Coxsackievirus

*Coxsackievirus* is a virus that belongs to a family of non enveloped linear single-stranded positive-sense ssRNA viruses, *Picornaviridae* and the genus *Enterovirus*, which also includes poliovirus, echovirus and hepatitis A virus.

Enteroviruses are among the most common and important human pathogens and ordinarily its members are transmitted by the fecal-oral route. Coxsackieviruses share many characteristics with poliovirus. With control of poliovirus infections in much of the world, more attention has been focused on understanding the non-polio enteroviruses such as coxsackievirus.

Coxsackieviruses are among the leading causes of aseptic meningitis, the other usual suspects are echovirus and mumps virus.

**Groups**

Coxsackieviruses are divided into group A and group B viruses based on early observations of their pathogenicity in mice.

Group A coxsackieviruses were noted to cause a flaccid paralysis, which was caused by generalized myositis, while group B coxsackieviruses were noted to cause a spastic paralysis due to focal muscle injury and degeneration of neuronal tissue. At least 23 serotypes (1-22, 24) of group A and 6 serotypes (1-6) of group B are recognized.

In general, group A coxsackieviruses tend to infect the skin and mucous membranes, causing herpangina, acute hemorrhagic conjunctivitis (AHC), and hand-foot-and-mouth (HFM) disease. Both group A and group B coxsackieviruses can cause nonspecific febrile illnesses, rashes, upper respiratory tract disease, and aseptic meningitis.
Group B coxsackieviruses tend to infect the heart, pleura, pancreas, and liver, causing pleurodynia, myocarditis, pericarditis, and hepatitis. Coxsackie B infection of the heart can lead to pericardial effusion. Muffled heart sounds and pulsus paradoxus are signs of this.

The development of insulin-dependent diabetes (IDDM) has recently been associated with recent enteroviral infection, particularly coxsackievirus B pancreatitis. This relationship is currently being studied further.

Sjogren’s syndrome is also being studied in connection with coxsackievirus, as of January 2010.

History

The coxsackieviruses were discovered in 1948-49 by Gilbert Dalldorf, a scientist working at the New York State Department of Health in Albany, New York.

Dr. Dalldorf, in collaboration with Grace Sickles, had been searching for a cure for the dreaded disease polio. Earlier work Dalldorf had done in monkeys suggested that fluid collected from a non-polio virus preparation could protect against the crippling effects of polio. Using newborn mice as a vehicle, Dalldorf attempted to isolate such protective viruses from the feces of polio patients. In carrying out these experiments, he discovered viruses that often mimicked mild or non-paralytic polio. The virus family he discovered was eventually given the name Coxsackie, for the town of Coxsackie, New York, a small town on the Hudson River where Dalldorf had obtained the first fecal specimens.

Dalldorf also collaborated with Gifford on many early papers.

The Coxsackie viruses subsequently were found to cause a variety of infections, including epidemic pleurodynia (Bornholm disease), and were subdivided into groups A and B based on their pathology in newborn mice. (Coxsackie A virus causes paralysis and death of the
mice, with extensive skeletal muscle necrosis; Coxsackie B causes less severe infection in the mice, but with damage to more organ systems, such as heart, brain, liver, pancreas, and skeletal muscles.)

The use of suckling mice was not Dalldorf’s idea, but was brought to his attention in a paper written by Danish scientists Orskov and Andersen in 1947, who were using such mice to study a mouse virus. The discovery of the Coxsackie viruses stimulated many virologists to use this system and ultimately resulted in the isolation of a large number of so-called enteric viruses from the gastrointestinal tract that were unrelated to poliovirus, and some of which were oncogenic (cancer-causing).

The discovery of the Coxsackie viruses yielded further evidence that viruses can sometimes interfere with each other’s growth and replication within a host animal. Other researchers found that this interference can be mediated by a substance produced by the host animal, a protein now known as interferon. Interferon has since become prominent in the treatment of a variety of cancers and infectious diseases.

In 2007, an outbreak of Coxsackie virus occurred in Eastern China. It has been reported that 22 children died. More than 800 people were affected, with 200 children hospitalized.

Coxsackieviruses are part of the enterovirus family of viruses (which also include polioviruses and hepatitis A virus) that live in the human digestive tract. They can spread from person to person, usually on unwashed hands and surfaces contaminated by feces, where they can live for several days.

In cooler climates, outbreaks of coxsackievirus infections most often occur in the summer and fall, though they cause infections year-round in tropical parts of the world.
In most cases, coxsackieviruses cause mild flu-like symptoms and go away without treatment. But in some cases, they can lead to more serious infections.

**Signs and Symptoms**

Coxsackievirus can produce a wide variety of symptoms. About half of all children infected with coxsackievirus have no symptoms. Others suddenly develop high fever, headache, and muscle aches, and some also develop a sore throat, abdominal discomfort, or nausea. A child with a coxsackievirus infection may simply feel hot but have no other symptoms. In most kids, the fever lasts about 3 days, and then disappears.

Coxsackieviruses can also cause several different symptoms that affect different body parts, including:

- **Hand, foot, and mouth disease**, a type of coxsackievirus syndrome, causes painful red blisters in the throat and on the tongue, gums, hard palate, inside of the cheeks, and the palms of hands and soles of the feet.

- **Herpangina**, an infection of the throat which causes red-ringed blisters and ulcers on the tonsils and soft palate, the fleshy back portion of the roof of the mouth.

- **Hemorrhagic conjunctivitis**, an infection that affects the whites of the eyes. Hemorrhagic conjunctivitis usually begins as eye pain, followed quickly by red, watery eyes with swelling, light sensitivity, and blurred vision.

Occasionally, coxsackieviruses can cause more serious infections that may need to be treated in a hospital, including:

- viral meningitis, an infection of the meninges (the three membranes that envelop the brain and spinal cord)
- encephalitis, a brain infection
- myocarditis, an infection of the heart muscle
Newborns can be infected from their mothers during or shortly after birth and are more at risk for developing serious infection, including myocarditis, hepatitis, and meningo-encephalitis (an inflammation of the brain and meninges). In newborns, symptoms can develop within 2 weeks after birth.

**Contagiousness**

Coxsackieviruses are very contagious. They can be passed from person to person on unwashed hands and surfaces contaminated by feces. They can also be spread through droplets of fluid sprayed into the air when someone sneezes or coughs.

When an outbreak affects a community, risk for coxsackievirus infection is highest among infants and children younger than 5. The virus spreads easily in group settings like schools, child-care centers, or summer camps. People who are infected with a coxsackievirus are most contagious the first week they are sick.

**Prevention**

There is no vaccine to prevent coxsackievirus infection. Hand washing is the best protection. Remind everyone in your family to wash their hands frequently, particularly after using the toilet (especially those in public places), after changing a diaper, before meals, and before preparing food. Shared toys in child-care centers should be routinely cleaned with a disinfectant because the virus can live on these objects for days.

Children who are sick with a coxsackievirus infection should be kept out of school or child care for a few days to avoid spreading the infection.

The duration of an infection varies widely. For coxsackie fever without other symptoms, a child’s temperature may return to normal within 24 hours, although the average fever lasts 3 to 4 days. Hand,
foot, and mouth disease usually lasts for 2 or 3 days, while viral meningitis can take 3 to 7 days to clear up.

*Treating Coxsackievirus Infections*

Depending on the type of infection and symptoms, the doctor may prescribe medications to make your child feel more comfortable. However, because antibiotics only work against bacteria, they cannot be used to fight a coxsackievirus infection.

Acetaminophen may be given to relieve any minor aches and pains. If the fever lasts for more than 24 hours or if your child has any symptoms of a more serious coxsackievirus infection, call your doctor.

Most children with a simple coxsackievirus infection recover completely after a few days without needing any treatment. A child who has a fever without any other symptoms should rest in bed or play quietly indoors. Offer plenty of fluids to prevent dehydration.

*When to Call the Doctor*

Call the doctor immediately if your child develops any of the following symptoms:

- fever higher than 100.4° Fahrenheit (38° Celsius) for infants younger than 6 months and higher than 102° Fahrenheit (38.8° Celsius) for older kids
- poor appetite
- trouble feeding
- vomiting
- diarrhea
- difficulty breathing
- convulsions
- unusual sleepiness
- pain in the chest or abdomen
- sores on the skin or inside the mouth
• severe sore throat
• severe headache, especially with vomiting, confusion, unusual sleepiness, or convulsions
• neck stiffness
• red, swollen, and watery eyes
• pain in one or both testicles