

Virology

Paramyxoviruses

The paramyxoviruses include the important agents of respiratory infections of infants and young children (respiratory syncytial virus _RSV and the parainfluenza virus) as well as the causative agents of contagious diseases of childhood (mumps and measles).

Structure

Virions are enveloped, with spherical or pleomorphic nucleocapsid, and capable of producing filamentous virions. The nucleocapsid core is composed of the genomic single-stranded RNA.

The paramyxovirus family contains four important human pathogens:

- **measles** virus
- **mumps** virus
- **respiratory syncytial** virus
- **parainfluenza** viruses

All members of the **paramyxoviridae** family initiate infection via the respiratory tract. Whereas replication of the respiratory pathogens is limited to the respiratory epithelia, measles and mumps become disseminated throughout the body and produce generalized disease.

1. MEASLES VIRUS

Disease: this virus causes **measles**, a disease characterized by a maculopapular rash. It occurs primarily in childhood.

Transmission: measles virus is transmitted via **respiratory droplets** produced by coughing and sneezing both during the prodromal period and for a few days after the rash appears.

Pathogenesis: after infecting the cells lining the upper respiratory tract, the virus enters the blood and infects reticuloendothelial cells, where it replicates again. It then spreads via the blood to the skin, causing rash.

Laboratory diagnosis: most diagnoses are made on clinical grounds, but the virus can be isolated in cell culture. A greater than fourfold rise in antibody titer can be used to diagnose difficult cases. PCR assay is also used.

Treatment: there is no antiviral therapy available.

Prevention: prevention rests on immunization with the **live, attenuated vaccine**. The vaccine is effective and causes few side effects. It is given subcutaneously to children at 15 months of age, usually in combination with rubella and mumps vaccines_ **MMR vaccine _measles mumps rubella vaccine**.

2. MUMPS VIRUS

Disease: this virus causes mumps, a disease characterized by salivary gland swelling. It occurs primarily in childhood.

Transmission: mumps virus is transmitted via respiratory droplets. Mumps occurs worldwide, with a peak incidence in the winter. About 30% of children have a subclinical (inapparent) infection.

Pathogenesis: the virus infects the upper respiratory tract and then spreads through the blood to infect the salivary glands, especially the parotid gland, testes, ovaries, pancreas, and, in some cases, meninges.

Clinical Findings: the disease is typically benign and resolves spontaneously within 1 week, but there are two complications related to:

** Orchitis in postpubertal males, which, if bilateral, can result in sterility. Unilateral orchitis, although quite painful, does not lead to sterility.

** Meningitis, which is usually benign, self-limited.

Laboratory Diagnosis: the diagnosis of mumps is usually made clinically, but laboratory tests are available for confirmation. The virus can be isolated in cell culture from saliva, spinal fluid, or urine. PCR assay can also be used. In addition, serological tests can be done.

Treatment: there is no antiviral therapy for mumps.

Prevention: consists of immunization with the **live, attenuated vaccine (MMR)**. The vaccine is effective and long-lasting (at least 10 years) and causes few side effects. Two immunizations are recommended, one at 15 months and a booster dose at 4 to 6 years, usually in combination with measles and rubella vaccines.

3. RESPIRATORY SYNCYTIAL VIRUS

Disease: Respiratory syncytial virus (RSV) is the most important cause of pneumonia and bronchiolitis in infants. It is also an important cause of otitis media in children and of pneumonia in the elderly and in patients with chronic cardiopulmonary diseases.

Transmission: occurs via **respiratory droplets** and by direct contact of contaminated hands with the nose or mouth.

Pathogenesis: RSV infection in **infants is more severe** and more often involves the lower respiratory tract than in older children and adults. The infection is localized to the respiratory tract; viremia does not occur.

Treatment: aerosolized ribavirin (Virazole) is recommended for severely ill hospitalized infants.

3. PARAINFLUENZA VIRUSES

Diseases: these viruses cause croup (acute laryngotracheobronchitis), laryngitis, bronchiolitis, and pneumonia in children and a disease resembling the common cold in adults.

Transmission: these viruses are transmitted via **respiratory droplets**. They cause disease worldwide, primarily in the winter months.

Pathogenesis: these viruses cause upper and lower respiratory tract disease without viremia. A large proportion of infections are subclinical. Parainfluenza viruses 1 and 2 are **major causes of croup**.

Laboratory Diagnosis: most infections are diagnosed clinically. The diagnosis can be made in the laboratory either by isolating the virus in cell culture or by PCR test.

Treatment and Prevention: there is neither antiviral therapy nor a vaccine available.