



Virology for 2<sup>nd</sup> Year MD Students

# **(11) RNA viruses:** ***Picornaviridae***

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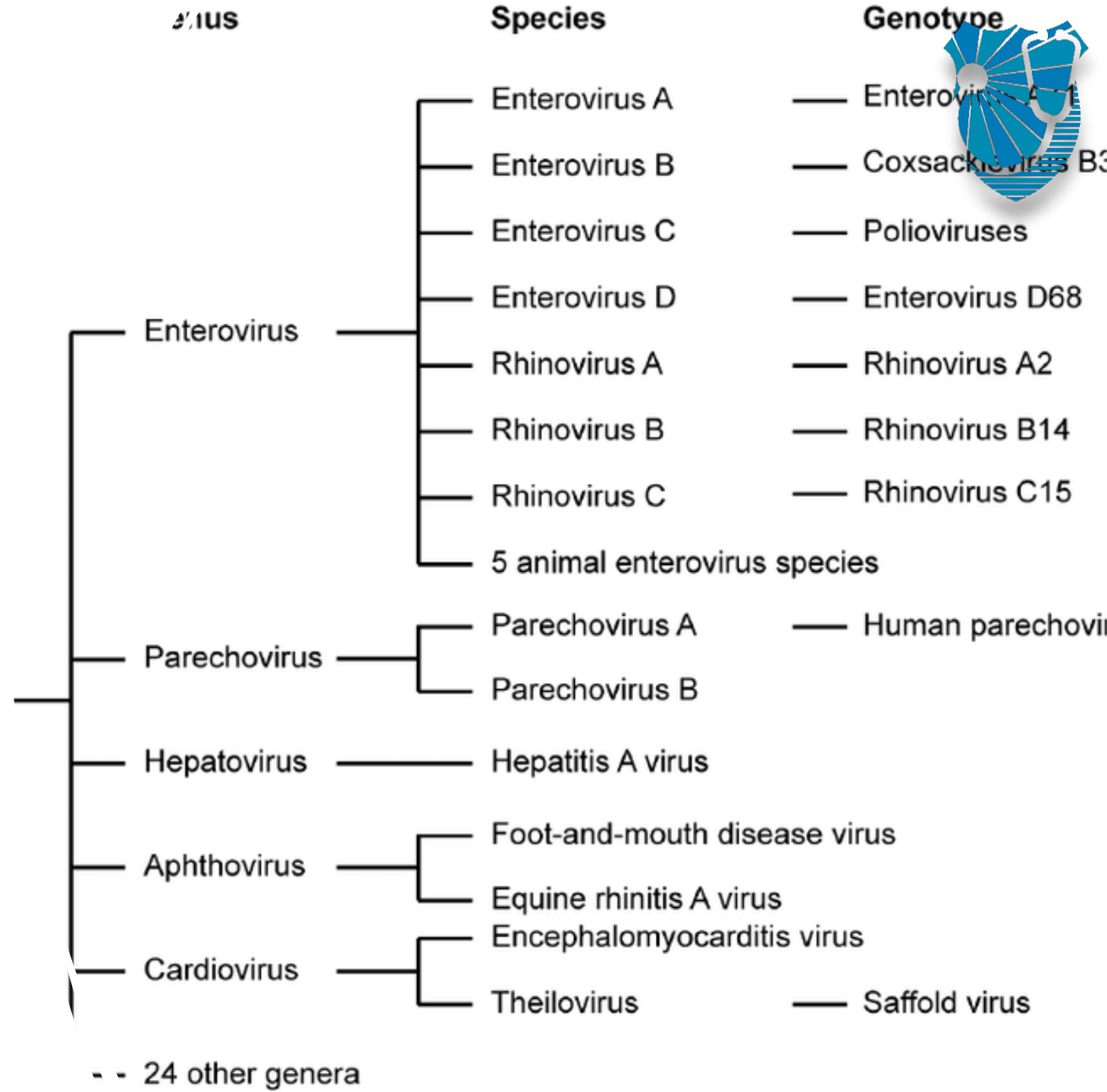


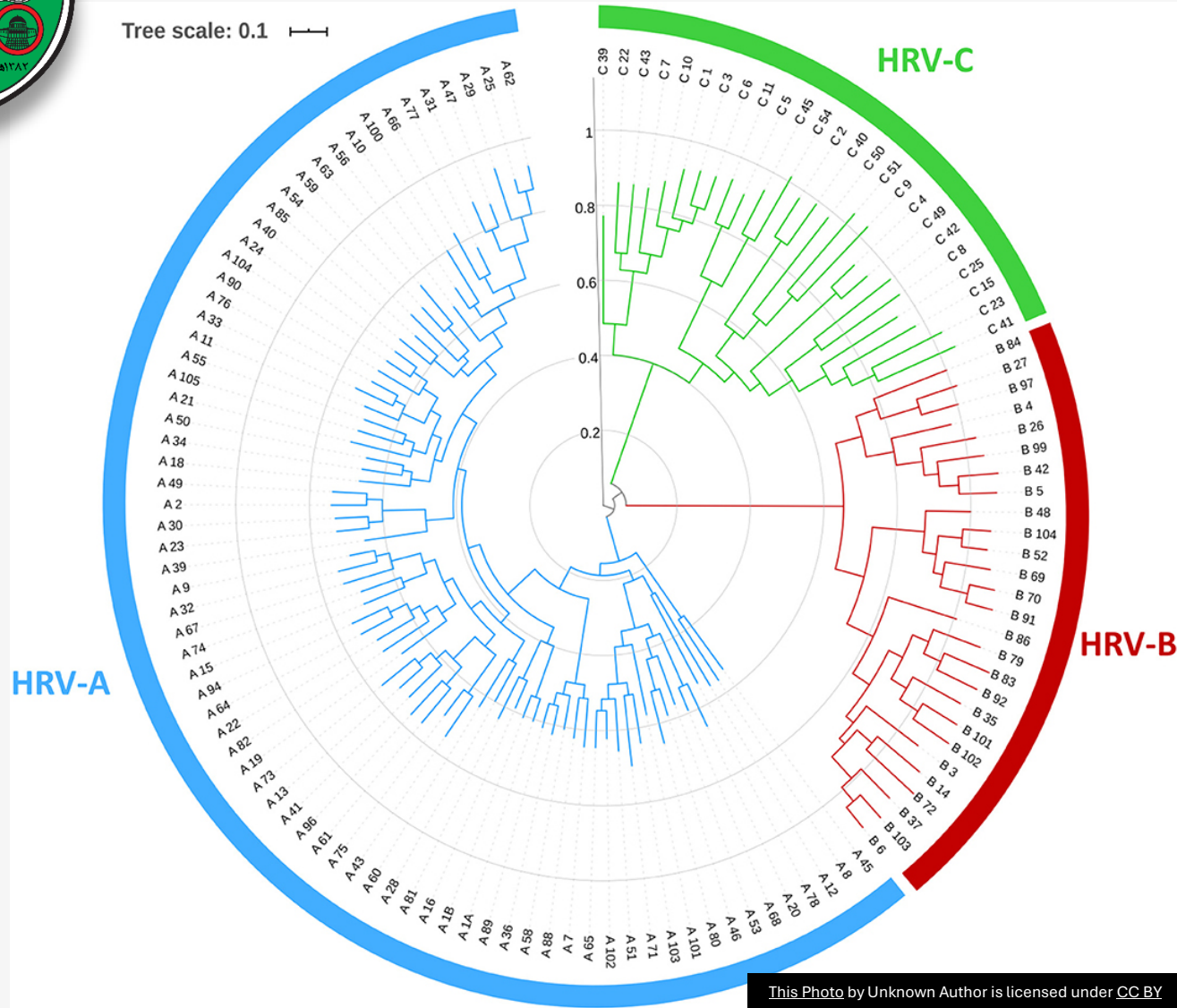
# *Picornaviridae*

- Two groups of single stranded positive sense non-enveloped RNA viruses:

A. Rhinoviruses

B. Enteroviruses





# Rhinoviruses

- More than 150 types classified into 3 groups (A, B and C).
- Cellular receptors: intercellular adhesion molecule-1 (ICAM-1) and low-density lipoprotein receptor (LDLR).
- Acid labile (complete inactivation occurs at a pH of 3.0).



# Rhinoviruses

- Disease: Upper respiratory tract infection (also called: common cold, coryza, rhinosinusitis). The symptoms include: Chilliness is an early symptom of the common cold. Other symptoms include runny nose, sore throat, coughing, sneezing, nasal congestion, headache, low-grade fever and fatigue. Asymptomatic infection can occur.
- Acute asthma exacerbations.
- Short incubation period: 2-4 days. The illness usually lasts 7 days.

## COMMON COLD



sneezing and runny nose? you might have a



## Steps to prevent common cold

Handwashing.

Avoid close contact with sick individuals.

Eating healthy diet.



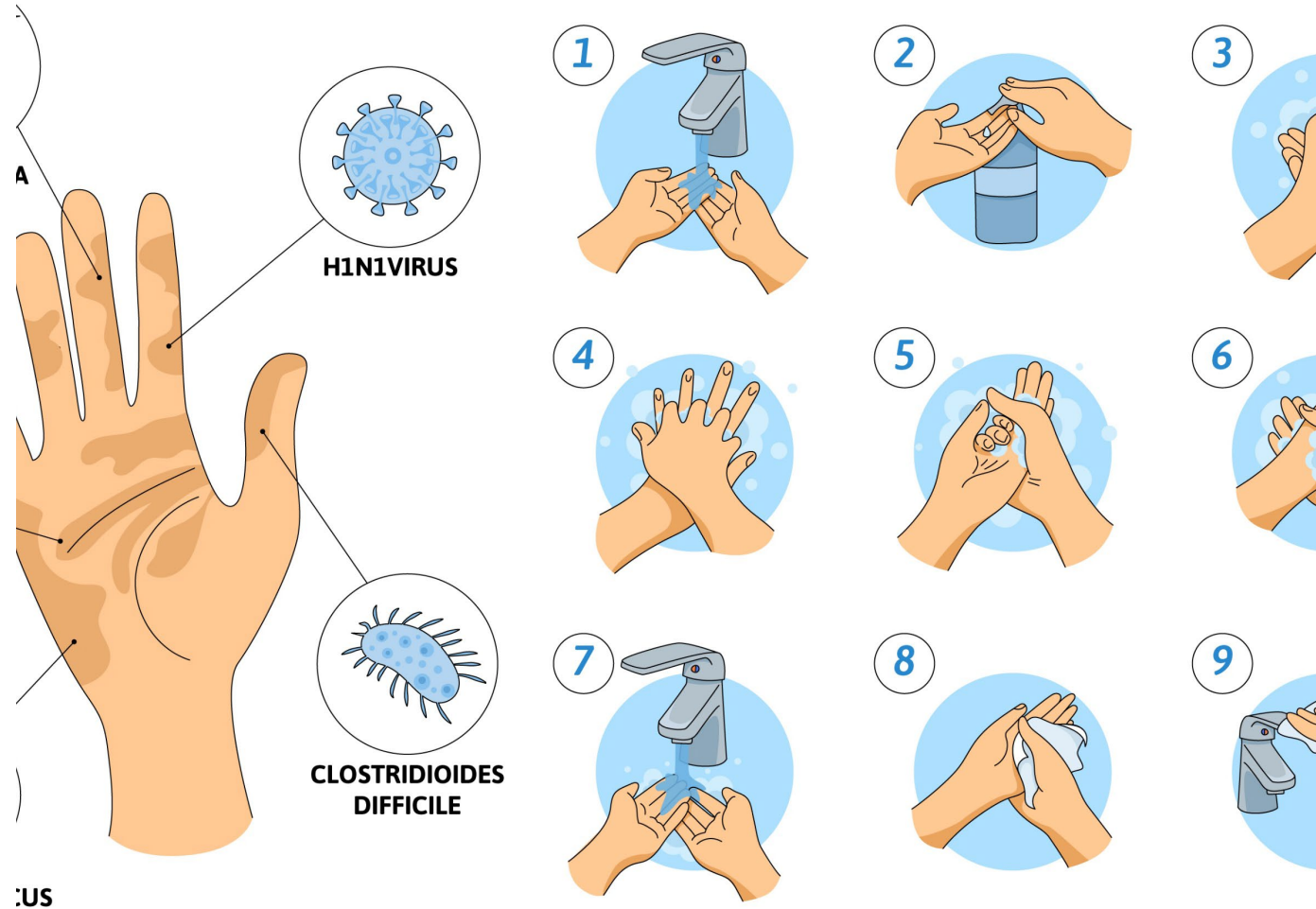


# Rhinoviruses

- The disease is common in fall, winter and spring.
- Transmission: hand-to-hand, hand-to-eye, or hand-to-object- (e.g., doorknob) to-hand contamination. Rhinoviruses can survive for hours on contaminated environmental surfaces.
- Diagnosis: real-time PCR.
- Treatment: symptomatic. Prevention: hand washing.

# WASH YOUR HANDS

CLEAN HANDS SAVE LIFE!



US



# Poliovirus

- There are three antigenic types of polioviruses.
- Transmission: The mouth is the portal of entry of the virus, and primary multiplication takes place in the oropharynx or intestine.
- Poor hygiene and sanitation is linked to virus spread.

## polio eradicated in Africa

countries with polio cases in the past 12 months

■ vaccine-derived poliovirus ■ Wild poliovirus



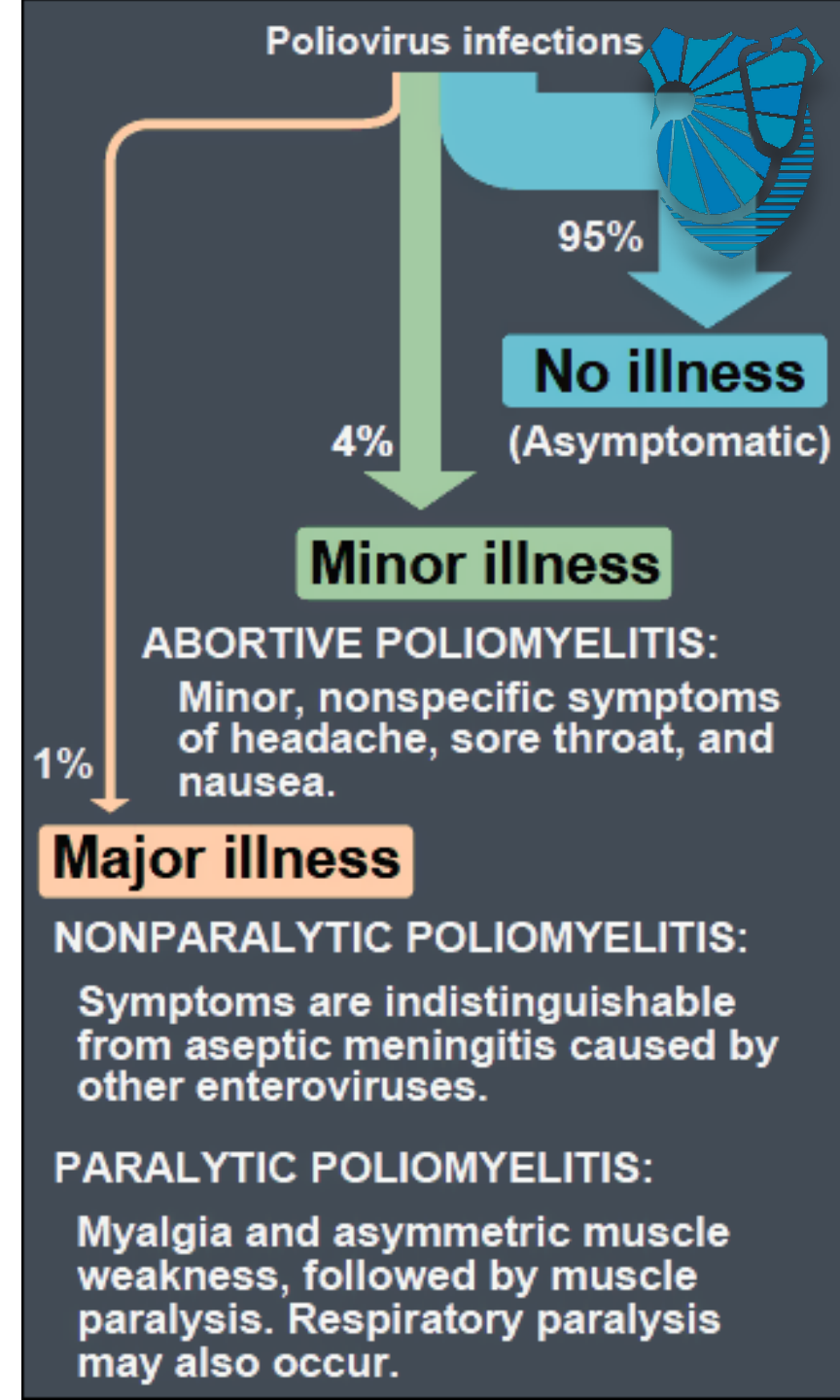
Afghanistan and Pakistan also have cases of vaccine-derived poliovirus

Source: WHO (data up to 19 August 2020)



# Poliovirus infection

- After 1-2 weeks incubation disease may appear, which can be:
  1. **Asymptomatic infection** in 90–99% of the cases (sub-clinical disease)
  2. **Acute febrile illness:** the most common form of symptomatic disease. Includes: fever, headache, nausea, vomiting, constipation, and sore throat.
  3. **Nonparalytic poliomyelitis (aseptic meningitis)** stiffness and pain in the back and neck. Recovery is rapid and complete.







# Poliovirus infection

- In less than 1/1000: Paralytic poliomyelitis (flaccid paralysis) resulting from lower motor neuron damage and subsequent muscle atrophy. Fatality in 5–10 % of the cases (due to respiratory failure caused by depression of the respiratory centers).
- Poliovirus can spread along axons of peripheral nerves to the CNS, where it continues to progress along the fibers of the lower motor neurons to increasingly involve the spinal cord or the brain.







# Poliovirus Infection Management and Prevention

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- Diagnosis: virus culture, PCR.
- Management is supportive.
- Vaccination is the only effective method of preventing poliomyelitis. Poliomyelitis can be prevented by either live-attenuated (Sabin) or killed (Salk) polio vaccines.
- Killed polio vaccine has no adverse effects, whereas live polio vaccine may undergo reversion to a virulent form while it multiplies in the human intestinal tract and cause vaccine-associated paralytic poliomyelitis in those receiving the vaccine.





# Coxsackievirus Infections

- They are divided into two groups: A and B.
- They produce a variety of illnesses in humans, including **aseptic meningitis** and respiratory and acute febrile illnesses.
- Herpangina (vesicular pharyngitis), hand-foot-and-mouth disease, and acute hemorrhagic conjunctivitis are caused by certain coxsackievirus group A serotypes.
- Pleurodynia (epidemic myalgia; Bornholm disease that presents with fever and stabbing chest pain), myocarditis and pericarditis are caused by some group B coxsackieviruses.



# Coxsackievirus Infections

- Herpangina is a febrile illness of relatively sudden onset with complaints of fever and sore throat.
- Characteristic lesions are found on the anterior tonsillar pillars, soft palate, uvula, and tonsils, and on the posterior pharynx.
- The illness, which has a predilection for the young, is usually self-limited and disappears within a few days.
- Hand-foot-and-mouth disease is an illness associated with vesicular lesions of the hands, feet, mouth, and, at times, buttocks.
- The main causes of hand-foot-and-mouth disease are A10, A16 and EV71.





# Echovirus, Parechoviruses, and Human Enteroviruses



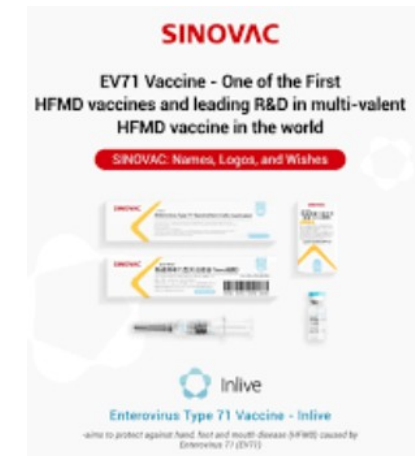
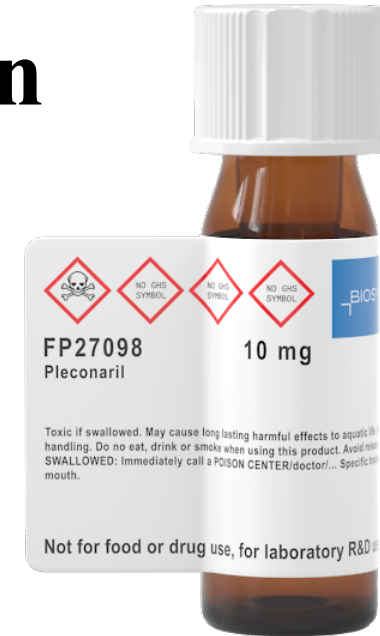
- Echoviruses (enteric cytopathogenic human orphan viruses) are associated with the following human infections: Aseptic meningitis, encephalitis, febrile illnesses with or without rash, common colds, and ocular disease.
- Similar clinical syndromes are caused by human enteroviruses. However, certain enteroviruses are associated with specific syndromes. E.g. EV 70 is a main cause of acute hemorrhagic conjunctivitis. EV70 and 71 are associated with severe CNS disease. EV71 is associated with HFM disease.





# Diagnosis, Management, and Prevention

- Reverse-transcriptase real-time quantitative PCR (RT-qPCR) is the gold standard for diagnosing enterovirus infections.
- To date three vaccines (inactivated vaccines) against EV71 have been licensed in China, all using C4 genogroup strains.
- Pleconaril is an antiviral drug from viral capsid inhibitor class, intended for the prevention of acute asthma exacerbations and common cold symptoms in asthmatic patients who have had exposure to picornavirus. It acts by inhibiting viral replication.





**Thank You...**  
**Wishing you all the best!**

