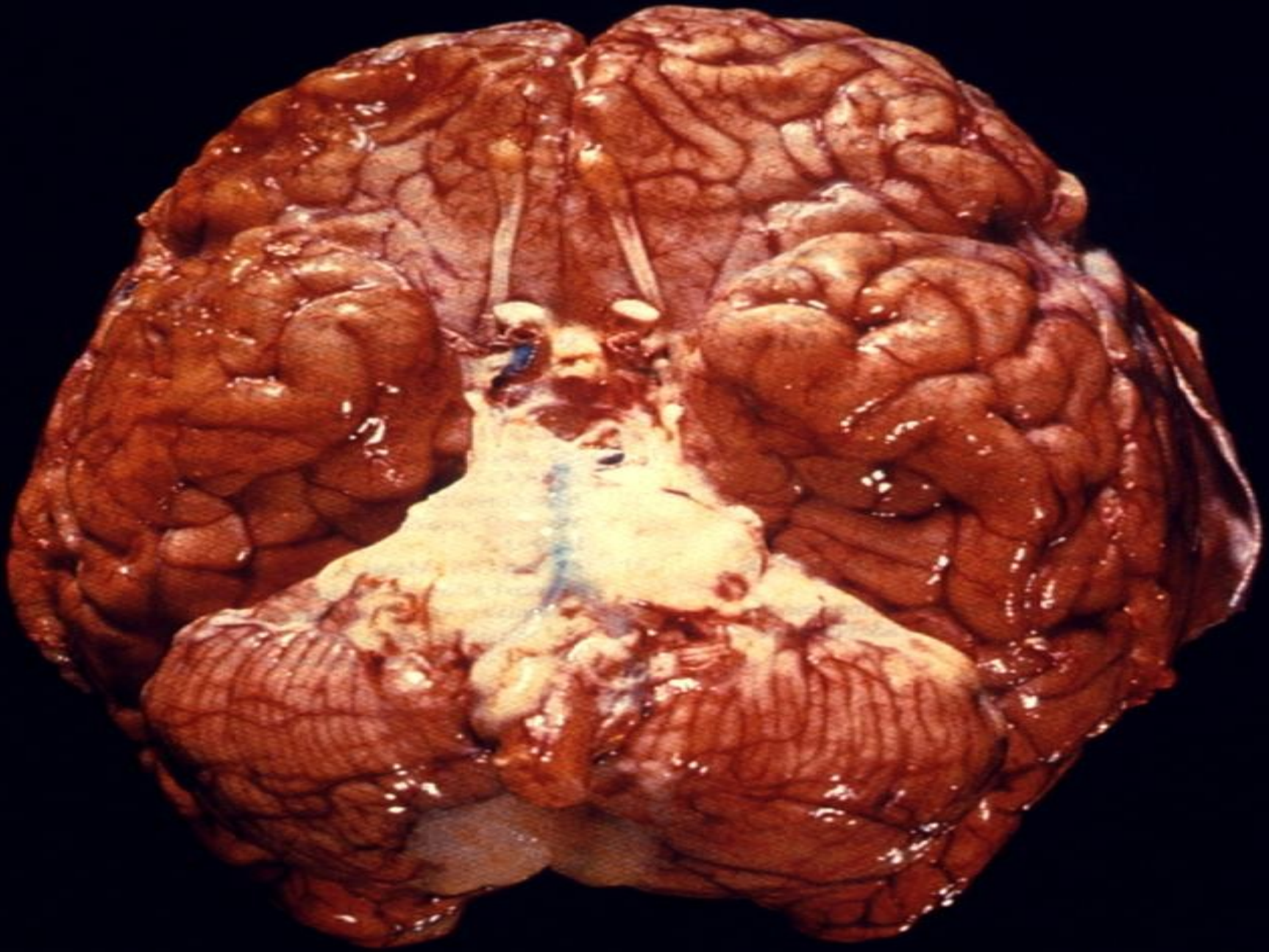
Nursing Intervention

- Assess functional ability/extent of impairment initially and on a regular basis. Classify according to 0–4 scale.
- Change positions at least every 2 hr (supine, sidelying) and possibly more often if placed on affected side.

Rationale

- Identifies strengths/deficiencies and may provide information regarding recovery. Assists in choice of interventions, because different techniques are used for flaccid and spastic paralysis.
- Reduces risk of tissue ischemia/injury. Affected side has poorer circulation and reduced sensation and is more predisposed to skin breakdown/decubitus.

Infections/Inflammations of CNS (Central Nervous System)



Objectives

- By the end of this unit the learners will be able to:

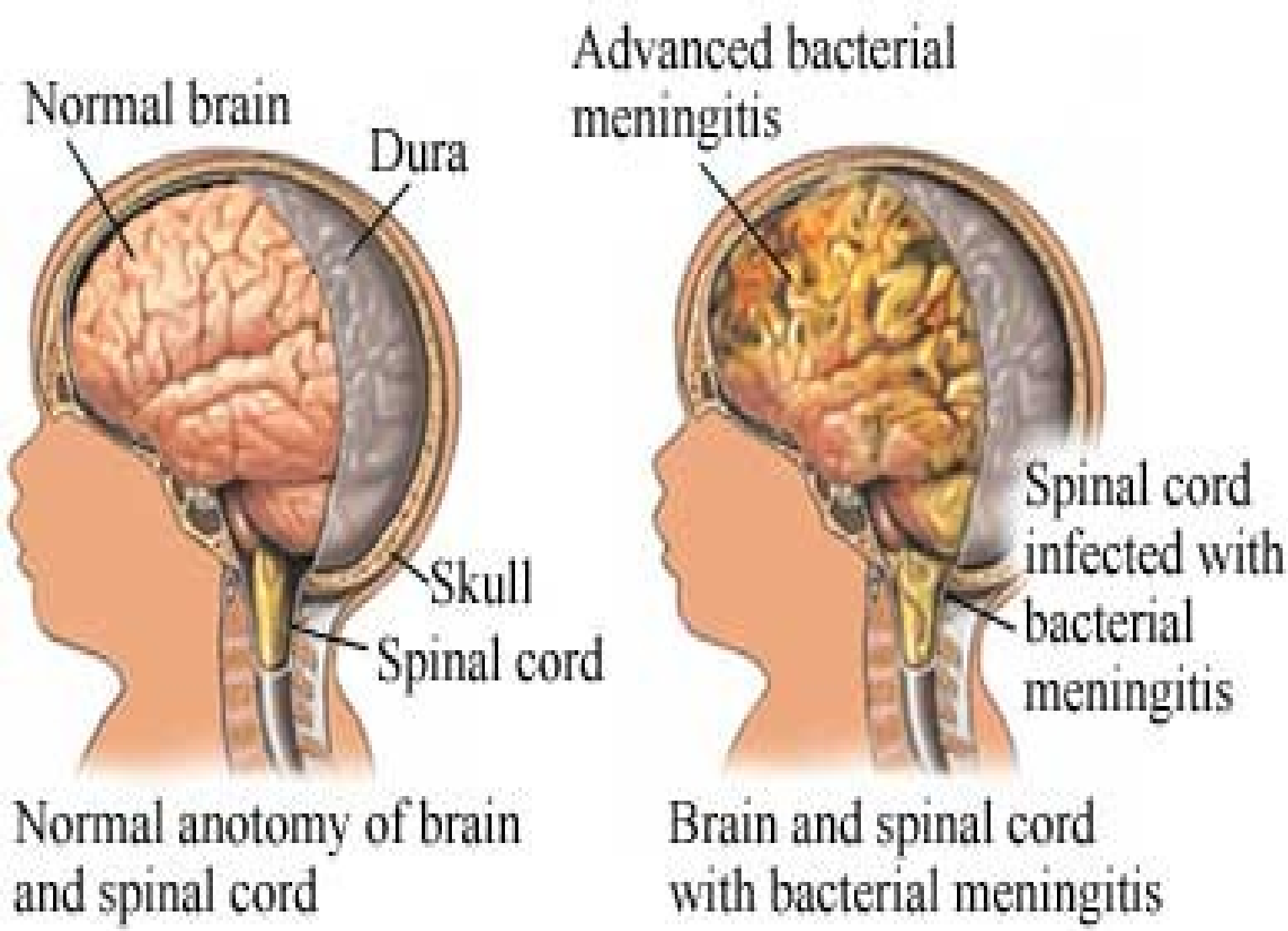
1. Describe alterations in intracranial dynamics resulting from infectious disorders of Central Nervous System (CNS).
2. Differentiate between the etiology, manifestations and diagnostic markers of meningitis, encephalitis and brain abscess.
3. Discuss the pharmacological and nursing management of patients with inflammations and infections of CNS.

Central Nervous System Infections

- The CNS is well defended against infection. The spine and brain are sheathed in tough, protective membranes.
- The outermost membrane, the dura mater, and the next layer, the arachnoid, entirely encase the brain and spinal cord.
- However, these defenses are not absolute. In rare cases, bacteria gain access to areas within the CNS.

Meningitis

- Meningitis is an inflammation of the membranes (meninges) surrounding your brain and spinal cord.



Normal anotomy of brain and spinal cord

Brain and spinal cord with bacterial meningitis

Signs and Symptoms

- Sudden high fever
- Severe headache that isn't easily confused with other types of headache
- Stiff neck
- Vomiting or nausea with headache
- Confusion or difficulty concentrating
- Seizures
- Sleepiness or difficulty waking up

- Sensitivity to light
- Lack of interest in drinking and eating
- Skin rash in some cases, such as in meningococcal meningitis

Causes

- Meningitis usually results from a viral infection, but the cause may also be a bacterial infection.
- Less commonly, a fungal infection may cause meningitis.
- Because bacterial infections are the most serious and can be life-threatening, identifying the source of the infection is an important part of developing a treatment plan.

Risk factors

- Skipping vaccinations
- Age
- Compromised immune system
- Pregnancy

Complications

- Hearing loss
- Memory difficulty
- Learning disabilities
- Brain damage
- Gait problems
- Seizures
- Kidney failure
- Shock
- Death

Tests and diagnosis

- Blood cultures
- Imaging
- Spinal tap (lumbar puncture)

Treatments and Drugs

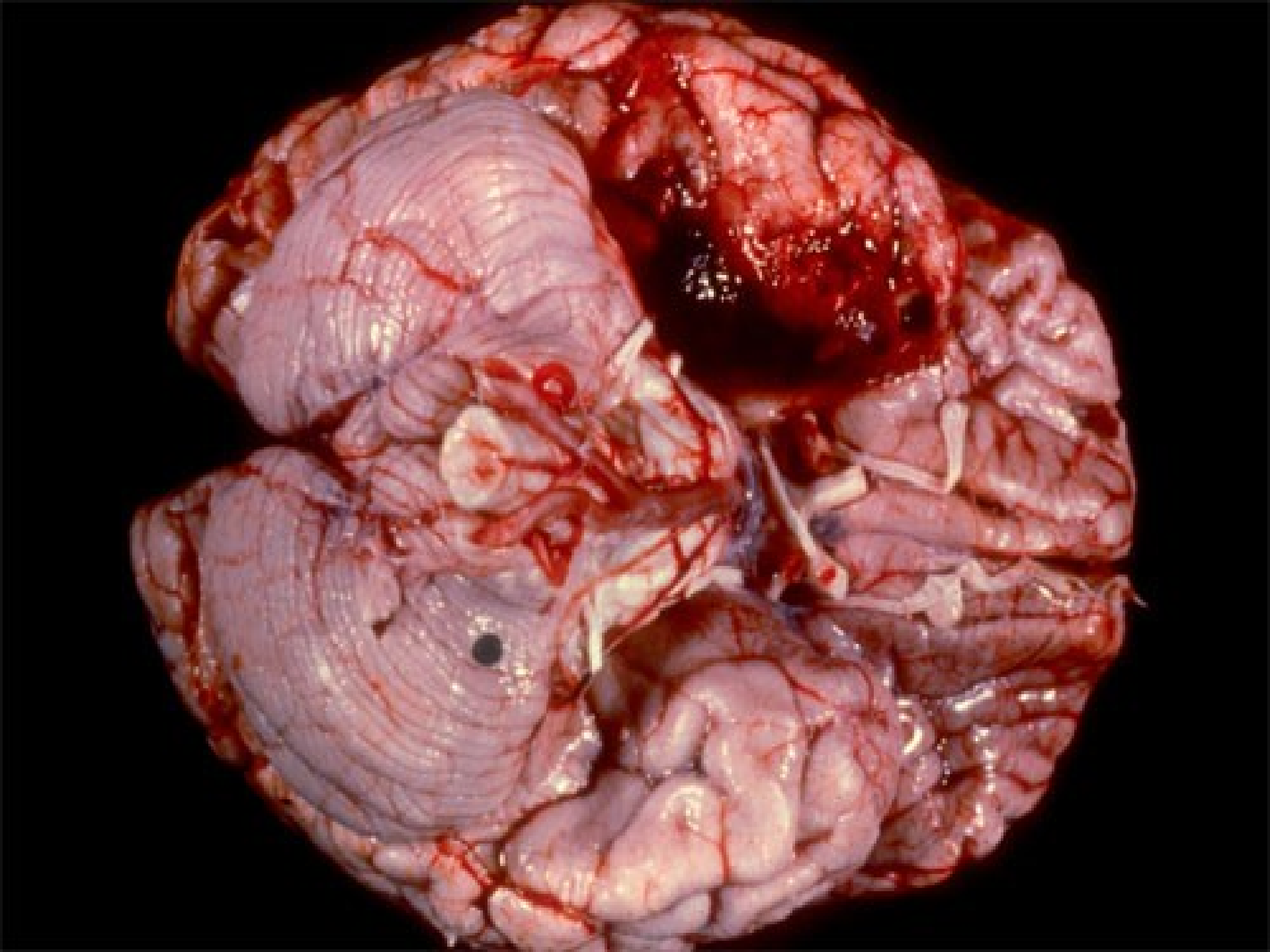
- Acute bacterial meningitis requires prompt treatment with intravenous antibiotics and, more recently, cortisone medications, to ensure recovery and reduce the risk of complications, such as brain swelling and seizures.

Prevention

- Wash your hands
- Practice good hygiene
- Stay healthy
- If you're pregnant, take care with food.
- Immunizations

Encephalitis

- Encephalitis (en-sef-uh-LIE-tis) is inflammation of the brain.
- Viral infections are the most common cause of the condition.



Signs and Symptoms

- Headache
- Fever
- Aches in muscles or joints
- Fatigue or weakness
- Confusion, agitation or hallucinations
- Seizures
- Loss of sensation or paralysis in certain areas of the face or body
- Muscle weakness

Causes

- The exact cause of encephalitis is often unknown, but the most commonly diagnosed cause is a viral infection.
- Bacterial infections and noninfectious inflammatory conditions also may cause encephalitis

Risk factors

- Age
- Weakened immune system
- Geographic regions
- Season of the year

Complications

- Persistent fatigue
- Weakness or lack of muscle coordination
- Personality changes
- Memory problems
- Paralysis
- Hearing or vision defects
- Speech impairments

Tests and diagnosis

- Brain imaging
- Spinal tap (lumbar puncture)
- Other lab tests. Samples of blood or urine, or of excretions from the back of the throat can be tested for viruses or other infectious agents.
- Brain biopsy

Treatments and drugs

- Bed rest
- Plenty of fluids
- Anti-inflammatory drugs— such as acetaminophen (Tylenol, others), ibuprofen (Advil, Motrin IB, others) and naproxen sodium (Aleve, others) — to relieve headaches and fever.

Supportive care

- Breathing assistance, as well as careful monitoring of breathing and heart function
- Intravenous fluids to ensure proper hydration and appropriate levels of essential minerals
- Anti-inflammatory drugs, such as corticosteroids, to help reduce swelling and pressure within the skull
- Anticonvulsant medications, such as phenytoin (Dilantin), to stop or prevent seizures.

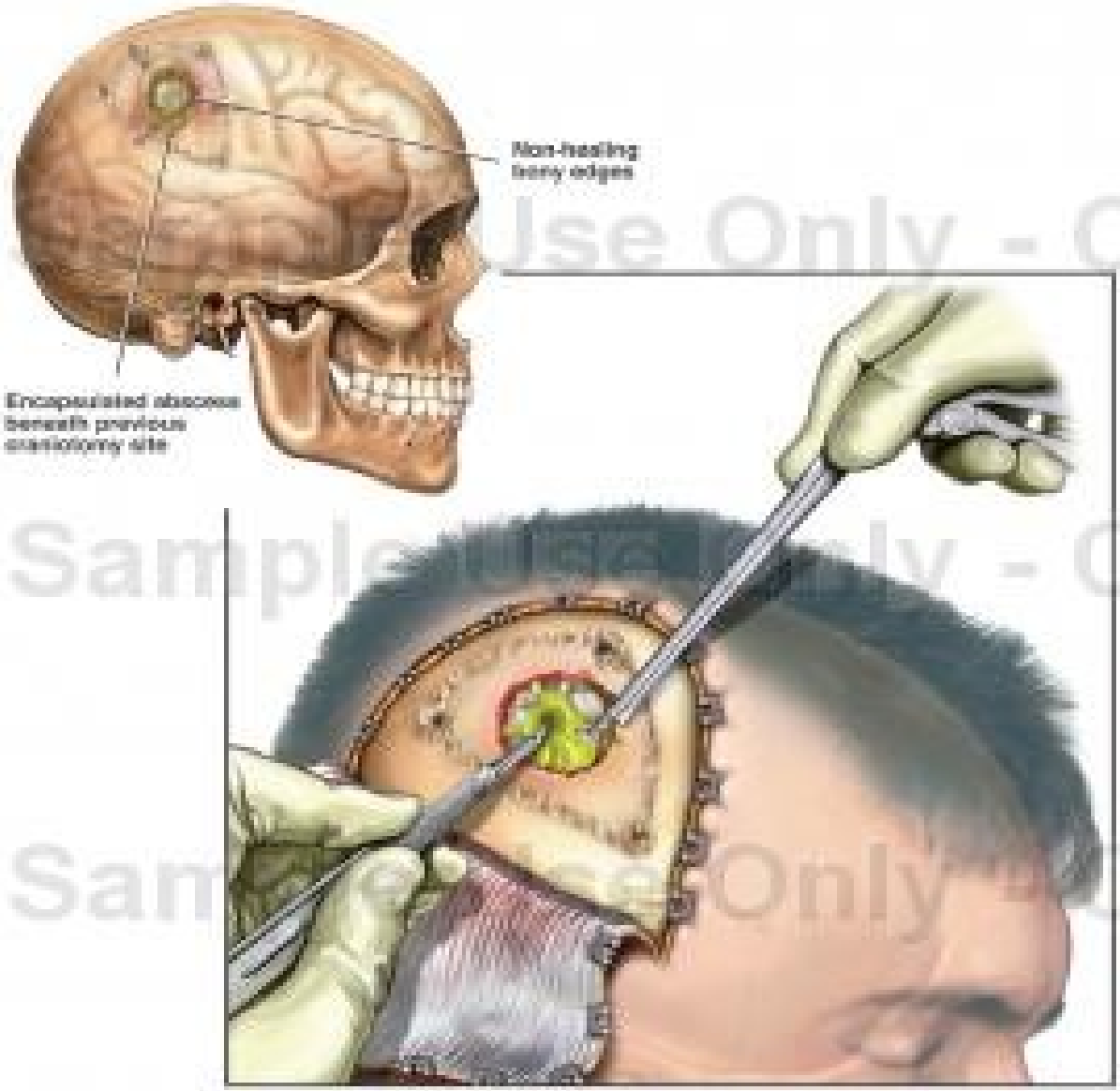
Prevention

- Practice good hygiene
- Don't share utensils
- Get vaccinations
- Dress to protect yourself
- Apply mosquito repellent.
- Get rid of water sources outside your home.

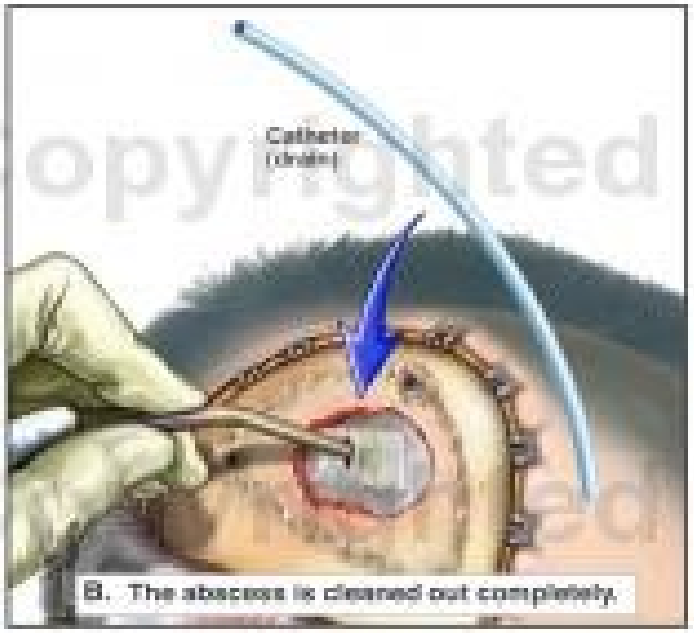
Brain Abscess

- A brain abscess is a collection of pus, immune cells, and other material in the brain, usually from a bacterial or fungal infection.

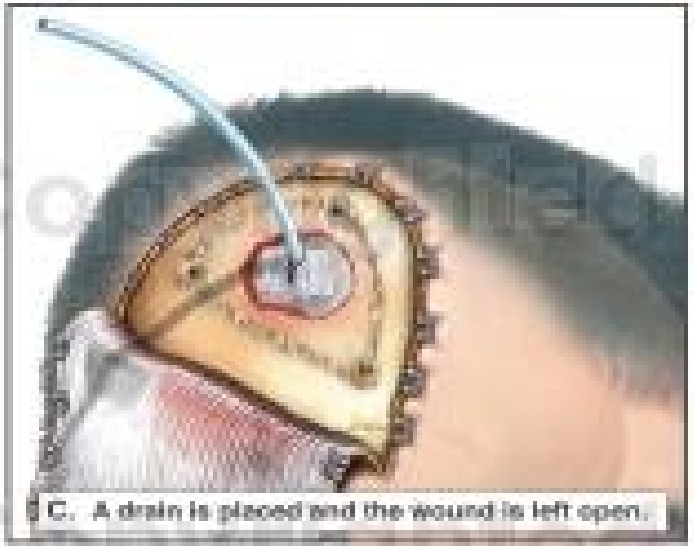
Brain Abscess Evacuation



A. The previous incision reopened. The plates are removed and the non-healing bone is debrided. The abscess is opened and 7 cc of pus is released.



B. The abscess is cleaned out completely.



C. A drain is placed and the wound is left open.

Causes

- Brain abscesses commonly occur when bacteria or fungi infect part of the brain. Swelling and irritation (inflammation) develop in response to this infection.
- Infected brain cells, white blood cells, live and dead bacteria, and fungi collect in an area of the brain.
- Tissue forms around this area and creates a mass.

Risk Factors

- A weakened immune system (such as in AIDS patients)
- Chronic disease, such as cancer
- Drugs that suppress the immune system (corticosteroids or chemotherapy)
- Right-to-left heart shunts, usually the result of congenital heart disease

Signs and Symptoms

- Changes in mental status
- Confusion
- Decreasing responsiveness
- Drowsiness
- Eventual coma
- Inattention
- Irritability
- Slow thought processes

- Decreased movement
- Decreased sensation
- Decreased speech (aphasia)
- Fever and chills
- Headache
- Language difficulties
- Loss of coordination
- Loss of muscle function, typically on one side

Exams and Tests

- Blood cultures
- Chest x-ray
- Complete blood count (CBC)
- Head CT scan
- Electroencephalogram (EEG)
- MRI of head

Treatment

- A brain abscess is a medical emergency. Pressure inside the skull may become high enough to be life threatening. You will need to stay in the hospital until the condition is stable. Some people may need life support.
- Medication, not surgery, is recommended if you have:
- Several abscesses (rare)
- A small abscess (less than 2 cm)
- An abscess deep in the brain

- **Surgery is needed if :**
- Increased pressure in the brain continues or gets worse
- The brain abscess does not get smaller after medication
- The brain abscess contains gas (produced by some types of bacteria)
- The brain abscess might break open (rupture)

Outlook (Prognosis)

- If untreated, a brain abscess is almost always deadly. With treatment, the death rate is about 10 - 30%. The earlier treatment is received, the better.

- Some patients may have long-term neurological problems after surgery.

Possible Complications

- Brain damage
- Meningitis that is severe and life threatening
- Return (recurrence) of infection
- Seizures

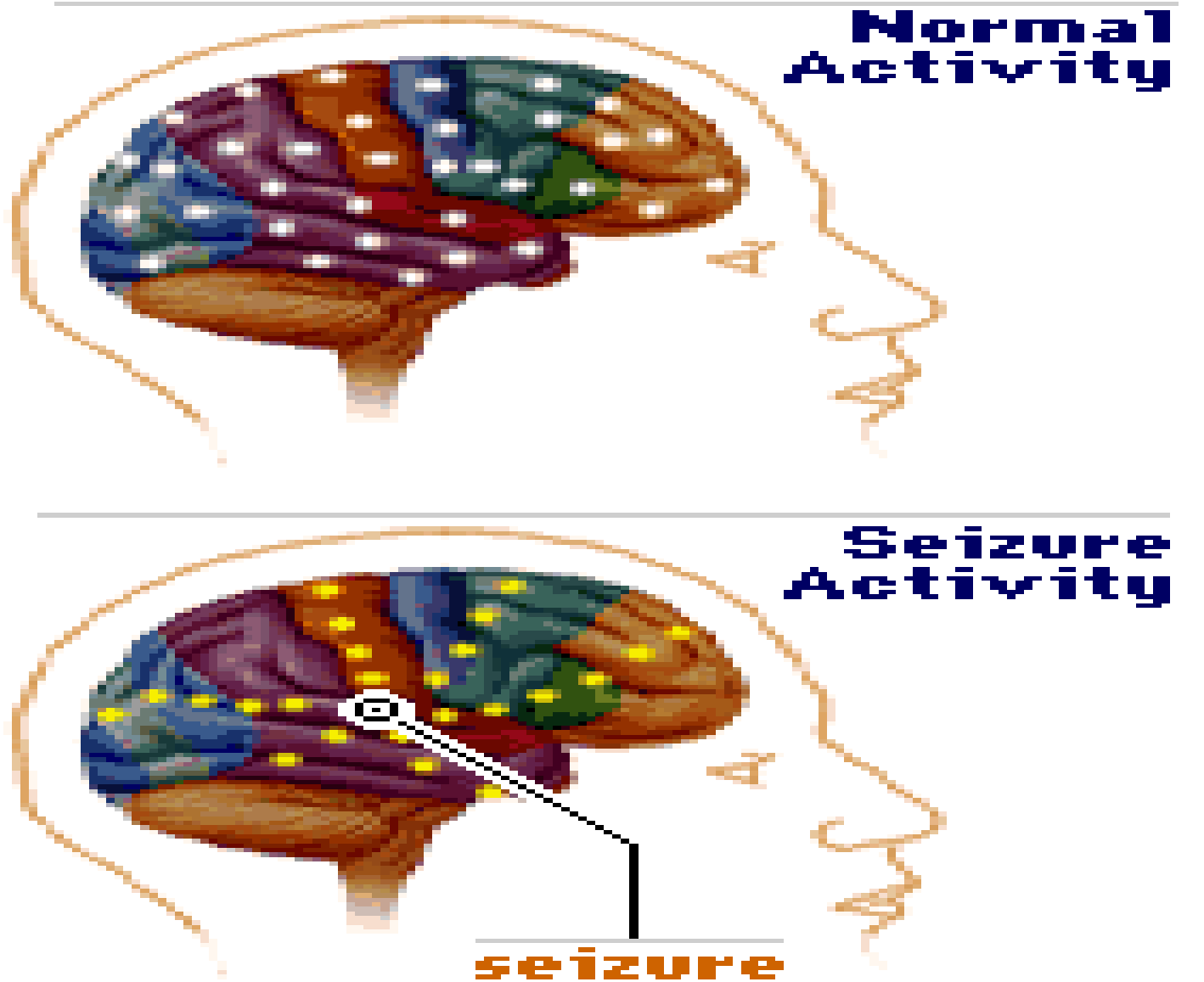
Prevention

- You can reduce the risk of developing a brain abscess by treating any disorders that can cause them.
- Have a follow-up examination after infections are treated.

Alternative Names

- Abscess - brain; Cerebral abscess; CNS abscess

Epilepsy/Seizures


Normal Activity
Seizure Activity
seizure discharge focus, partial seizure
©UPHS

Objectives

1. Use nursing process to provide care to patients with various seizures disorders.

2. Demonstrate an understanding of the side effects and nursing care of some common antiepileptic drugs.

3. Appreciate the psychological effects of epilepsy for a patient and family.

Epilepsy

- A condition of recurring seizures that are unprovoked by an immediate identified cause.

Seizure

- A discrete event characterized by a sudden, excessive, and disorderly (abnormal) discharge of electrons in the brain that may be accompanied by an abrupt alteration in motor and sensory function and level of consciousness.

Nursing Assessment

- Appropriate information about what occurred during the ictal (active seizure) phase should be documented. If the nurse does not actually witness the seizure, persons present should be consulted to obtain the information.
- The individual should be monitored during the postictal phase of the seizure.
- The individual's postictal condition and activity should be documented

Diagnostic Reasoning

- Significant or unusual findings should be reported immediately to the primary care prescriber.
- The decision of what to report is based on review of the seizure characteristics as well as the seizure history which includes:

1. current seizure medications and past history,
2. current frequency of seizures, date of last seizure, and type and characteristics of seizures

Planning

- Planning strategies related to seizure management should occur and be documented.

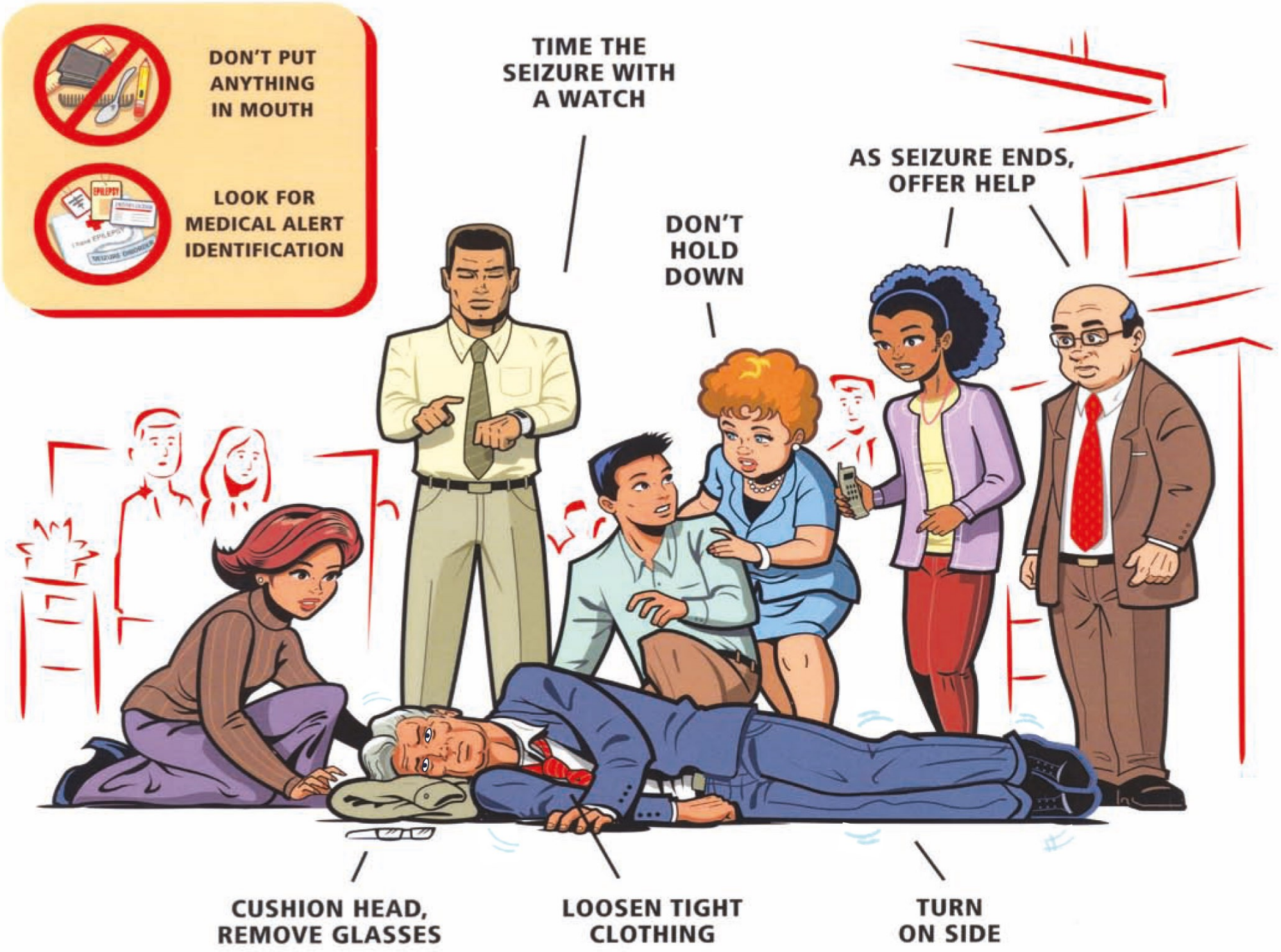
1. The individual's risk factors and actual or potential health problems should be included

in the health assessment report and also in the Single Plan as needed.

Implementation

- Plans should be implemented and nursing interventions documented.

All orders for medication, treatment, and diagnostic procedures should be carried out as prescribed by the primary care prescriber.


DON'T PUT ANYTHING IN MOUTH
LOOK FOR MEDICAL ALERT IDENTIFICATION
TIME THE SEIZURE WITH A WATCH
DON'T HOLD DOWN
AS SEIZURE ENDS, OFFER HELP
CUSHION HEAD, REMOVE GLASSES
LOOSEN TIGHT CLOTHING
TURN ON SIDE

Evaluation

- Evaluation of the seizure management plan should occur and the results documented.

The nurse should monitor the results of seizure management program and make recommendations to the primary care prescriber and interdisciplinary team for changes based on the progress noted.

How does epilepsy affect one's life?

- Because epilepsy varies so widely from person to person, the effects that it has on an individual's body and life can range from mild and relatively minor to extremely serious and debilitating.

What is the public's attitude towards epilepsy?

Epilepsy is still not often talked about in public. Ignorance of epilepsy among the general public means that many seizures are still unrecognized and mishandled.

- The public's misconceptions and fears about epilepsy promote misunderstanding and prejudice against people with seizures.
- This stigma can be very damaging to people living with epilepsy.

What impact can epilepsy have on social relations?

- The very unpredictability of seizures, in terms of their nature, timing, severity and the situations in which they can occur can cause social difficulties.
- Discrimination or rejection may also be a problem for a person with seizures.

What psychological impact can epilepsy have?

- Just as the effects that epilepsy has on a person's body and their life vary widely, so do its effects on feelings.
- Certainly, feelings of uncertainty and being out of control are common.
- Society's lack of understanding of epilepsy is a burden that is strongly felt, and many people with epilepsy try to keep their condition a secret.

- Psychological problems, if they develop, usually come from how others react to the person with epilepsy, or how the person with epilepsy anticipates others will react, rather than from the epilepsy itself.
- Lowered self-esteem and self-confidence often accompany epilepsy.
- Feelings of anger, frustration, embarrassment and vulnerability may develop.
- Increased levels of anxiety and depression are also more common.

Disorders of Neuromuscular Transmission

Objectives

- Relate the normal physiology of neuro-muscular transmission to the pathophysiological mechanisms involved in GBS and MG.
- Distinguish the signs and symptoms of MG and GBS.
- Describe nurses‟ role in caring for patients undergoing diagnostic procedures to rule out MG and GBS.

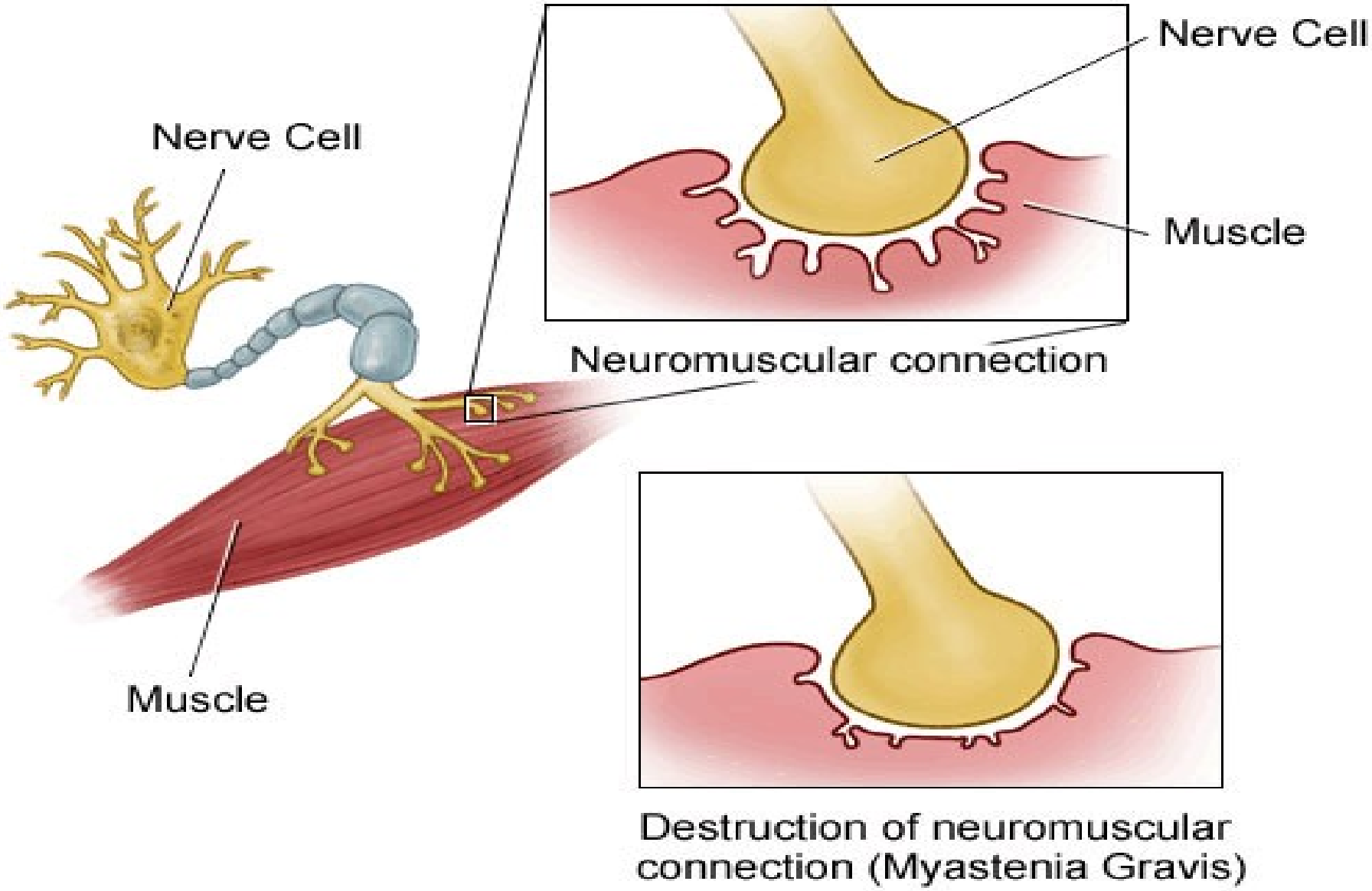
- Identify major complications associated with Myasthenic Crises and Cholinergic Crisis.
- Utilize effective nursing process in caring for patients with neuromuscular transmission disorder.

Myasthenia Gravis

- Myasthenia gravis is a chronic autoimmune neuromuscular disease characterized by varying degrees of weakness of the skeletal (voluntary) muscles of the body.
- The hallmark of myasthenia gravis is muscle weakness that increases during periods of activity and improves after periods of rest.

- Certain muscles such as those that control eye and eyelid movement, facial expression, chewing, talking, and swallowing are often, but not always, involved in the disorder.
- The muscles that control breathing and neck and limb movements may also be affected.

Myasthenia Gravis



What causes myasthenia gravis?

- Myasthenia gravis is caused by a defect in the transmission of nerve impulses to muscles.
- It occurs when normal communication between the nerve and muscle is interrupted at the neuromuscular junction—the place where nerve cells connect with the muscles they control.

- In myasthenia gravis, antibodies block, alter, or destroy the receptors for acetylcholine at the neuromuscular junction, which prevents the muscle contraction from occurring.
- These antibodies are produced by the body's own immune system.
- Myasthenia gravis is an autoimmune disease because the immune system—which normally protects the body from foreign organisms—mistakenly attacks itself.

What is the role of the thymus gland in myasthenia gravis?

- Scientists believe the thymus gland may give incorrect instructions to developing immune cells, ultimately resulting in autoimmunity and the production of the acetylcholine receptor antibodies, thereby setting the stage for the attack on neuromuscular transmission.

What are the symptoms of myasthenia gravis?

- In most cases, the first noticeable symptom is weakness of the eye muscles.
- In others, difficulty in swallowing and slurred speech may be the first signs.

- The degree of muscle weakness involved in myasthenia gravis varies greatly among individuals, ranging from a localized form limited to eye muscles (ocular myasthenia), to a severe or generalized form in which many muscles—sometimes including those that control breathing—are affected.

- Symptoms, which vary in type and severity, may include a drooping of one or both eyelids (ptosis), blurred or double vision (diplopia) due to weakness of the muscles that control eye movements, unstable or waddling gait, a change in facial expression, difficulty in swallowing, shortness of breath, impaired speech (dysarthria), and weakness is the arms, hands, fingers, legs, and neck.

Who gets myasthenia gravis?

- Myasthenia gravis occurs in all ethnic groups and both genders.
- It most commonly affects young adult women (under 40) and older men (over 60), but it can occur at any age.

How is myasthenia gravis diagnosed?

- A special blood test can detect the presence of immune molecules or acetylcholine receptor antibodies.
- Most patients with myasthenia gravis have abnormally elevated levels of these antibodies.

- Recently, a second antibody—called the anti-MuSK antibody—has been found in about 30 to 40 percent of individuals with myasthenia gravis who do not have acetylcholine receptor antibodies.
- This antibody can also be tested for in the blood.

- However, neither of these antibodies is present in some individuals with myasthenia gravis, most often in those with ocular myasthenia gravis.

- Diagnostic imaging of the chest, using computed tomography (CT) or magnetic resonance imaging (MRI), may be used to identify the presence of a thymoma.
- Pulmonary function testing, which measures breathing strength, helps to predict whether respiration may fail and lead to a myasthenic crisis.

How is myasthenia gravis treated?

- Today, myasthenia gravis can generally be controlled. There are several therapies available to help reduce and improve muscle weakness.
- Medications used to treat the disorder include anticholinesterase agents such as neostigmine and pyridostigmine, which help improve neuromuscular transmission and increase muscle strength.

- Immunosuppressive drugs such as prednisone, azathioprine, cyclosporin, mycophenolate mofetil, and tacrolimus may also be used.

What are myasthenic crises?

- A myasthenic crisis occurs when the muscles that control breathing weaken to the point that ventilation is inadequate, creating a medical emergency and requiring a respirator for assisted ventilation.
- In individuals whose respiratory muscles are weak, crises—which generally call for immediate medical attention—may be triggered by infection, fever, or an adverse reaction to medication.

What is the Prognosis?

- With treatment, most individuals with myasthenia can significantly improve their muscle weakness and lead normal or nearly normal lives. Some cases of myasthenia gravis may go into remission—either temporarily or permanently—and muscle weakness may disappear completely so that medications can be discontinued

- Stable, long-lasting complete remissions are the goal of thymectomy and may occur in about 50 percent of individuals who undergo this procedure.
- In a few cases, the severe weakness of myasthenia gravis may cause respiratory failure, which requires immediate emergency medical care.

Gullien Barrie Syndrome

- Guillain-Barré syndrome (GBS) is a disorder in which the body's immune system attacks part of the peripheral nervous system.
- Guillain-Barré syndrome can affect anybody.
- It can strike at any age and both sexes are equally prone to the disorder.

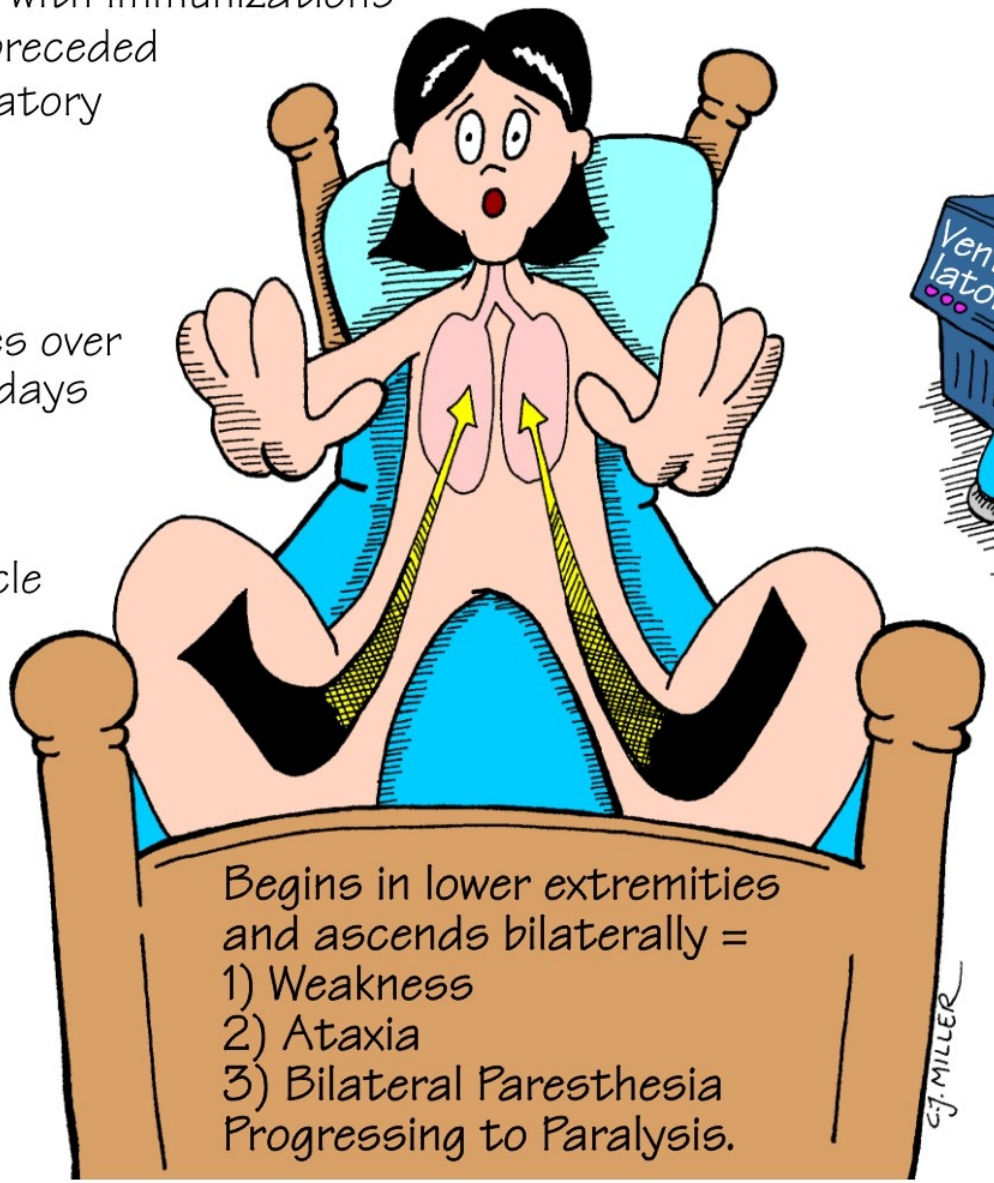
GUILLAIN-BARRE' SYNDROME

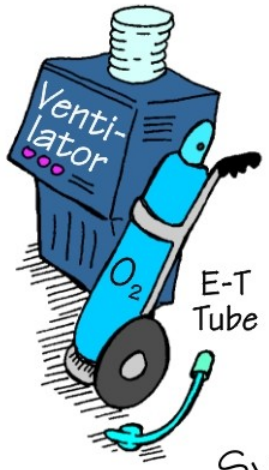
Risk Factors:

- Possibly Autoimmune
- Association with Immunizations
- Frequently preceded by mild repiratory or intestinal infection

- Progresses over hours to days

- Minimal Muscle Atrophy





Symmetrical Paralysis

Causes Problems With:
- Respiration
- Talking
- Swallowing
- Bowel & Bladder Function

What causes Guillain-Barré syndrome?

- What scientists do know is that the body's immune system begins to attack the body itself, causing what is known as an autoimmune disease.
- Usually the cells of the immune system attack only foreign material and invading organisms.

- When Guillain-Barré is preceded by a viral or bacterial infection, it is possible that the virus has changed the nature of cells in the nervous system so that the immune system treats them as foreign cells.

How is Guillain-Barré syndrome diagnosed?

- Because the signals traveling along the nerve are slower, a nerve conduction velocity (NCV) test can give a doctor clues to aid the diagnosis.
- In Guillain-Barré patients, the cerebrospinal fluid that bathes the spinal cord and brain contains more protein than usual.

How is Guillain-Barré treated?

- In high-dose immunoglobulin therapy, doctors give intravenous injections of the proteins that, in small quantities, the immune system uses naturally to attack invading organisms. Investigators have found that giving high doses of these immunoglobulins, derived from a pool of thousands of normal donors, to Guillain-Barré patients can lessen the immune attack on the nervous system.

- The use of steroid hormones has also been tried as a way to reduce the severity of Guillain-Barré, but controlled clinical trials have demonstrated that this treatment not only is not effective but may even have a deleterious effect on the disease.

Pain and painful disorders related to nervous system.

Trigeminal Neuralgia

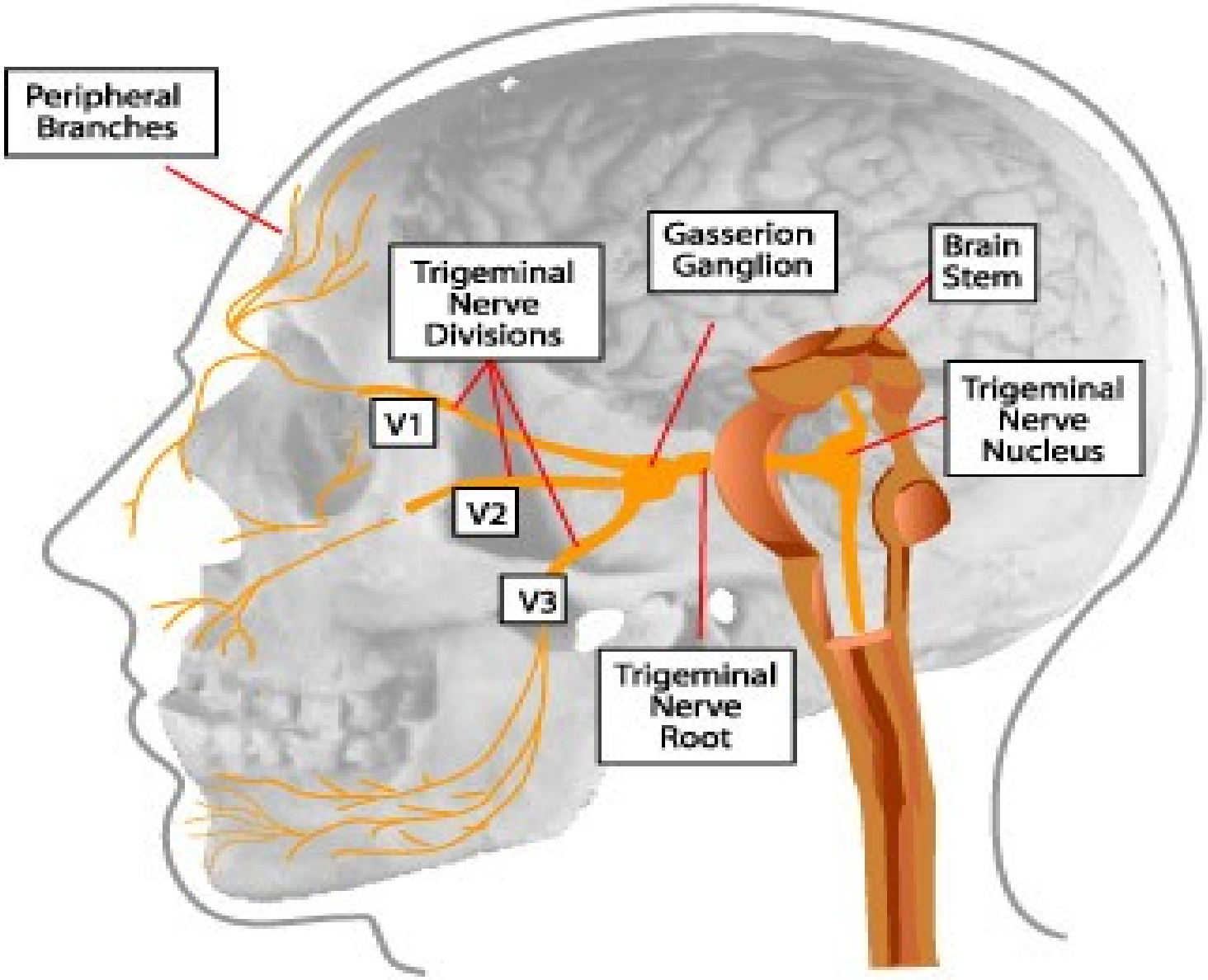
Anatomy of Trigeminal Nerve

- The **trigeminal nerve** (the **fifth cranial nerve**, also called the **fifth nerve**, or simply **CNV** or **CN5**) is a nerve responsible for sensation in the face and certain motor functions such as biting and chewing.

- It is the largest of the cranial nerves.

- Each trigeminal nerve, one on each side of the pons, has three major branches: the ophthalmic nerve (V_1), the maxillary nerve (V_2), and the mandibular nerve (V_3).

- The ophthalmic and maxillary nerves are purely sensory.
- The mandibular nerve has both sensory and motor functions.


Peripheral Branches
Trigeminal Nerve Divisions
Gasserion Ganglion
Brain Stem
Trigeminal Nerve Nucleus
V1
V2
V3
Trigeminal Nerve Root

Trigeminal Neuralgia

- Neuralgia involving one or more of the branches of the trigeminal nerves, and often causing severe pain.


Trigeminal Neuralgia:

Etiology

- Trigeminal neuralgia can occur as a result of aging, or it can be related to multiple sclerosis or a similar disorder that damages the myelin sheath protecting certain nerves.

- Some people may experience trigeminal neuralgia due to a brain lesion or other abnormalities.

Pathophysiology

- slowly evolving process, whether a compression exerted on the nerve by a blood vessel or tumour or alteration of neural functions by an MS plaque at the level of the dorsal root entry zone, leads to increased excitability in some of the trigeminal afferents and subsequently to typical TGN.

Central nervous system
(brain and spinal cord)

In multiple sclerosis the myelin sheath, which is a covering that wraps around the axon, is destroyed with inflammation and scarring

Clinical Manifestations

- Occasional twinges of mild pain.
- Episodes of severe, shooting or jabbing pain that may feel like an electric shock.
- Spontaneous attacks of pain or attacks triggered by things such as touching the face, chewing, speaking and brushing teeth.
- Pain in areas supplied by the trigeminal nerve, including the cheek, jaw, teeth, gums, lips, or less often the eye and forehead.

Diagnostic Techniques

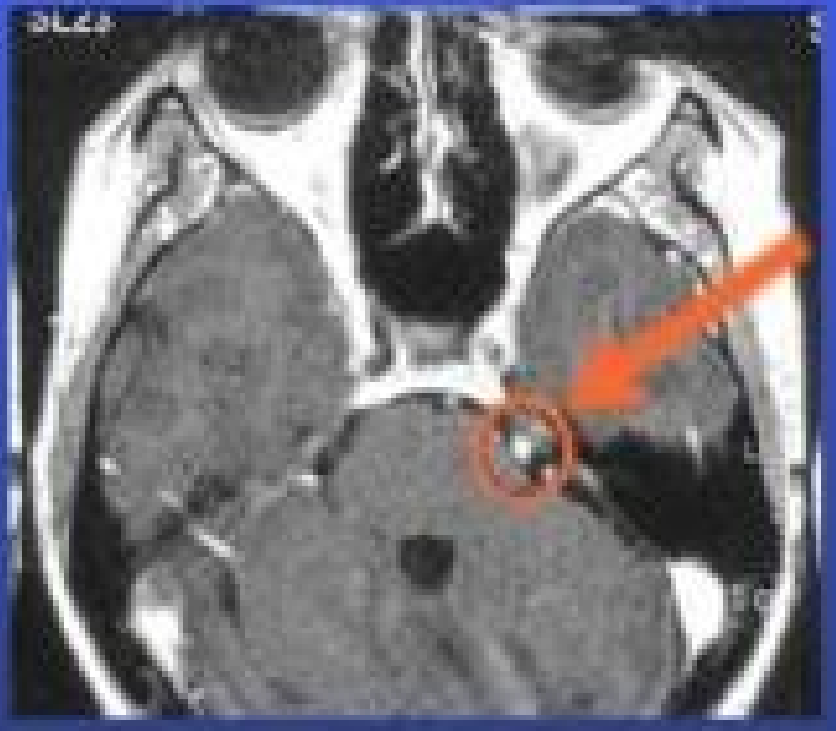
- Most TN patients undergo a standard magnetic resonance imaging scan to rule out a tumor or multiple sclerosis as the cause of their pain.

- This scan may or may not clearly show a blood vessel on the nerve.

- Magnetic resonance angiography, which can trace a colored dye that is injected into the bloodstream prior to the scan, can more clearly show blood vessel problems and any compression of the trigeminal nerve close to the brainstem.

Trigeminal Neuralgia

Coronal View
(Front to Back)



Axial View
(Top to Bottom)

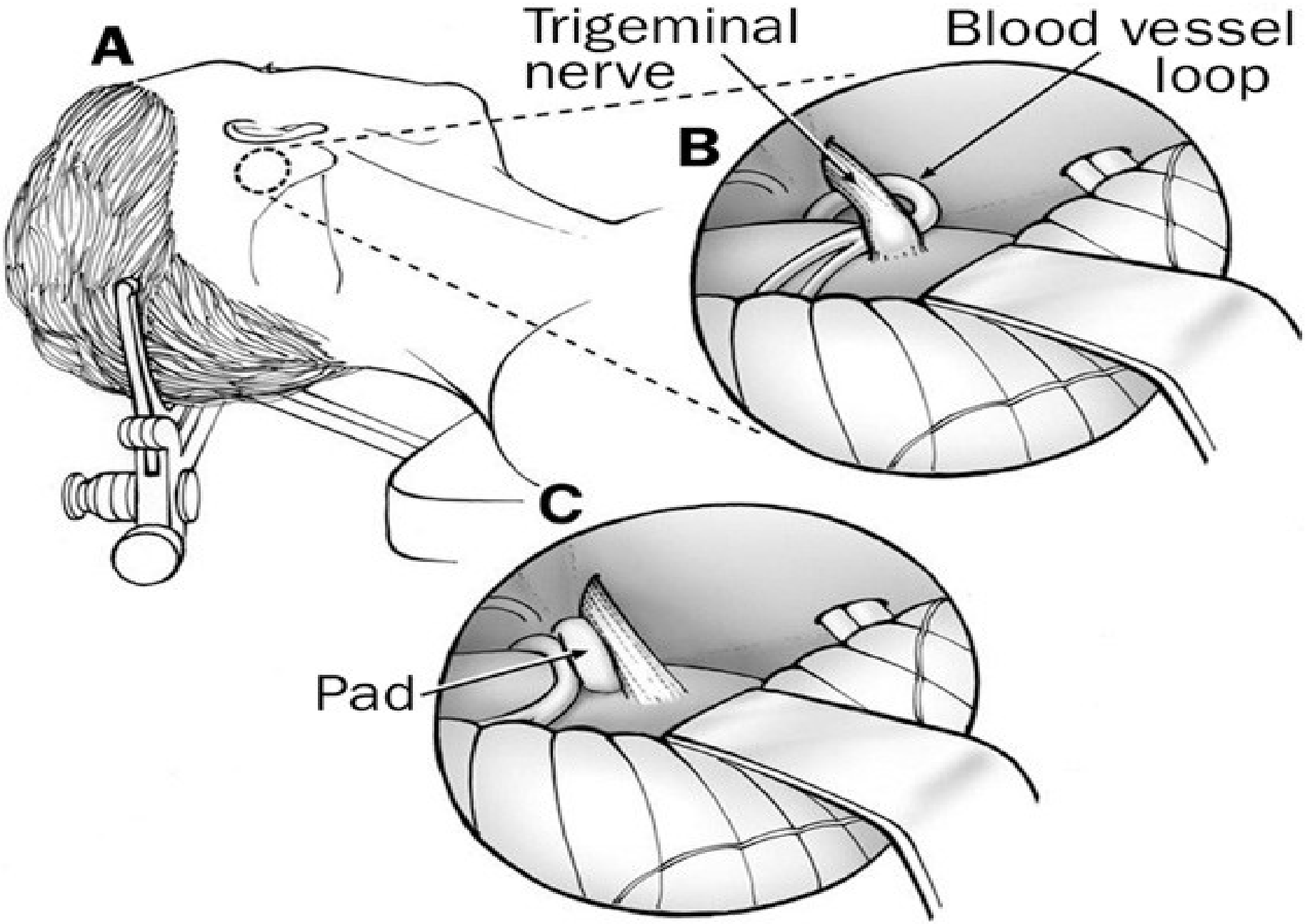
Medical Management

- Carbamazepine (Tegretol) is regarded as the most effective medical treatment.

- Additional agents that may benefit selected patients include phenytoin (Dilantin), baclofen, gabapentin (Neurontin), Trileptol and Klonazepin.

Surgical Management

- The surgical options for trigeminal neuralgia include peripheral nerve blocks or ablation, gasserian ganglion and retrogasserian ablative (needle) procedures, craniotomy followed by microvascular decompression (MVD), and stereotactic radiosurgery.


A
Trigeminal nerve
Blood vessel loop
B
C
Pad

Nurse's Role

- The nurse's role in assessing and managing patients' pain is vital and will vary enormously depending on where the patient is being managed.

- In the case of patients with TN, their pain is likely to be managed primarily through a specialist unit or pain service, which is multidisciplinary

- The nurse is therefore usually a specialist or consultant nurse and will have additional skills to be able to assess and manage pain of a complex nature.

- The specialist nurse role will vary from service to service but may include specialist assessment techniques, advising on pharmacological interventions and reviews, offering a variety of psychological and physical therapies, and being an educator.

Migraine / Headache

Migraine

- A recurrent throbbing headache that typically affects one side of the head and is often accompanied by nausea and disturbed vision.

There are several types of migraine headache, but most are characterized by severe pain on one or both sides of the head (which may move to the other side), nausea, dizziness and visual disturbances caused by dilation and constriction of the blood vessels in the head

Various Types of Headaches

- **Tension Headaches**

Also called chronic daily headaches or chronic non-progressive headaches, tension headaches are the most common type of headaches among adults and adolescents. These muscle contraction headaches cause mild to moderate pain and come and go over a prolonged period of time.

Mixed Headache Syndrome

- Also called transformed migraines, mixed headache syndrome is a combination of migraine and tension headaches. Both adults and children experience this type of headache.

Cluster Headaches

- The pain is located behind one eye or in the eye region, without changing sides.
- The term "cluster headache" refers to headaches that have a characteristic grouping of attacks.
- Cluster headaches occur one to three times per day during a cluster period, which may last two weeks to three months.

- The headaches may disappear completely (go into "remission") for months or years, only to recur.

Cluster headaches may involve pain around one eye, along with drooping of the lid, tearing and congestion on the same side as the pain

Sinus Headaches

- Sinus headaches are associated with a deep and constant pain in the cheekbones, forehead, or bridge of the nose.
- The pain usually intensifies with sudden head movement or straining and usually occurs with other sinus symptoms, such as nasal discharge, feeling of fullness in the ears, fever, and facial swelling.

Acute Headaches

- Seen in children, these are headaches that occur suddenly and for the first time and have symptoms that subside after a relatively short period of time.
- Acute headaches most commonly result in a visit to the pediatrician's office and/or the emergency room.

- If there are no neurological signs or symptoms, the most common cause for acute headaches in children and adolescents is a respiratory or sinus infection.

Hormone Headaches

- Headaches in women are often associated with changing hormone levels that occur during menstruation, pregnancy, and menopause. Chemically induced hormone changes, such as with birth control pills, also trigger headaches in some women.

Chronic Progressive Headaches

Also called traction or inflammatory headaches, chronic progressive headaches get worse and happen more often over time.

These are the least common type of headache, accounting for less than 5% of all headaches in adults and less than 2% of all headaches in kids. Chronic progressive headaches may be the result of an illness or disorder of the brain or skull.

Headaches

Sinus:
pain is usually behind the forehead and/or cheekbones

Cluster:
pain is in and around one eye

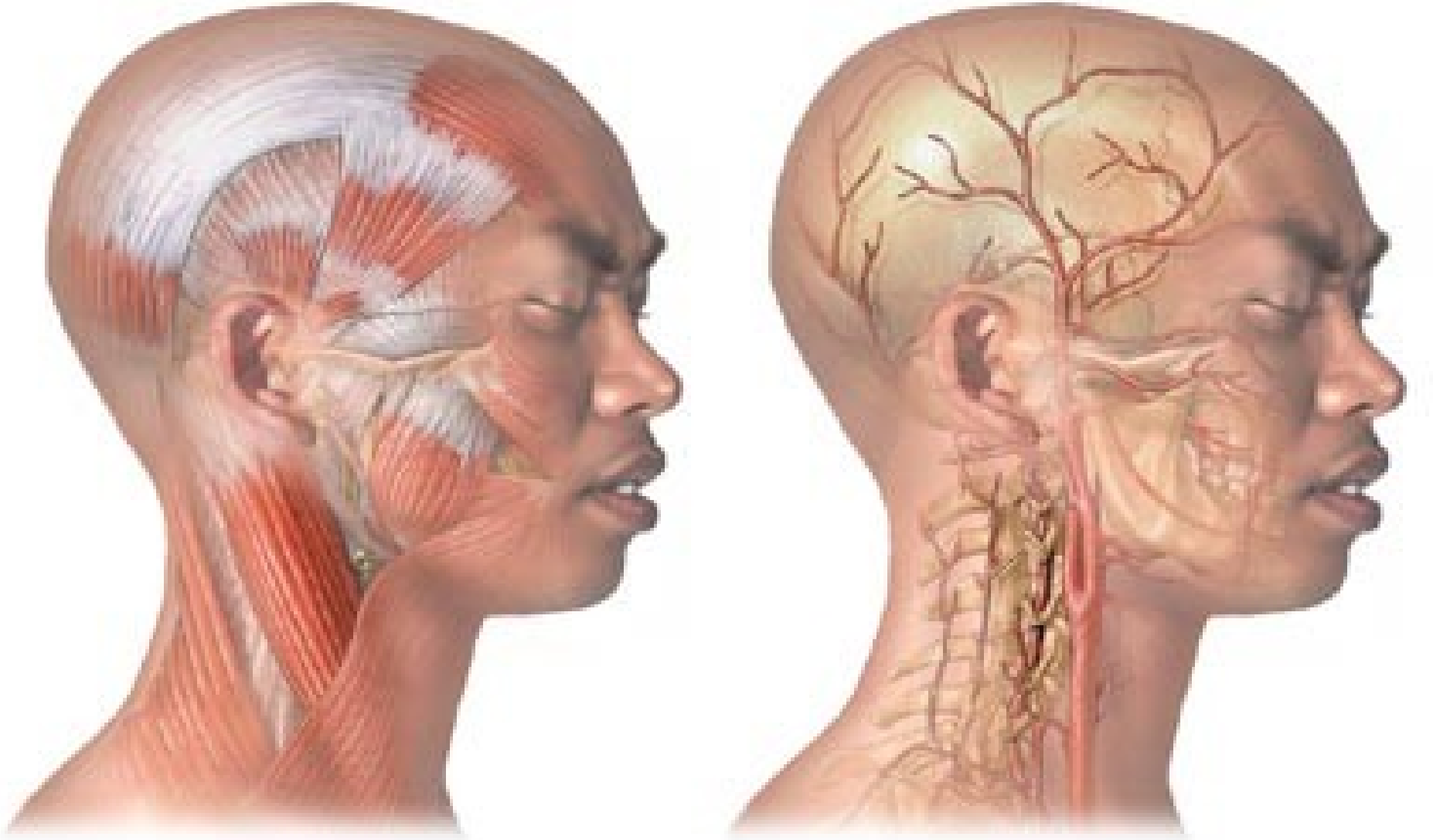
Tension:
pain is like a band squeezing the head

Migraine:
pain, nausea and visual changes are typical of classic form

What Causes Headaches

- Headaches that occur suddenly (acute-onset) are usually due to an illness, infection, cold, or fever.
- Other conditions that can cause an acute headache include sinusitis (inflammation of the sinuses), pharyngitis (inflammation or infection of the throat), or otitis (ear infection or inflammation).

Most headaches are caused by muscle contraction or blood flow problems



- In some cases, the headaches may be the result of a blow to the head (trauma) or rarely, a sign of a more serious medical condition.

- Common causes of tension headaches or chronic non progressive headaches include emotional stress related to family and friends, work, or school; alcohol use; skipping meals; changes in sleep patterns; excessive medication use; tension and depression. Other causes of tension headaches include eye strain and neck or back strain due to poor posture.

- Headaches can also be triggered by specific environmental factors that are shared in a family's household, such as exposure to secondhand tobacco smoke, strong odors from household chemicals or perfumes, exposure to certain allergens, or eating certain foods. Stress, pollution, noise, lighting, and weather changes are other environmental factors that can trigger headaches for some people.

Are Headaches Hereditary?

- Yes, headaches, especially migraines, have a tendency to run in families.
- Most children and adolescents (90%) who have migraines have other family members with migraines.

- When both parents have a history of migraines, there is a 70% chance that the child will also develop migraines.
- If only one parent has a history of migraines, the risk drops to 25%-50%.

Precipitants of Migraine Headache

Allergies and allergic reactions

Bright lights, loud noises, and certain odors or perfumes

Physical or emotional stress

Changes in sleep patterns or irregular sleep

Smoking or exposure to smoke

Skipping meals or fasting

Alcohol

Menstrual cycle fluctuations, birth control pills, hormone fluctuations during menopause onset.

Foods containing tyramine (red wine, aged cheese, smoked fish, chicken livers, figs, and some beans), monosodium glutamate (MSG), or nitrates (like bacon, hot dogs, and salami).

Other foods such as chocolate, nuts, peanut butter, avocado, banana, citrus, onions, dairy products, and fermented or pickled foods.

Triggers do not always cause migraines, and avoiding triggers does not always prevent migraines.

Treatment Used for Various Types of Headaches

- Headache treatment depends upon the frequency, severity, and symptoms of your headache.

- Acute treatment refers to medicines you can take when you have a headache to relieve the pain immediately.

- Preventive treatment refers to medicines you can take on a regular (usually daily) basis to prevent headaches in the future

Pain Reliever

- A pain reliever may be recommended first for the treatment of tension type headache. These drugs include:

- Aspirin

- Acetaminophen (eg, Tylenol®)

- Nonsteroidal antiinflammatory drugs (NSAIDs) such as ibuprofen (eg, Motrin or Advil), indomethacin, or naproxen (eg, Naprosyn or Aleve).

CHRONIC DAILY HEADACHE TREATMENT

- The treatment of chronic migraine should focus on preventive therapy while avoiding migraine triggers and limiting the use of acute headache medications to avoid medication overuse headache.
- Preventive treatments include medicines, behavioral therapy, or physical therapy. Management often requires the simultaneous use of these different treatments.

CLUSTER HEADACHE TREATMENT

- Most people who suffer with cluster headaches will need both acute and Preventive medicines.

- **Acute therapy:** Inhaling 100 percent oxygen through a face mask for 20 minutes.
- Oxygen treatment is often recommended first because it has few side effects.

- Triptans are medicines often used to treat migraines.
- Triptans (especially injections of sumatriptan) can stop a cluster headache, often within 20 to 30 minutes.
- If you are unable to give yourself an injection, options include inhaled (nasal spray) sumatriptan or zolmitriptan.

- If neither oxygen nor triptans are helpful, alternative choices include octreotide (an injection), lidocaine (liquid applied inside the nose), and ergotamine (a tablet dissolved under the tongue).

Preventive Treatment

- Preventive therapy is usually started as soon as possible and taken every day when a new cluster of headaches develops.
- Some people require a combination of medicines.
- Preventive medicines may be gradually stopped after the cluster has passed, but can be restarted if symptoms recur.

- The best studied medicines include:
- Verapamil, a calcium channel blocker, is a pill that is effective and has few side effects. The dose may be slowly increased as needed.
- The glucocorticoid drug prednisone (a pill) is an effective preventive therapy.
- However, long-term use of glucocorticoids is not recommended due to the risk of side effects.

COMPLEMENTARY HEADACHE TREATMENT

Lifestyle changes

- Stop smoking
- Reduce the amount of alcohol you drink
- Decrease or stop drinking/eating caffeine
- Eat and sleep on a regular schedule
- Exercise several times per week

Physical Therapy

- Some people with frequent headaches benefit from working with a physical therapist who has a special interest in headaches.
- This treatment may be used if you do not respond or only partially or temporarily respond to medicines, or if you cannot use medicines (eg, women who are pregnant or breastfeeding).

Acupuncture

- Acupuncture involves inserting hair-thin, metal needles into the skin at specific points on the body.
- It causes little to no pain. Electrical stimulation is sometimes applied to the acupuncture needle.

- Acupuncture has not been proven to improve tension-type or chronic daily headaches. However, people who do not want to try or who cannot tolerate other treatments may try using acupuncture

Behavioral Therapy

- Headaches can be triggered or worsened by stress, anxiety, depression, and other psychological factors.
- Furthermore, living with headache pain can cause difficulties in relationships, at work or school, and with general day to day living.

Nursing Responsibilities

- Make sure the duration / episode problems, who have been consulted, and drug and / or what therapy has been used

- Thorough complaints of pain, record itensitasnya (on a scale 0-10), characteristics (eg, heavy, throbbing, constant) location, duration, factors that aggravate or relieve.

- Note the possible pathophysiological characteristic, such as brain / meningeal /sinus infection, cervical trauma, hypertension, or trauma.

- Observe for nonverbal signs of pain, are like: facial expression, posture, restlessness, crying / grimacing, withdrawal, diaphoresis, changes in heart rate / breathing, blood pressure.
- Assess the relationship of physical factors / emotional state of a person.
- Evaluation of pain behavior.

- Note the influence of pain such as: loss of interest in life, decreased activity, weight loss.

- Assess the degree of making a false step in person from the patient, such as isolating themselves.

- Determine the issue of a second party to the patient / significant others, such as insurance, spouse / family.

- Discuss the physiological dynamics of tension / anxiety with the patient / person nears.

- Instruct patient to report pain immediately if the pain arises.
- Place on a rather dark room according to the indication.
- Suggest to rest in a quiet room.
- Give cold compress on the head.

- Massage the head / neck / arm if the patient can tolerate the touch.

- Use the techniques of therapeutic touch, visualization, biofeedback, hypnosis itself, and stress reduction and relaxation techniques to another.

.

- Instruct the patient to use a positive statement "I am cured, I'm relaxing, I love this life". Instruct the patient to be aware of the external-internal dialogue and say "stop" or "delay" if it comes up negative thoughts.

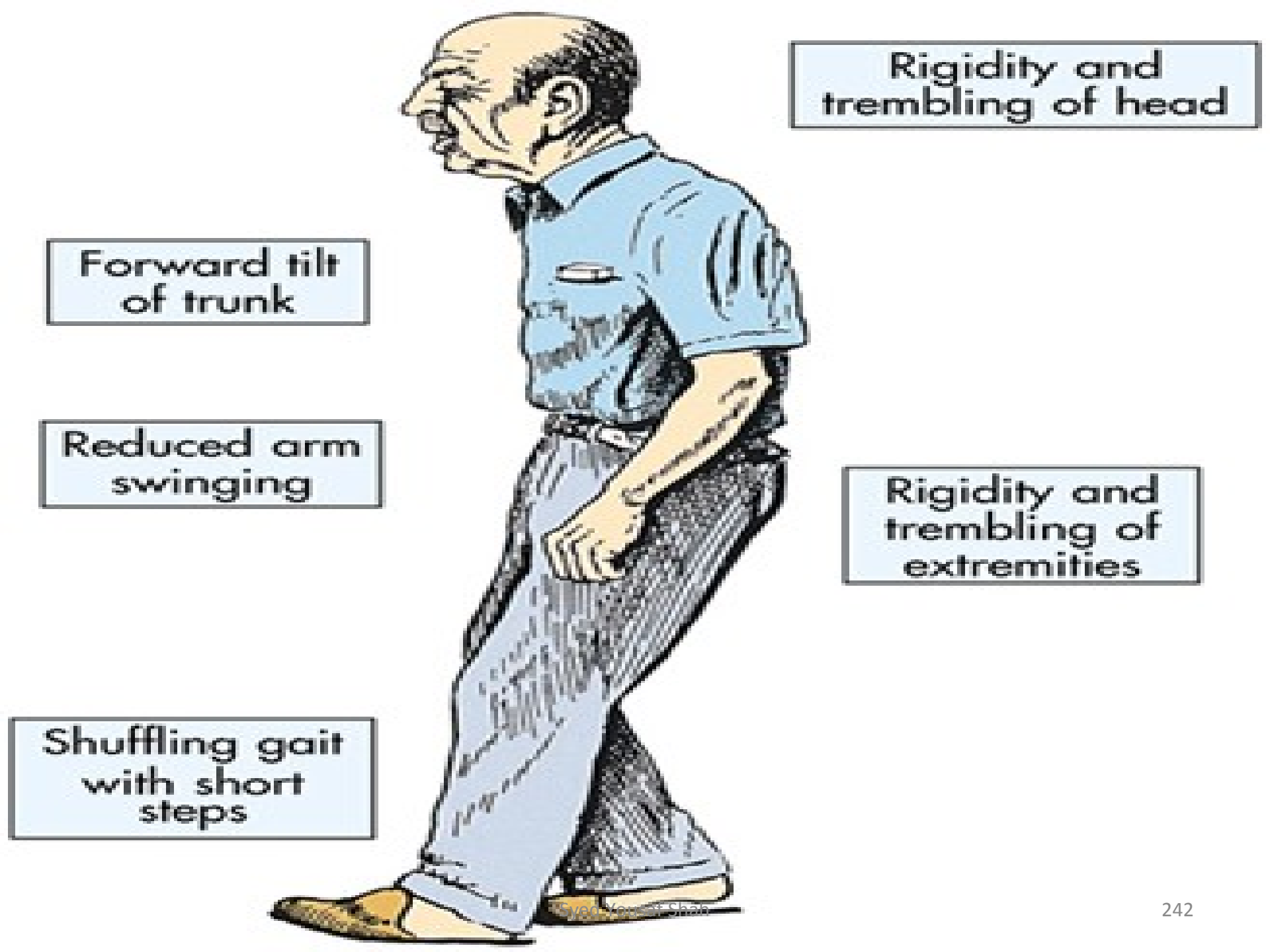
- Observe for nausea / vomiting. Give the ice, drinks containing carbonate as indicated

Chronic Neurological Disorders

Parkinson’s disease

INTRODUCTION

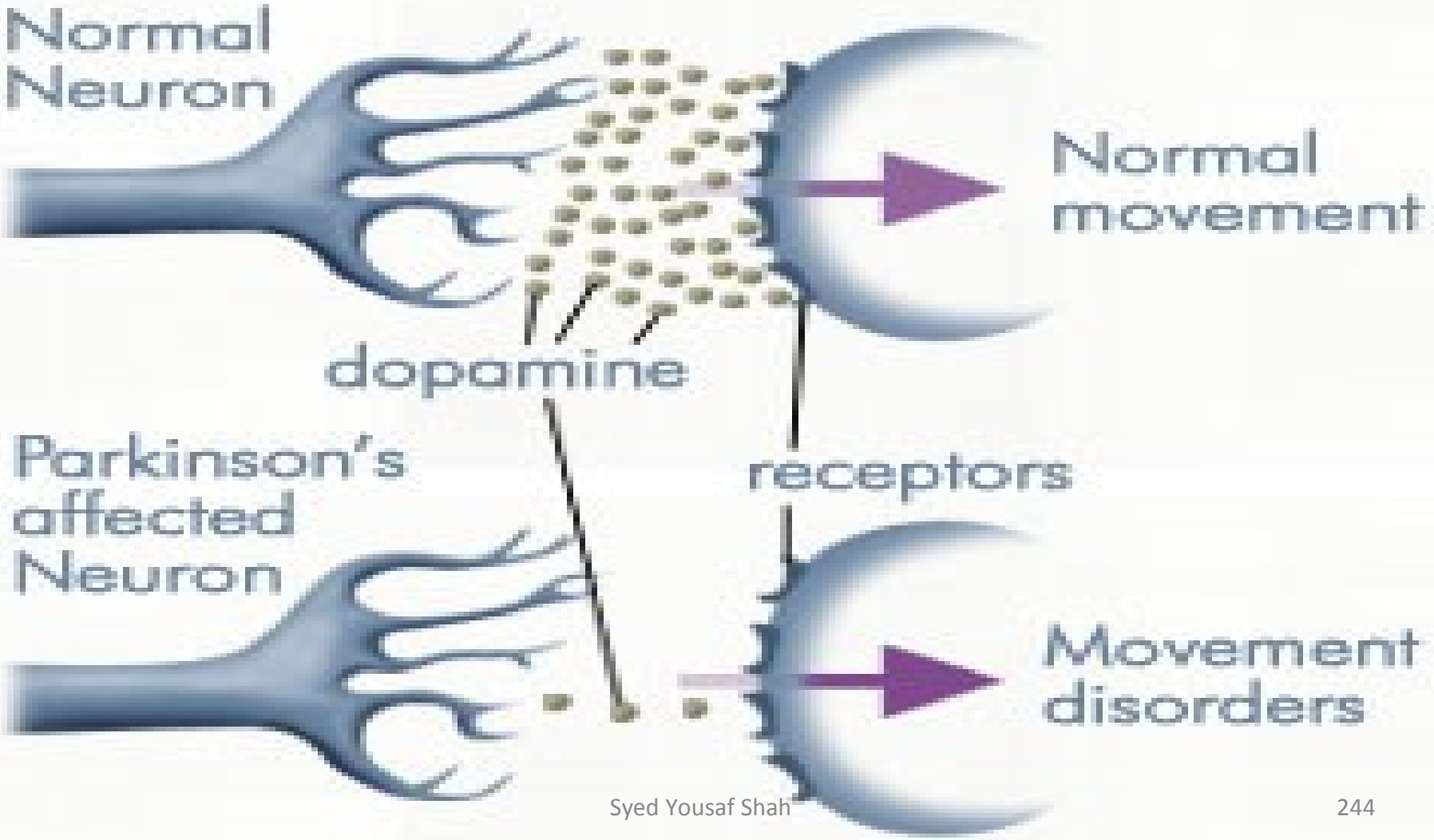
- A progressive disease of the nervous system marked by tremor, muscular rigidity, and slow, imprecise movement, chiefly affecting middle-aged and elderly people.
- It is associated with degeneration of the basal ganglia of the brain and a deficiency of the neurotransmitter dopamine.


Rigidity and trembling of head
Forward tilt of trunk
Reduced arm swinging
Rigidity and trembling of extremities
Shuffling gait with short steps

ETIOLOGY

- Nerve cells use a brain chemical called dopamine to help control muscle movement.
- Parkinson's disease occurs when the nerve cells in the brain that make dopamine are slowly destroyed.
- Without dopamine, the nerve cells in that part of the brain cannot properly send messages.
- This leads to the loss of muscle function. The damage gets worse with time.

Dopamine levels in a normal and a Parkinson's affected neuron.



Medical Treatment for Parkinson's Disease

- There is no cure for Parkinson's disease. Treatment centers on the administration of **medication to relieve symptoms**.

Medications to Treat Parkinson's

- **Levodopa** and carbidopa combined (Sinemet®) is the mainstay of Parkinson's therapy.
- Levodopa is rapidly converted into dopamine by the enzyme dopa decarboxylase (DDC), which is present in the central and peripheral nervous systems.
- Much of levodopa is metabolized before it reaches the brain.

Parkinson’s Disease Surgery

- Not every Parkinson's patient is a good candidate for surgery.
- For example, if a patient never responded to, or responded poorly to levodopa/carbidopa, surgery may not be effective.
- **Only about 10 percent** of Parkinson's patients are estimated to be suitable candidates for surgery.

- There are three surgical procedures for treating Parkinson's disease:
- Ablative surgery.
- Stimulation surgery or deep brain stimulation (DBS).
- Transplantation or restorative surgery.

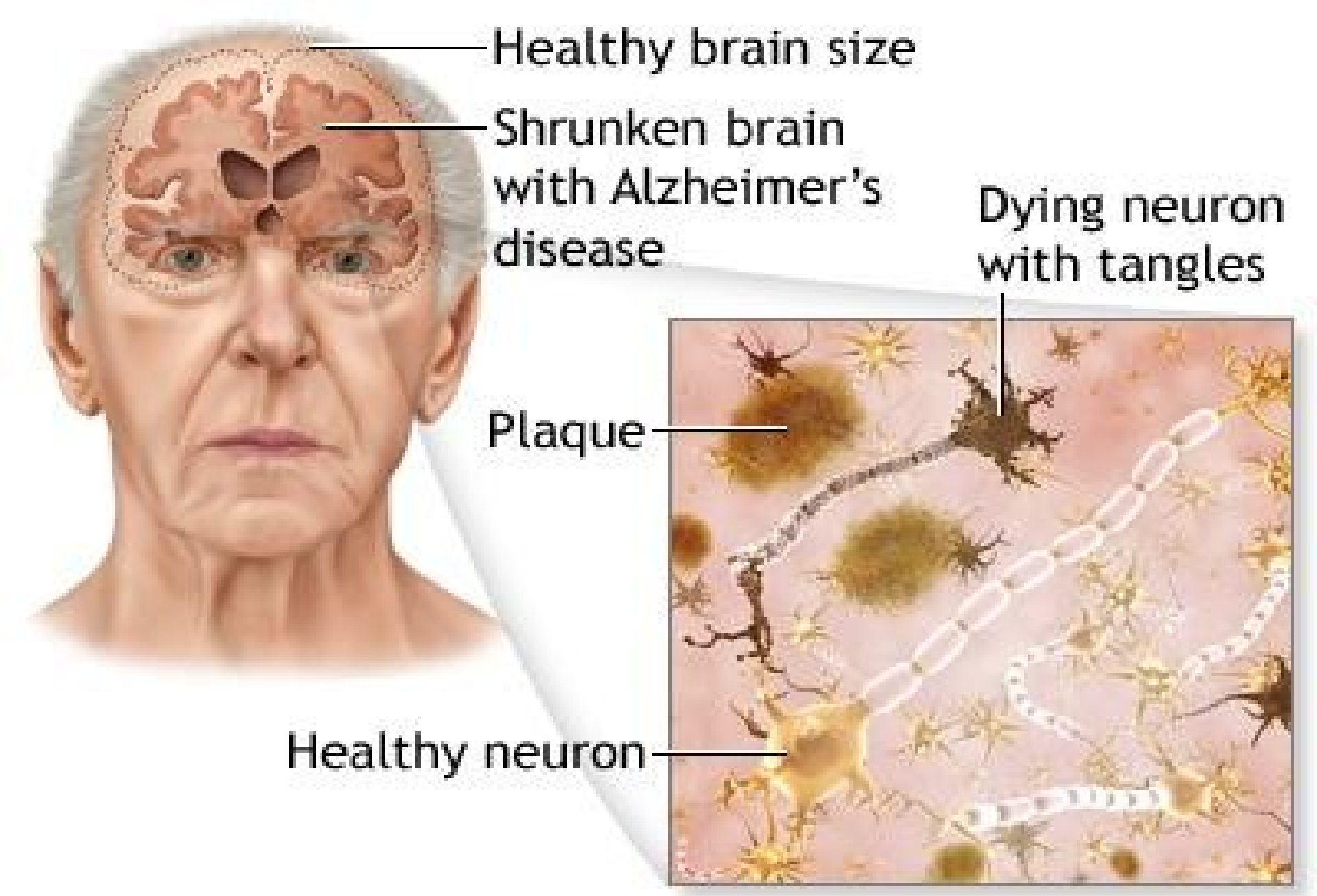
Nurse's Role

- examine existing mobility and observation of an increase in damage
- do an exercise program increases muscle strength.
- encourage hangan bath and massage the muscle.
- help clients perform ROM exercises, self-care according to tolerance

Alzheimer's Disease

Alzheimer’s Disease

- Alzheimer's disease is a progressive disease that destroys memory and other important mental functions.
- In Alzheimer's disease, the brain cells themselves degenerate and die, causing a steady decline in memory and mental function.


Healthy brain size
Shrunken brain with Alzheimer's disease
Dying neuron with tangles
Plaque
Healthy neuron

Symptoms

- At first, increasing forgetfulness or mild confusion may be the only symptoms of Alzheimer's disease that you notice.
- But over time, the disease robs you of more of your memory, especially recent memories.

- **Brain changes associated with Alzheimer's disease lead to growing trouble with:**
- Memory
- Speaking and writing
- Thinking and reasoning
- Making judgments and decisions
- Planning and performing familiar tasks
- Changes in personality and behavior

Causes

- The causes of Alzheimer's are not yet fully understood.
- Scientists believe that for most people, Alzheimer's disease results from a combination of genetic, lifestyle and environmental factors that affect the brain over time.

Risk factors

- Increasing age is the greatest known risk factor for Alzheimer's.
- **Family history and genetics**
- **Sex (**Women may be more likely than are men to develop
- **Mild cognitive impairment**
- **Past head trauma**
- **Lifestyle and heart health**

Complications

- **Pneumonia and other infections**
- **Injuries from falls.**

Tests and Diagnosis

- Physical and neurological exam
- Lab tests
- Mental status testing
- Neuropsychological testing
- Brain imaging

Treatments and Drugs

- Cholinesterase inhibitors
- Memantine (Namenda)
- Creating a safe and supportive environment
- Exercise
- Nutrition

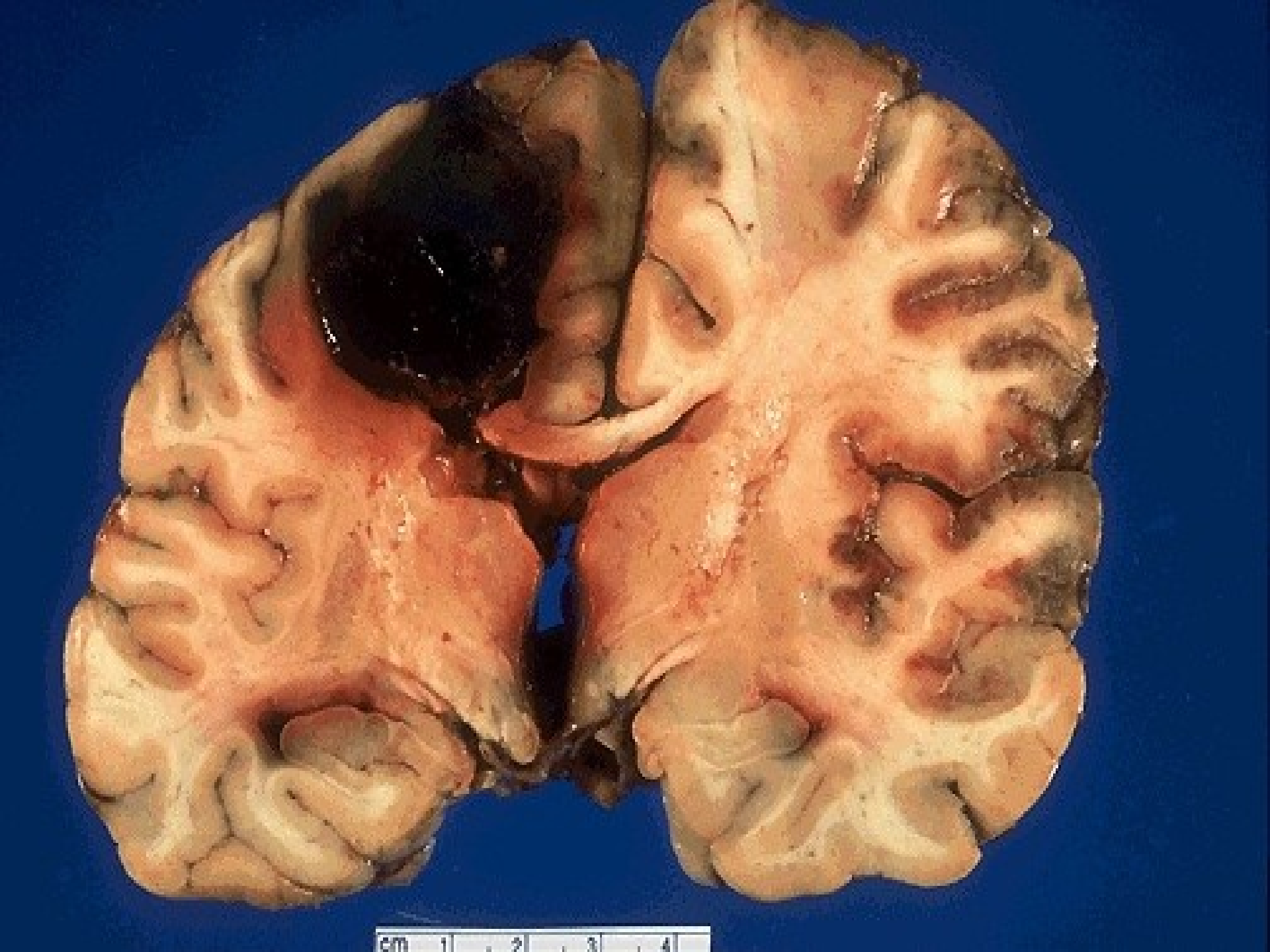
Prevention

- Right now, there's no proven way to prevent Alzheimer's disease.
- Research into prevention strategies is ongoing. The strongest evidence so far suggests that you may be able to lower your risk of Alzheimer's disease by reducing your risk of heart disease

Brain damage and special states of altered consciousness

Brain Damage

- Injury to the brain that impairs its functions, especially permanently.


cm
1
2
3
4

Causes of Brain Damage

- Anoxia (an extreme form of hypoxia)
- Perfusion failure.

HYPOXIC-ISCHEMIC BRAIN INJURY

- Hypoxic-ischemic brain injury is a diagnostic term that encompasses a complex constellation of pathophysiological and molecular injuries to the brain induced by hypoxia, ischemia, cytotoxicity, or combinations of these conditions

(Busl and Greer 2010).

- The typical causes of hypoxic-ischemic brain injury – cardiac arrest, respiratory arrest, near-drowning, near-hanging, and other forms of incomplete suffocation, carbon monoxide and other poisonous gas exposures, and perinatal asphyxia – expose the entire brain to potentially injurious reductions of oxygen (i.e., hypoxia) and/or diminished blood supply (ischemia).

Symptoms

- Loss of consciousness for a few seconds to a few minutes
- No loss of consciousness, but a state of being dazed, confused or disoriented
- Headache
- Nausea or vomiting
- Fatigue or drowsiness
- Difficulty sleeping

- Blurred vision
- Ringing in the ears,
- A bad taste in the mouth or changes in the ability to smell
- Sensitivity to light or sound
- Memory or concentration problems
- Mood changes or mood swings
- Feeling depressed or anxious

Persistent vegetative state

- A **persistent vegetative state** is a disorder of consciousness in which patients with severe brain damage are in a state of partial arousal rather than true awareness.

Locked-in syndrome

- **Locked-in syndrome** (**LIS**) is a condition in which a patient is aware but cannot move or communicate verbally due to complete paralysis of nearly all voluntary muscles in the body except for the eyes

Brain Stem Death

- **Brain stem death** is a clinical syndrome defined by the absence of reflexes with pathways through the brain stem - the “stalk” of the brain which connects the spinal cord to the mid-brain,cerebellum and cerebral hemispheres – in a deeply comatose, ventilator-dependent, patient

Clinical Criteria for Determining Brain Death

- Loss of consciousness
- Absent motor response to painful stimulus
- Absent brainstem reflexes
- Apnea
- Acute CNS catastrophe
- Absent electrolyte or acid-base imbalance
- Absent drug intoxication or poisoning

NURSING CARE

- **Maintaining or decreasing intracranial pressure (ICP)**
  - Maintaining ICP at <20 mm Hg
  - Draining cerebrospinal fluid (CSF)
  - Maintaining normocapnia rather than inducing hyperventilation
  - Administering sedation
  - Administering mannitol
  - Elevating the head of the bed (HOB) to 30 degrees

- **Controversial treatments for refractory intracranial hypertension**
  - Inducing moderate hypothermia
  - Administering hypertonic saline
  - Administering high-dose barbiturates
  - Hyperventilation

- **Maintaining adequate cerebral perfusion pressure (CPP) or increasing CPP**
  - Maintaining CPP between 50-70 mmHg
  - Administering norepinephrine
  - Elevation of the HOB 0-30 degrees
  - CSF drainage

- **Monitoring modalities**
  - Continuous ICP monitoring and display
  - Continuous CCP monitoring and display
  - Continuous brain tissue oxygen monitoring and display
  - Monitoring and displaying brain temperature
- **Preventing deep venous thrombosis**
  - Pharmacologic treatment
  - Mechanical prophylaxis

- **Maintaining adequate nutrition**
  - Early initiation of adequate nutrition
  - Continuous intragastric feeding
- Maintaining glycemic control through intensive insulin therapy
- **Preventing seizures**
  - Administering antiepileptic drugs
  - Monitoring the electroencephalogram

Major Outcomes Considered

- Glascow Coma Scale score
- Intracranial pressure
- Cerebral perfusion pressure
- Brainstem herniation
- Complications of treatment
- Deep venous thrombosis
- Disability
- Mortality

References

1. Smeltzer, S. C., & Bare, B. G. (2000). *Text book of medical-surgical nursing* (9th ed.). Philadelphia: Lippincott.

2. Ross, & Wilson, K.J. (2002). *Anatomy and physiology in health and illness.*(7th ed.). Hong Kong: Livingstone.

3. Brune, B. (July 2001). *Deep vein thrombosis prophylaxis: The effectiveness and implications of using below knee or thigh length graduated compression stocking. (Vol. 30). Heart and lung 277-284.*

4. Dolan, J.T. (1991). *Critical care nursing: Clinical management through nursing process* Philadelphia: Davis.