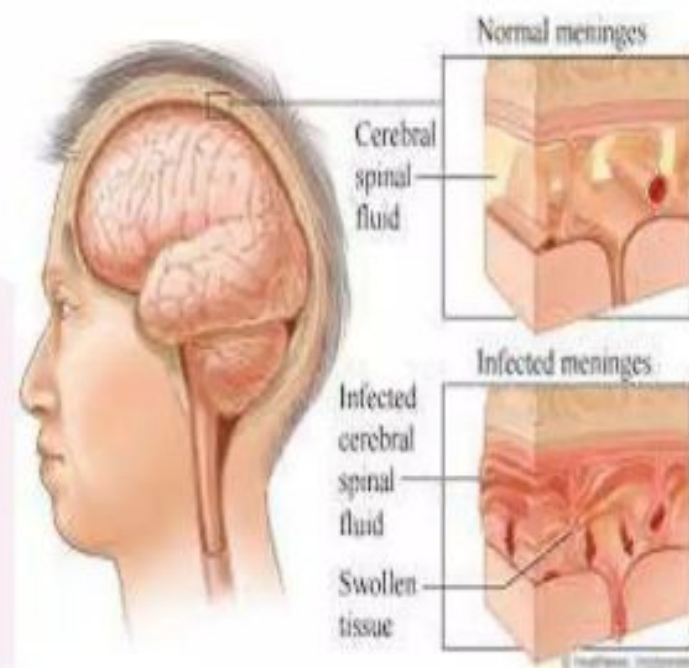
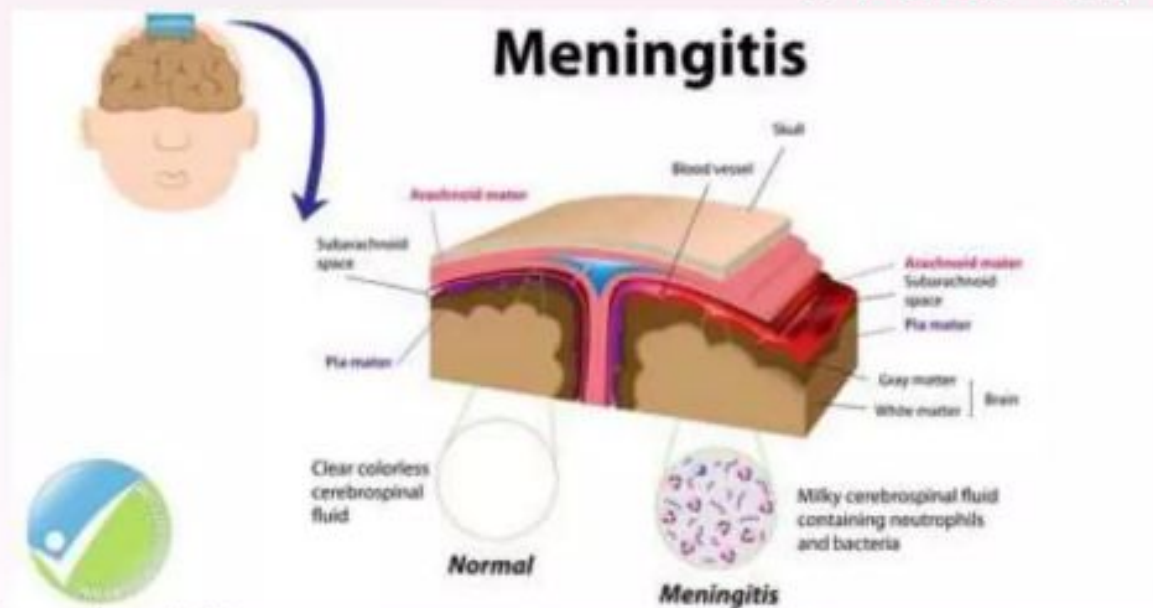
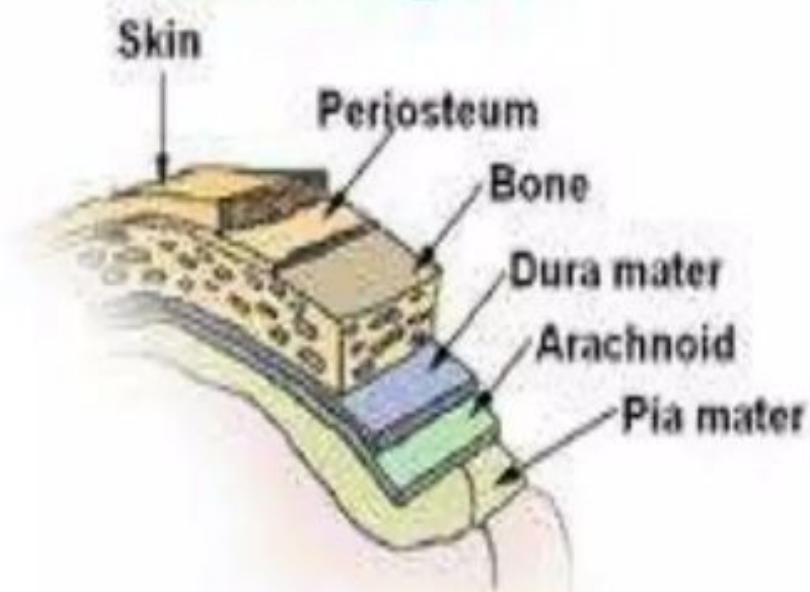


MENINGITIS



Anatomy

Meninges



Dura mater – outer layer lining skull

Arachnoid (mater) – contains blood vessels

Subarachnoid space – filled with CSF

Pia mater – covers brain

The Meninges

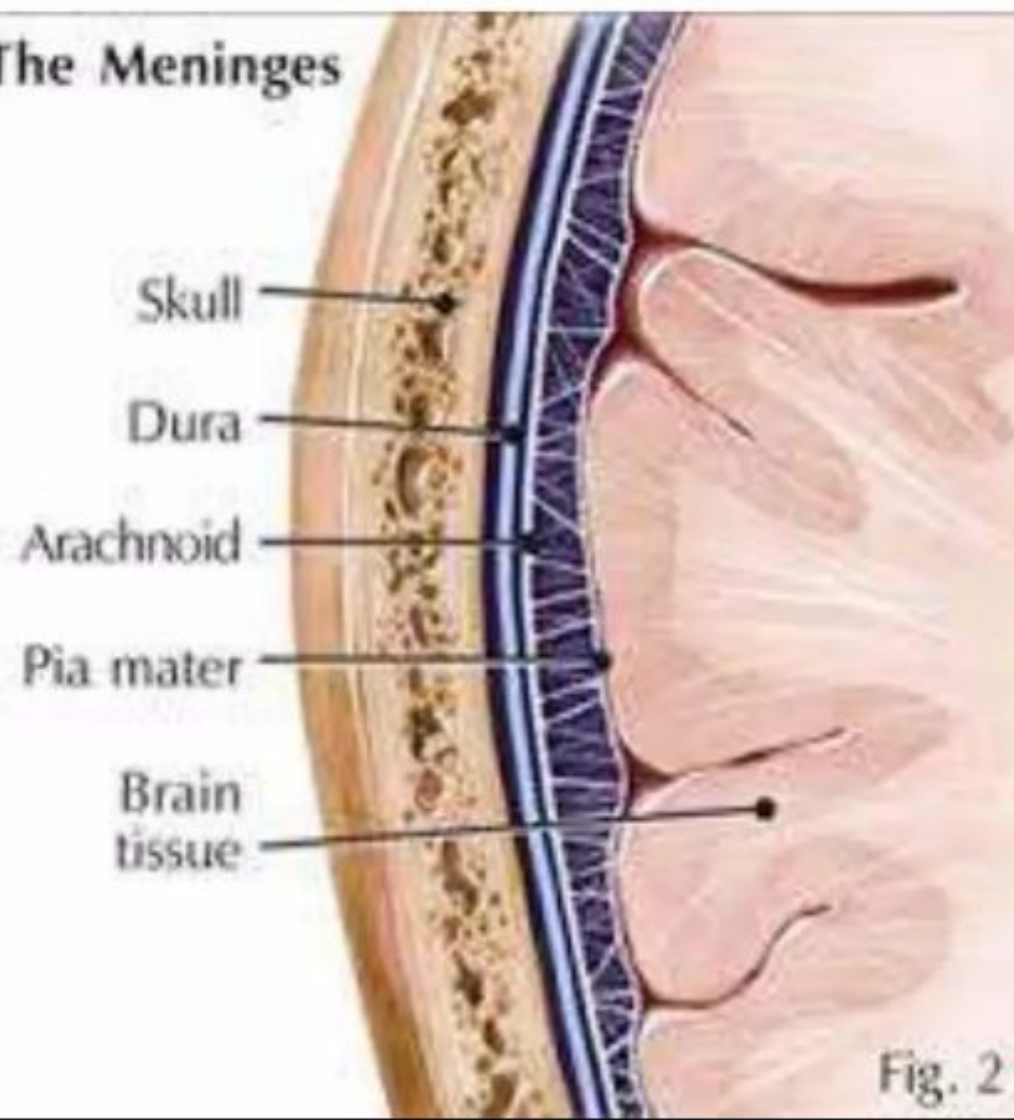


Fig. 2

Introduction:

- @ It is an inflammation of the meninges , the protective membrane that surrounds the brain and spinal cord.
- @ Mainly the pia and arachnoid membranes are involved in this infectious disorder.
- @ The subarachnoid space between these meninges contains CSF that may reflect the signs and symptoms of meningitis.

Risk factors

- @ Age of 60 years or greater
- @ Age of 5 years or less
- @ Diabetes mellitus, renal or adrenal insufficiency, hypoparathyroidism, or cystic fibrosis
- @ Immunosuppression, which increases the risk of opportunistic infections and acute bacterial meningitis

Risk factors...

- @ Human immunodeficiency virus (HIV) infection
- @ Over Crowding
- @ Splenectomy and sickle cell disease, which increase the risk of meningitis secondary to encapsulated organisms
- @ Alcoholism and cirrhosis
- @ Recent exposure to others with meningitis, with or without prophylaxis

Risk factors...

- ⊙ Contiguous infection (eg, sinusitis, otitis media, mastoiditis)
- ⊙ Dural defect (eg, traumatic, surgical, congenital)
- ⊙ Intravenous (IV) drug abuse
- ⊙ Bacterial endocarditis
- ⊙ Ventriculoperitoneal shunt

Classification: Micro organisms

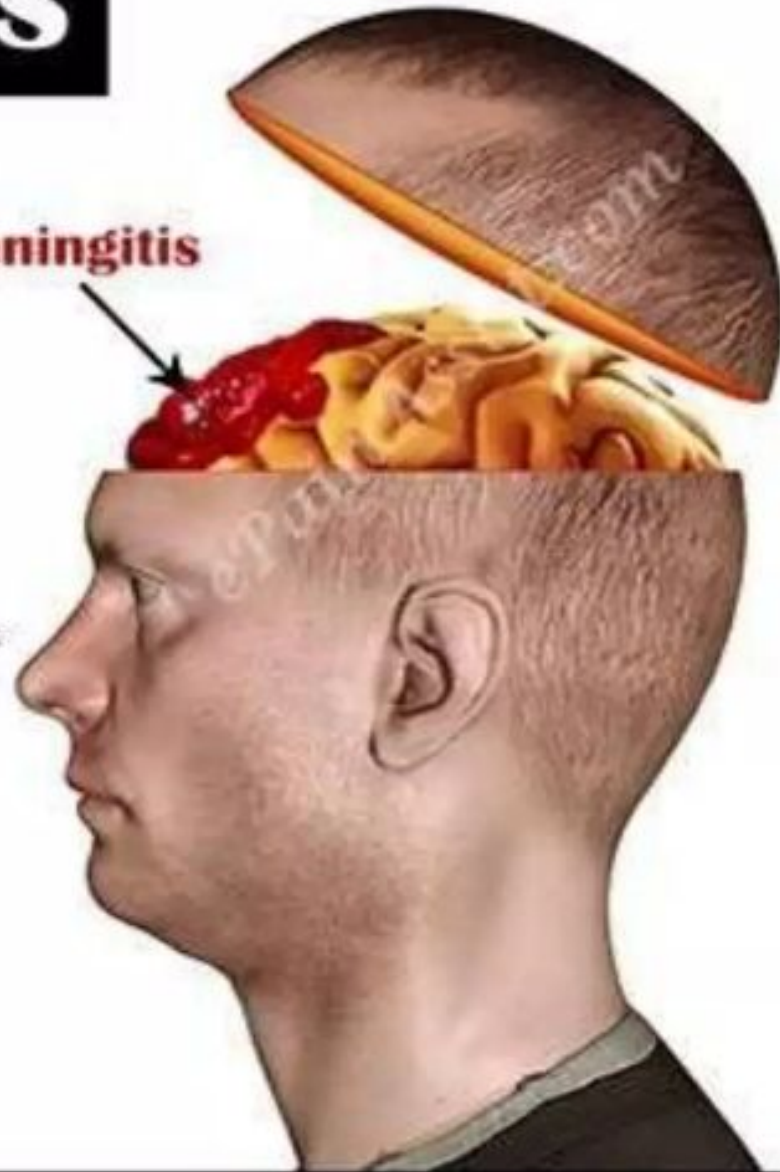
- ⊙ **Viral meningitis** is more common than bacterial meningitis, although rarely life threatening.
 - Non polio entro virus, Mumps virus, Herpes, Measles virus, Influenza virus.
- ⊙ **Bacterial meningitis**, although rare, may be fatal.
 - Neisseria Meningitides, (Meningococcal) Haemophilus Influenza Type B, Streptococcus Pneumonia (Pneumococcal
- ⊙ **Fungal meningitis:** Cryptococcus, Histoplasma
- ⊙ **Parasitic Meningitis, Amebic Meningitis**

Meningitis

Causes

- Bacterial Meningitis
- Viral Meningitis
- Parasitic Meningitis
- Fungal Meningitis
- Non-Infectious Meningitis

Meningitis



Classification: Anatomical

Pachymeningitis

- Inflammation of the dura (less common)

Leptomeningitis

- Inflammation of the arachnoid tissue and subarachnoid space (more common)

Classification

Aseptic Meningitis

- In aseptic meningitis, bacteria are not the cause of the inflammation; the cause is viral or secondary to lymphoma, leukemia, or brain abscess.

Septic Meningitis

- Septic meningitis refers to meningitis caused by bacteria, most commonly *Neisseria meningitis*, although *Haemophilus influenzae* and *Streptococcus pneumoniae* are also causative agents.

Classification: Duration

- @ **Acute meningitis** :Symptoms develop over the course of a few hours to days and include headache, sensitivity to light, and neck stiffness and is life-threatening .
- @ **Chronic meningitis**: is a constellation of signs and symptoms of meningeal irritation associated with CSF pleocytosis that persists for longer than 4 weeks.

Classification

- @ Infectious
- @ Non infectious

Pathophysiology:

Meningeal infection generally originate in one of two ways

Through blood stream as
A consequences of other
infection

Through direct infection after
traumatic injury/ invasive
procedures.

The causative organism enters the blood stream

Crosses blood brain barrier

Pathophysiology:

Leads to an inflammatory reaction in the meninges



Inflammation of the subarachnoid space and pia mater occurs



CSF fluids flow in the subarachnoid space, there inflammatory material
From meningeal tissue enters and accumulate in subarachnoid, leads to
Increase in CSF cell count.



This inflammatory reaction in meninges leads to fever, headache
Nuchal rigidity, kerning's and brudziniski's sign

CLINICAL MANIFESTATION:

- ⊙ Headache and fever. fever remain high throughout the course of illness and headache is result of meningeal irritation.
- ⊙ Nuchal rigidity
- ⊙ Positive kerning's and brudzinski sign
- ⊙ Photophobia, altered mental status, confusion.
- ⊙ Nausea vomiting, joint pain, seizure
- ⊙ **Symptoms for children may also include:**
 - fever
 - high-pitched cry
 - pale, blotchy skin colour
 - fretful and fussy
 - arching back
 - difficult to wake

CLINICAL MANIFESTATION...

- @ Meningeal symptoms (eg, headache, nuchal rigidity, photophobia).
- @ Pleocytosis (an increased number of white blood cells) in the cerebrospinal fluid (CSF).

KERNIG'S SIGN

Elicitation: Flexing the patient's hip 90 degrees then extending the patient's knee causes pain.



BRUDZINSKI'S NECK SIGN

Elicitation: Flexing the patient's neck causes flexion of the patient's hips and knees.





Kernig's sign



Diagnostic Evaluation:-

- ⊙ **lumbar puncture (spinal tap)** : Leukocyte count increased to 90% in bacterial infection and 50% in viral infection
- ⊙ **Blood testing** : to identify the causative organism
- ⊙ **Computed tomography scan**
- ⊙ **MRI**

Treatment:

- @ Anti-Biotic: penicillin, ampicillin associated with dexamethasone by I.V route
- @ Hydantoins: Phenytoin
- @ Anti- Fungal: Amphotericin B
- @ Anti T.B drug
- @ Anti pyretic and NASIDS

Prevention

- ⊙ **Haemophilus vaccine (HiB vaccine)** in children will help prevent one type of meningitis.
- ⊙ The **pneumococcal conjugate vaccine** is now a routine childhood immunization and is very effective at preventing pneumococcal meningitis.
- ⊙ **Household members** and others in close contact with people who have meningococcal meningitis should receive **preventive antibiotics** to avoid becoming infected themselves.

Prevention

The meningococcal vaccination is recommended for:

- ✓ Adolescents ages 11 - 12 and adolescents entering high school (about age 15) who have not already received the vaccination.
- ✓ All college freshmen who have not been vaccinated and are living in dorms.
- ✓ Children age 2 and older who do not have their spleen or who have other problems with their immune system.
- ✓ Those traveling to countries where diseases caused by meningococcus are very common
- ✓ Some communities conduct vaccination campaigns after an outbreak of meningococcal meningitis.

Encephalitis

- ⓐ Encephalitis is an acute inflammatory process of the brain tissue.
- ⓐ The inflammation causes the brain to swell, which leads to changes in the person's neurologic condition, including mental confusion and seizures.

CAUSES:

- @ Viruses are the leading cause of encephalitis. These include herpes simplex virus and rabies.
- @ It can also occur following infection by disease-carrying agents including ticks (Lyme disease and Rocky Mountain Spotted Fever), mosquitoes (West Nile virus, St. Louis encephalitis), and cats (toxoplasmosis and cat-scratch disease)

TYPES:

- ② **Viral encephalitis:** accounting for majority of cases, caused by direct infection of gray matter contain cell, result in perivascular inflammation and neuronal destruction
- ② **Post ischemic encephalitis:** It occur due to brain inflammation following a CVA. In patient with ischemia, inflammation can result in secondary brain injury and micro vascular occlusion can caused by activated leukocyte , result in increased ICP and compromised cerebral perfusion.

TYPES...

- ④ **Herpes simplex encephalitis:** result from reactivation of the virus that has been dormant in the cranial or reinfection. Direct spread to the brain by olfactory and trigeminal nerve with type1 virus and type 2 is common for causing disease in neonate born to mother with infection during pregnancy.
- ④ **Post infectious:** caused by virus or bacteria, but organism do not directly affect the neural cells ,leads to perivascular infection and demyelination do occur in the cerebral tissue.
- ④ **Cytomegalo virus encephalitis:** considered in patient with HIV infection.

Clinical Manifestation:

- @ Headache
- @ Sensitivity to light
- @ Neck stiffness
- @ Sleepiness or lethargy
- @ Increased irritability
- @ Seizures
- @ Skin rashes
- @ Difficulty talking and speech changes
- @ Changes in alertness, confusion, or hallucinations
- @ Loss of energy
- @ Loss of appetite
- @ Unsteady gait

Clinical Manifestation...

- @ In severe cases, an individual may experience :-
 - @ **loss of muscle power in the arms and legs**
 - @ **double vision**
 - @ **impairment of speech and/or hearing**

DIAGNOSIS

- Ⓢ X-ray -
- Ⓢ Magnetic Resonance Imaging (MRI)
- Ⓢ Computed Tomography Scan
- Ⓢ Blood Tests
- Ⓢ Urine And Stool Tests
- Ⓢ Electroencephalogram
- Ⓢ Spinal Tap (Also Called A Lumbar Puncture.)
- Ⓢ Brain Biopsy
- Ⓢ Intracranial Pressure Monitoring

Treatment for encephalitis

- @ Immediate hospitalization and close monitoring.
- @ The goal of treatment is to reduce the cerebral edema and to prevent other related complications.
- @ Acyclovir (Zovirax), an antiviral agent.
- @ In the rare case of acyclovir resistance, foscarnet sodium (Foscavir) is prescribed.

Brain Abscess

Introduction

- @ Brain Abscess is an accumulation of pus within the brain tissue that can result from a local or systemic infection.
- @ Streptococci and staph. Aureus : primary infective organisms.

Definition

- @ **Brain abscess or cerebral abscess** is an abscess caused by inflammation and collection of infected material, coming from local or remote infectious sources, within the brain tissue.

Risk Factors

- ④ Ear infection
- ④ Dental abscess
- ④ Infection of paranasal sinuses
- ④ Infection of the mastoid air cells of the temporal bone
- ④ Epidural abscess
- ④ Systemic Infections such as Lung, heart, kidney Infections etc.
- ④ The infection may also be introduced through a skull fracture following a head trauma or surgical procedures
- ④ Brain abscess is usually associated with congenital heart disease in young children.
- ④ It may occur at **any age** but is most frequent in **the third decade of life**

Clinical manifestations

- @ Similar to those of meningitis and encephalitis: headache, fever, nausea vomiting.
- @ Drowsiness, confusion and seizure.
- @ Visual impairment
- @ Hallucinations

Diagnosis

- @ History
- @ Physical Examination
- @ CT
- @ MRI

Medical Management

- @ Anti microbial therapy
- @ Symptomatic treatment
- @ Drainage of abscess
- @ Treatment of the cause

Neurocysticercosis

Introduction

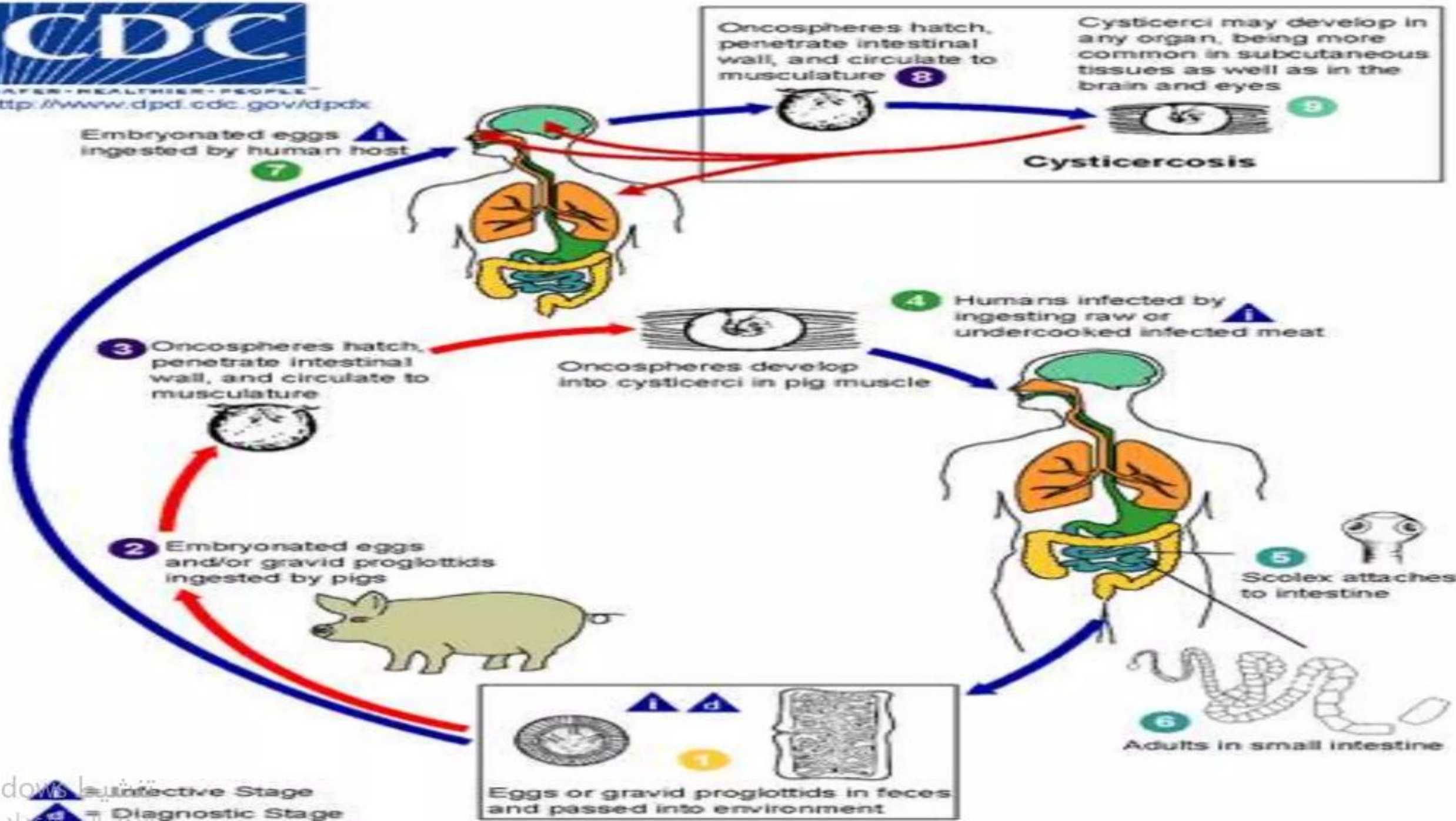
- ④ Neurocysticercosis is the result of accidental ingestion of eggs of *Taenia solium* (ie, pork tapeworm), usually due to contamination of food by people with taeniasis.

Introduction...

- @ Taenia solium has a predilection for skeletal muscles, eyes, and the nervous system
- @ Two distinct types of infection
 - @ Intestinal Taeniasis
 - @ Cysticercosis



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Clinical Manifestations

- ⊙ Vary with the locations of the lesions, the number of parasites, and the host's immune response.
- ⊙ Many patients are asymptomatic. Possible symptomatic presentations include the following:
 - ⊙ Epilepsy: Most common presentation (70%)
 - ⊙ Headache, dizziness
 - ⊙ Stroke
 - ⊙ Neuropsychiatric dysfunction

Abnormal Physical findings

- @ Cognitive decline
- @ Dysarthria
- @ Extraocular movement palsy or paresis
- @ Hemiparesis or hemiplegia, which may be related to stroke, or Todd paralysis
- @ Hemisensory loss
- @ Movement disorders
- @ Hyper/hyporeflexia
- @ Gait disturbances
- @ Meningeal signs

Diagnosis

- @ CT scan
- @ MRI
- @ CSF findings
- @ Stool examination: 10-15% of neurocysticercosis patients have taeniasis
- @ Brain biopsy: Necessary only in extreme cases

Treatment...

Medical

- a) Cysticidal
Albendazole, Praziquantel
- b) Steroid
Dexamethasone, Prednisolone
- c) Anti-epileptics
Phenytoin, Carbamazepine

Surgical

- a) Endoscopic removal
- b) Shunting surgery
- c) Local excision