**Paramyxoviruses lecture 10**

**Paramyxoviruses**

The paramyxoviruses include the most important agents of respiratory infections of infants and young children as well as the causative agents of two of the most common contagious diseases of childhood (mumps and measles).

**PARAMYXOVIRUS FAMILY**

|  |  |  |
| --- | --- | --- |
| **GLYCOPROTEINS** | **MEMBERS** | **GENUS** |
| HN, F | mumps  human parainfluenza viruses (HPIV 1-4) | Paramyxovirus |
| H, F | Measles | Morbillivirus |
| G, F | Respiratory syncytial virus | Pneumovirus |

**Properties of paramyxoviruses**

**Virion :-** enveloped  and can be spherical sometimes filamentous , larger than influenza Virus (100-300) nm in diameter Composed of inner **Helical nucleocapsid** containing Genome.

**Genome** :- linear , non segmented, **ssRNA ,** negative-sense **( -ve).** There is **no reassortment .**

**Proteins :-**

**1- N**P – The nucleocapsid protein associates with genomic RNA.

**2- L** and **P** - polymerase activity.

**3- HN** - The cell attachment proteins span the viral envelope and project from the surface as spikes . haemagglutinin + neuraminidase activities.

**4**- **F :-** the fusion protein projects from the envelope surface .

**5-** **M**  :- The matrix protein lines the inner surface of the envelope.



**Structure of paramyxovirus**

**Replication** :- replication of the viruses occurred in the cytoplasm and bud from plasma membrane . A large excess of nucleocapsids are produced in infected cells, which form characteristic cytoplasmic inclusion bodies.

**Transmission** :- spread by droplets from the nose and mouth to close contacts. Many of them are highly infectious and go around the community in epidemics- often seasonal, eg. Winter coughs and colds. Fomites might also assist spread.

**Parainfluenza viruses infections :-**

These viruses are the common cause of respiratory illness in all ages but specially in infant and young children. The reinfection of these viruses are common.

**Pathogensis and pathology**

The replication of this viruses are limited to the respiratory epithelial cells , the infection is limited to the nose and throal resulting to common cold syndrome, but it may ivolve the larynx and upper trachea and resulting to **croup** . the duration of the shedding of the virus about 1 week after onset of the illness . the severity of the disease related to the production of specific IgE antibodies.

**Clinical findings :**

Rhinitis , phyarngitis , fever, bronchitis and may be pass to croup. The severity of the disease occurred in infant less than 6 months.

**Laboratory diagnosis**

1. **Clinical feature**
2. **Antigen detection**

Direct detection of viral antigens in respiratory secretions (collected within 1 week of symptom onset) using **immunofluorescence or enzyme immunoassay.**

1. **Isolation and identification**

Nasal wash are good specimens, culture in monkey kidney cell line , the diagnosis depending on hemadsorption.

**4) Nucleic acid detection :-** by polymerase chain reaction assays **(PCR)** .

**5) Serology** :- detection of specific IgM antibodies by **ELISA test** .

**Treatment :-**

No specific treatment but ribavirin has been used with some benefit in immunocompromised patients . no vaccine is available .

**Respiratory syncytial virus(RSV)**

It is the most common cause of lower respiratory tract illness in infant and young children .

**Pathogenesis and pathology**

Replication of the virus occurred initially in the nasopharynx , then the virus may spread to the lower respiratory tract and produce bronchiolitis and pneumonia. The incubation period 3-5 days and virus shedding for 1-3 weeks.

**Clinical findings :-**

Common cold , pneumonia in infant and may bronchrolitis and Bronchitis. Reinfection is common in both children and adult with less severity. This virus are a common cause of otitis media about 30% of otitis media cause in infant .

**Laboratory diagnosis of Respiratory syncytial virus(RSV)**

**1) Clinical feature**

**2) Antigen detection**

Nasal wash or aspirate are good sample . Virus antigens detection by immunofluorescence test .

**3) Isolation and identification of the virus**

By culturing the specimen into human heteroploid cell line ( Hela) and Hep-2, the diagnosis is depend on the cytopathic effect and appearance of giant cells.

**4) Nucleic acid detection**

Diagnosis by detection of the RNA of the virus by PCR.

**5) Serology**

Detection of serum antibodies which include IgM and IgG Abs by using immunofluorescence test .

**Treatment**

Supportive care , Ribavirin may be used in the treatment of sever cases by aerosol for 3-6 dayes . No vaccine is available today.

**Mumps virus infections**

Mumps is acute disease characterized by non suppurative enlargement of one or both salvery glands. It is a mild disease in children but in adult it may produce orchitis ( infection of the testis ).

**Pathogensis and pathology**

Human are the only natural host of mumps virus . primary replication are occurred in the epithelial cells of the upper respiratory tract The virus spreads to lymphoid tissue which, in turn, leads to viremia . The virus thus spreads to a variety of sites, including salivary glands specially the parotid salivary glands ,other glands and other body sites . The incubation period 2-4 weeks, shedding of the virus 3 before infection and 9 days after the appearance of salivary gland infection .

**Clinical findings**

Fever, malaise followed by rapid enlargement of the parotid gland and it is painful . mumps may be associated with aseptic meningitis . testes and ovaries may be infected especially after puberty and it may pass to sterility in man but it is rare ( not more than 1%).

**Laboratory diagnosis of Mumps virus**

**1) Clinical feature**

**2) Isolation and identification**

Sample s ( Saliva, CSF and Urine ) .

Culture in monkey kidney cells and diagnosis by using mumps specific antiserum by immunofluorescence method , hemadsorption test can also be used.

**3) Nucleic acid detection**

By PCR test .

**4) Serology**

IgM and IgG Abs detection by ELISA and Heamagglution inhibition test.

**Treatment**

No specific treatment but there is vaccination through mumps, measles, rubella vaccine **(MMR).**

**Measles virus infection**

Measles is an acute , highly infectious disease characterized by fever, respiratory symptoms and maculopapular rash .

**Pathogensis and pathology**

Human are the only natural host for measles virus . the site of replication is the respiratory tract , the infection then spread to the regional lymph nods followed by primary virema then replicat in the reticuloendothelial system followed by secondary viremia then seeds to the skin, respiratory tract and conjunctiva .

**Clinical findings**

Fever, sneezing, coughing ,runny nose, redness of the eye , the appearance of maculopapular rash .

**Laboratory diagnosis of Measles**

**1)** **Clinical feature**

**2)** **Antigen detection**

Measles antigen can be directly detected from specimen include respiratory secretion , nasopharynx and conjunctiva by Immunofluorescence test.

**3)** **Isolation and identification**

Specimen , Nasopharyngeal and conjunctiva swabs , respiratory secretion culture in monkey and human kidney cells , diagnosis by cytopathic effect , multinucleated and intranuclear and intracytoplasmic inclusion bodies.

**4) Serology**

IgM and IgG antibodies by ELISA and Heamagglution inhibition test (HI) test .

5) **Nucleic acid detection**

By PCR for RNA of the viruses.

**Treatment :-** No treatment . Vaccination with MMR.