

Coxsackie Virus

Important properties

- It belongs to the family Picornaviridae within the genus Enterovirus.
- ssRNA genome.
- Icosahedral Symmetry.
- Non-enveloped.
- Coxsackie viruses are divided into group A and group B viruses based on early observations of their pathogenicity in mice. Group A coxsackie viruses were noted to cause a flaccid paralysis, which was caused by generalized myositis, while group B coxsackie viruses were noted to cause a spastic paralysis due to focal muscle injury and degeneration of neuronal tissue.
- It has at least 23 serotypes (1-22, 24) of group A and 6 serotypes (1-6) of group B are recognized.

Transmission

Coxsackie viruses are present both in the stool and in the respiratory secretions.

- Fecal-oral transmission.
- Droplet transmission.
- Contact transmission.

Pathogenesis

the pathogenesis and replication cycle of coxsackie virus shared some features with other enteroviruses.

Group A: coxsackie viruses tend to infect the skin and mucous membranes causing :

1- Herpangina



2- Acute hemorrhagic conjunctivitis



3- Hand, foot, and mouth (HFMD) disease



Group B coxsackie viruses tend to infect the heart, pleura, pancreas, and liver, causing: pleurodynia, myocarditis, pericarditis, and hepatitis .

- 1- Pleurodynia (Epidemic Myalgia, Bornholm Disease)
- 2- Myopericarditis
- 3- Neonatal Disease

Epidemiology

- Most common in **young people**.
- Adults can be infected, but this is much less common.
- Most infections occur in the summer or early fall, with a peak from August to October in the northern hemisphere

Signs and Symptoms

- Incubation period for most coxsackie virus infections is about (2-10) days.
- Rash.
- Fever and Headache.
- Herpangina.
- Respiratory Infection.
- Gastrointestinal Infection.

Laboratory Diagnosis

- Virus is isolated from clinical specimen (fluids from the throat, or stool)
- Detection of specific antibodies serological tests .
- Detection of viral nucleic acid by PCR.

Treatment & Prevention

- Treatment usually consists of simple analgesia for sore throat/ pain .
 - There is no vaccine to prevent coxsackie virus infection.
 - **Hand washing** is the best prevention, especially after toileting and before eating can help reduce their spread.
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RNA Viruses-related to nervous system infection

1-Poliovirus

General properties

- It belongs to family picornaviridae.
- It is spherical shape.
- Icosahedral Symmetry .
- ssRNA genome.
- Non-enveloped.
- There are three serotypes: **poliovirus type-1** is most common and it causes most epidemics , **poliovirus type-2** is usually associated with epidemics, **poliovirus type-3** is occasionally cause epidemics.

Sources and Transmission

The infection naturally occurs only on humans. It is transmitted by fecal-oral route by ingestion of food and water contaminated with human feces. The virus considered as enterovirus . poliovirus cause poliomyelitis .

Pathogenesis

Virion interacts with specific cell receptor on the cell membrane and then enters the cell. After replicating in oropharynx (also in tonsils and in LN of neck) and small intestine tract, especially in lymphoid tissues , the virus spread through blood stream (or axon of peripheral nerves) to CNS, then attacking motor neurons located in anterior horn of spinal cord .

Death of infected cells results in paralysis of muscles innervated by those neurons. The virus also affects the brain stem, leading to bulbar poliomyelitis with respiratory paralysis.

Clinical Finding

Incubation period is (10-14 days) Poliovirus causes direct pathological changes in CNS and is responsible for causing symptoms of the poliomyelitis disease. Most cases occur in children and most cases 95% are asymptomatic (no illness), 4% minor illness (abortive infection) with fever, headache , nausea, drowsiness, vomiting and sore throat, 1% major illness with or without paralysis . The non-paralytic poliomyelitis is characterized with fever, stiff neck, malaise, while paralytic poliomyelitis is characterized by flaccid paralysis occurs especially in lower limbs such as legs. Respiratory paralysis can occur if brain stem is infected.

The motor nerve damage may permanent. Most patients recover spontaneously without CNS sequelae. Infection provides lifelong type-specific immunity (acquired immunity).

Laboratory Diagnosis

- Isolation of virus from throat, stool and CSF.
- Detection of specific antibodies.
- Detection of viral nucleic acid by PCR.

Control

- No specific antiviral therapy are available
 - Mechanical ventilation for cases with respiratory paralysis
 - Two type of vaccine; Salk (killed,IPV) and Sabin(live,OPV). Recently, a new monovalent oral poliovirus-1 vaccine (MOPV) has been introduced.
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2- Rabies

General properties

- It belongs to rhabdoviridae family.
- It is bullet-shaped.
- ssRNA Genome
- Neuclocapsid is helical.
- Enveloped and spiked.

Source and Transmission

The virus has a broad host range like dogs, foxes, wolves, bats. The virus is excreted in saliva of these infected animals. Infected animal has salivation, lacrimation, hydrophobia , attack any things. The virus is transmitted to human by bite of rabid animals or by contact of saliva with broken skin or with mucous membrane. Also human can infected with virus when expose to aerosolized secretion from infected animals or contact with un-pasteurized milk.

Pathogenesis

The virus replicate in muscle or connective tissue at site of bite, then enters peripheral nervous system directly at site of bite . The virus infects the sensory neurons by attaching to acetylcholine receptor and moves (ascends) rapidly by to CNS(brain and spinal cord) for replication in gray matter. The virus then descends down peripheral nerves to salivary glands and other tissues as kidney, cornea and skin.

Clinical Finding

Incubation Period is variable (1-2 months) after bite exposure. Rabies is zoonotic diseases and it is almost always fatal infection. Three stages : The prodromal phase of disease is characterized by fever, nausea, vomiting, pain or itching at site of bite wound, hydrophobia (fear of water). During neurologic phase shows signs as hallucination, bizarre behavior, encephalitis. This phase is followed convulsion or coma and death.

Laboratory Diagnosis

- Detection of inclusion bodies (Negri bodies) that formed in infected tissues.
- Detection of viral antigens in biopsy specimen from corneal scrapings or skin from nape of neck.
- Detection of viral nucleic acid by PCR.

Prevention and treatment

- No specific treatment.
- Washing of wound.
- Vaccination: post-exposure by rabies vaccine, also pre-exposure for high risk groups eg; veterinarians and animal handlers.

Good Luck