		Naegleria fowleri (Brain-eating amoeba)	Acanthamoeba castellani
Life cycle	Habitat	-Free living in soil and fresh- stagnant water -In human host (CNS)	**-Trophozoite and cyst may exist in environment and tissue** -Free living in soil, stagnant water and dust -In Human host (Brain, eye, skin, lung)
	Infective stage	**Amoeboid trophozoite**	**Trophozoite & Cyst**
	Method & Source of infection	**Through Nasal route:** 1- Swimming in /or sniffing contaminated water. 2- Inhalation of contaminated air.	**Source of infection:** dust, stagnant water and contact lens fluid. **Mode of infection:** -Skin, Lungs and Cornea **(contaminated contact lenses)**
Morphology	Trophozoite	Amoeboid Trophozoite (tissues/CSF) -Broad anterior end, tapering posterior end **-Single pseudopodium** Flagellate Trophozoite (when contact with water) -Pear shaped -2 long equal flagellae	-Amoeboid -Cytoplasm is well differentiated -Pseudopodia are **multiple** and **spiky** (Acanthopodia).
	Cyst	**-Only in soil (never in tissues)** -Rounded	-Double wall -Rounded
Pathology & Clinical picture		Primary Amoebic Meningoencephalitis (PAM) -**Neurotropic trophozoite** → Necrosis, bleeding, acute meningoencephalitis **-Subarachnoid space:** Inflammatory exudate -**Grey matter**: hemorrhage, inflammation, trophozoites, necrosis -**White matter**: demyelination (Due to phospholytic enzyme) Clinical picture death in 3-6 days. **Prodromal (Stage I):** Severe frontal headache, fever, blocked nose, nausea & vomiting. **Meningeal irritation (Stage II) (Rapid progression)** -Neck stiffness (Kernig's sign), Fever, photophobia, **signs of ↑ ICP.** **Rapid progression** → Irritability, coma, death	CNS: Granulomatous amoebic meningoencephalitis (GAE) -Hematogenous spread → granulomas **(space occupying lesions)**. -Infected tissues contain **trophozoites**, **cysts** and multinucleated giant cells. **-Signs of ↑ ICP** Eye (Amoebic keratitis) **Cause**: Contaminated water/contact lenses → corneal infection & ulceration **Features**: Unilateral eye pain, photophobia, annular corneal infiltration, conjunctival congestion **Complications**: Vision loss & eye perforation Chronic granulomatous skin lesions
Diagnosis		Clinical diagnosis History of swimming in lakes, few days before the disease Lab diagnosis **a.CSF analysis (lumbar puncture)**: trophozoites, ↑ CSF pressure, ↑ Protein (>1 g/L) , ↑ polymorphs, purulent **b-Culture of CSF** on **non nutrient agar (with E. coli)** **c-Intracerebral inoculation** of mice **d- Molecular diagnosis** (PCR)	GAE of CNS a-**CSF examination**: Trophozoites & cysts in brain/CSF. b-**Culture of CSF** on **non nutrient agar (with E. coli)** c-**CT scan** of brain. Amoebic keratitis Detect organism via corneal scraping → microscopy, staining, or culture.
Prevention		-Public education. -Adequate chlorination of swimming pools and water supplies.	1) Health education. 2) Avoid swimming in stagnant water. 3) The use of proper contact lens solution.
Treatment		1- Hospitalization 2- I.V. Amphotericin-B, Fluconazole and Rifampicin.	**CNS:** Sulfamethoxazole/Trimethoprim+ Fluconazole and Rifampin.

	Secondary Amoebic Cerebral Abscess (E. Histolytica)	Neurocysticercosis (T. solium)
Mode of infection	-Ingestion of **mature quadrinucleated cysts (infective stage)** in contaminated food or drink. -Mechanical transmission by flies and cockroaches. -Auto-infection (feco-oral route)	**Ingestion** of food or water contaminated by the eggs **(Infective stage)**. **Auto-infection:** **a- External:** Feco-oral. **b- Internal:** anti-peristaltic→ regurgitation of the gravid segments from small intestine to the stomach.
Morhphology	**Trophozoite** **-Shape:** Irregular outline with pseudopodia **-Nucleus:** Has centrally located fine karyosome and peripheral chromatin dots	———
Pathogenisis & Clinical picture	-**Trophozoite** invades brain tissue (**no cysts in tissue**) **-Spreads from large intestine** → blood vessels → extraintestinal amoebiasis (liver, lung, brain) -**Hematogenous spread** → Single brain abscess → 2ry amoebic meningoencephalitis, brain tissue destruction -**Acts as a brain tumor** (space-occupying lesion)	**Larval stage** (Cysticercus cellulosa) **invades CNS** **-Humans act as intermediate hosts** -Cyst causes **local inflammation** (neutrophils, eosinophils, lymphocytes) -**Acts as a brain tumor** (space-occupying lesion) -Causes **severe headache**, convulsions, paralysis
Diagnosis	**1. Microscopic examination:** Detection of trophozoites in CSF samples. **2. Serodiagnosis:** amoebic antigens or antibodies can detected by ELISA. **3. Radiological:** Ultrasound, CT or MRI	**1.Serological:** I.H.A.T and ELISA. **2- Imaging:** Ultrasound, C.T. and MRI. **3- X-ray** for calcified cyst. **4- Biopsy** for histopathological examination.
Prevention	-Health education -Safe water & proper sewage disposal -Case treatment -Examination of food handler -Insect control	-**Early treatment** of infected persons (prevent autoinfection) **-Avoid nauseating drugs** in infected patients -**No human excreta** as fertilizer -**Personal hygiene**, fly control, wash raw vegetables
Treatment	**Tissue amoebicides** (Act against trophozoite): -Metronidazole. -Tinidazole.	-**Surgical removal** when possible. -**Praziquantel** combined with corticosteroids. -**Albendazole** is also effective.