CHAPTER 24
INFECTIONS OF THE CENTRAL NERVOUS SYSTEM

THE CENTRAL NERVOUS SYSTEM

- The central nervous system (CNS) comprises the brain and spinal cord
- The blood-brain barrier protects the CNS from infection but can prevent drugs getting to the CNS if an infection does occur
- Swelling and inflammation can have disastrous results for the CNS

ROUTES FOR INFECTIONS OF THE CNS

- The CNS is well protected structurally and employs a blood-brain barrier to prevent infections
- Organisms that move from the blood to the cerebrospinal fluid can cause meningitis
- Most CNS infections result from bacteremia or viremia from distal infections
In some cases, infection comes from locations close to or in direct contact with the CNS, such as the middle ear or the sinuses. Bacterial and fungal CNS infections require immediate and aggressive treatment. Viral CNS infections are more difficult to treat, and therapy includes mostly supportive care.

Meningitis

Meningitis is an infection of the meninges and can be caused by bacteria, viruses, fungi, or parasitic pathogens. Bacterial meningitis is more severe than viral meningitis, but can be treated with antibiotics.

Tetanus and botulism

Tetanus and botulism are serious infections (or intoxications) that can be devastating. Both tetanus and botulism are caused by exotoxins produced by the pathogens.
TETANUS AND BOTULISM

- Tetanus toxin is a neurogenic toxin that blocks postsynaptic inhibition of the spinal motor reflexes, which leads to spasmodic contraction of muscles
- Botulism toxin moves from the intestinal tract to the CNS via the blood and inhibits the release of acetylcholine, causing muscular paralysis

VIRAL INFECTIONS OF THE CNS

- There are two types of viral CNS infection: acute and persistent
- Acute viral CNS infections include rabies, polio, and viral encephalitis
- There are no treatments for acute viral infections but there are effective vaccines
- Some persistent CNS infections are caused by conventional agents such as measles, rubella, and enterovirus

PRIONS

- Prions are infectious proteins and are not associated with nucleic acids
Fungal CNS infections are primarily opportunistic and are usually restricted to patients who are immunocompromised. The most important fungal CNS infection is cryptococcosis, caused by *Cryptococcus neoformans*, the only encapsulated fungus.

Parasitic CNS infections caused by the free-living amebas *Naegleria* and *Acanthamoeba* are rare but almost always fatal.