Human metapneumovirus

Metapneumovirus
Virus classification
Group: Group V ((-)ssRNA)
Order: *Mononegavirales*
Family: *Pneumoviridae*
Genus: ***Metapneumovirus***
Type species
Avian metapneumovirus
Species
• *Avian metapneumovirus* • *Human metapneumovirus*

VIROLOGY

- *Pneumoviridae* is a new virus family in the order *Mononegavirales*. It was created in 2016 by elevating the now dissolved paramyxoviral subfamily *Pneumovirinae*.
- HMPV is an enveloped virus with a non-segmented negative-sense RNA genome.
- HMPV is most closely related phylogenetically to avian metapneumovirus (APV). The complete genome sequence reveals a high level of homology with APV . Phylogenetic analysis has identified two subgroups of hMPV, subgroups A and B, and two clades within each of these subgroups (designated A1, A2, B1, and B2), which often circulate concurrently A study of 727 Australian hMPV isolates was undertaken from 2001 to 2004 to determine the epidemiologic profile of genetic subtypes associated with acute respiratory tract infections Concurrent annual circulation of all four hMPV subtypes was common, although a single, and usually different, hMPV subtype predominated each year.
- Given the close relationship between hMPV and APV, it was speculated that hMPV might have originated from birds

TRANSMISSION

- Transmission is by direct or close contact with contaminated secretions, which may involve large particle aerosols, droplets, or fomites.
- Human metapneumovirus (hMPV) can cause upper and lower respiratory tract infection in patients of all age groups, but symptomatic disease most often occurs in young children or older adults
- One study suggested that the co-circulation of diverse paramyxoviruses, such as respiratory syncytial virus (RSV), and parainfluenza virus may reduce the incidence of symptomatic hMPV infection due to transient cross-protective immunity induced by the related viruses

Children — Seroprevalence data suggest that most children are infected by the age of five years.

- Serosurveys suggest that hMPV is usually associated with mild, self-limited infections in children and adults. The incubation period is not fully defined but is thought to be five to six days in most cases, with a typical duration of illness of approximately one week.
- Among patients who require hospitalization, clinical manifestations can range from bronchiolitis or asthma exacerbation to severe pneumonia and acute respiratory distress syndrome

  Cough – 68 to 90 %

  Rhinitis – 44 to 77 %

  Fever – 52 to 86 %

  Wheezing – 51 to 56 %

- Symptoms of upper respiratory infection include rhino-pharyngitis and laryngitis
- bronchiolitis (59 %), croup (18 %), exacerbation of asthma (14 %), and pneumonia (8 %

- It is not known if primary hMPV infection that is severe or early in life predisposes to asthma or to a higher frequency of subsequent wheezing associated respiratory illnesses
- Immunization of HIV-infected children with pneumococcal vaccine reduces the prevalence of hMPV-associated lower respiratory tract illnesses, suggesting an interaction of bacteria and the virus in severe disease
- Encephalitis has been reported rarely in children with upper respiratory tract hMPV disease
- In one report of fatal encephalitis in a 14-month-old boy, rtPCR tests of both brain and lung tissue during the post-mortem were positive for hMPV. In another report, hMPV was detected by PCR from the cerebrospinal fluid and nasal washings of a 10-year-old girl with severe acute encephalitis. Magnetic resonance imaging of both patients demonstrated multifocal cortical and subcortical lesions. It is not clear whether hMPV is causative in these cases, since virus replication is thought to be limited to the respiratory tract.

Adults — the clinical manifestations of hMPV infection in adults are similar to those seen in children. In a review cited above, the following frequency of symptoms was noted:

Cough – 100 %

Nasal congestion – 85 %

Rhinorrhoea – 75 %

Dyspnoea – 69 %

Hoarseness – 67 %

Wheezing – 62 %

Severe pneumonia occurs and may present with an ARDS picture, especially in the elderly.

DIAGNOSIS

- Reverse transcriptase polymerase chain reaction (PCR) on nasopharyngeal specimens is the most sensitive method for diagnosis of hMPV infection, but the primers and techniques are not standardized among laboratories. Some commercial multiplex platforms include hMPV.
- HMPV grows slowly and inefficiently in culture

TREATMENT

Supportive and varies with the clinical manifestations. There are no clinical data on the susceptibility of hMPV to antiviral therapy. Ribavirin, which has activity against respiratory syncytial virus (RSV), is also active against hMPV in vitro and reduces viral replication in experimentally infected mice. The safety and efficacy of ribavirin in humans with hMPV infection is unknown.

September 2016, Pathology North, NSW, References available by request.