Microbiology TEAM 432

Lecture (5)

Viral infections of respiratory tract

Objectives

1. Introduction to respiratory viral infections
2. Characteristics of respiratory viruses
3. Mode of transmission
4. Clinical features
5. Lab diagnosis
6. Management & treatment

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Mind map

(viral infections of respiratory tract)

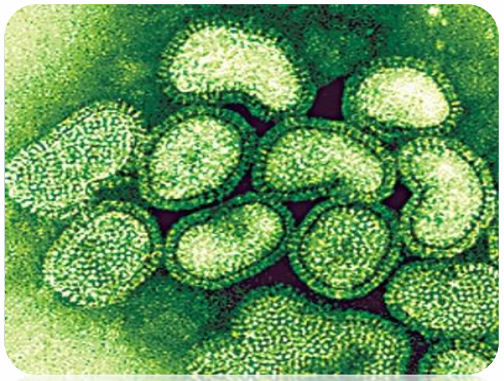
1	influenza virus	transmitted by inhalation	occurs in winter	fever
2	RHINOVIRUSES	transmitted by respiratory droplet	60% of common cold	more than 100 types
3	Coronaviruses	SARS is a new mutation of corona virus	2nd cause of common cold	no fever
4	parainfluenza virus	causes Croup & pneumonia	diagnosed by nasopharngeal aspirate	no tratment, no vaccine.
5	RSV	pneumonia & brochiolitis in infants	diagnosed by nasopharngeal aspirate or cell culture	treated by oxygen & Ribavirin
6	adenovirus	ds DNA virus	infect all epithelial cells except Brain	have the tendecy to become latent

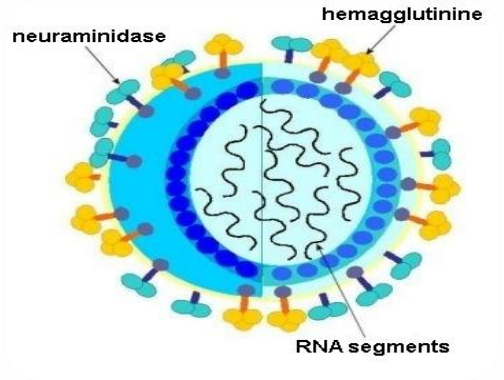
1- Influenza Virus

- Single, Stranded negative sense RNA with 8 helical segments
- Helical capsid symmetry
- Enveloped viruses which contains 2 projecting glycoprotein spikes.

- Heamagglutinin HA:
- attachment
- The virus can agglutinate certain erythrocyte.
- **Explanation:** if the human receptors could not recognize the HA signals, there will be no infection

- Neuroamindase NA: an enzyme help in releasing progeny virus formation from infected cell.





Types of influenza viruses

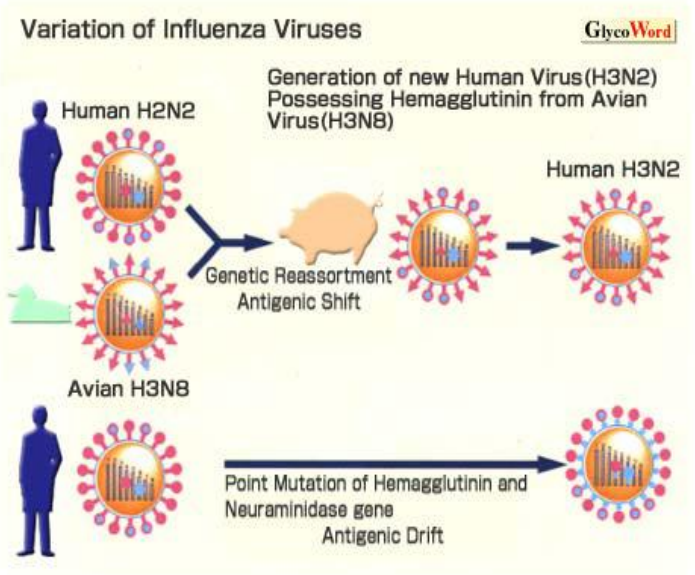
Influenza A

- Infect human & animals (hard to control)
- can cause epidemic and pandemic
- Antigenic shift *
- Antigenic drift (point mutation)

Influenza B

- Infect human
- Cause outbreak and epidemic
- Antigenic drift only

Influenza C



*** Antigenic shift: two different viruses from two different strains (one is human) passing to intermediate host (pig) and there they infect the same cell; genes from different strains mix to form a new virus strain.**

Influenza Virus

Pathogenesis & immunity	• It establish a local upper respiratory tract infection & it's self-limiting condition in Immunocompetent person. • According to the immunity of the host, it can cause localized infection or spread to the lower respiratory tract infection. • Viremia usually& occurs (fever).
Transmission	inhalation of respiratory secretion
Incubation period	1-4 days
Symptoms	Sudden onset of fever, malaise, sneezing, sore-throat, non-productive cough.
Complication	Primary Influenza Pneumonia, 2nd bacterial pneumonia, Myositis, Post influenza encephalitis, Bronchial Asthma, Sinusitis. Reye Syndrome.
Laboratory diagnosis	**1. Specimen:** • Nasopharyngeal aspirate • Rapid and direct detection of influenza A or B from nasopharyngeal aspirate by immunofluorescence & ELISA. **2. PCR**

Treatment

Amantadine: Is only effective against influenza A virus.
Inhibiting the un coating step of influenza A virus.
It has both therapeutic and prophylactic.
It significantly reduced the duration of fever and illness is given to high risk group of patients who are not vaccinated because they have allergy from egg.

Tamiflu: It is Neuraminidase inhibitor that act by blocking the viral enzyme neuraminidase which help the influenza virus invade respiratory tract cells.
It has to be given within the first 48 hours after the exposure of cases or appearance of symptoms

INFLUANZA VACCINE:

- Two types of vaccine ,both contain the current influenza A & B
- Vaccine should be given in October or November, before the influenza season begins.
- Yearly booster dose recommended.

1-The Flu shot vaccine:

- Inactivated (Killed vaccine)
- Given to people older than 6 months, including healthy people as well as high risk groups (elderly, patients with chronic pulmonary or cardiac diseases).

2-The Nasal spray flu vaccine(Flu mist):

- This is a live attenuated vaccine.
- Approved for use in healthy people only between 5-49 years age.

2-RHINOVIRUSES	3- Coronaviruses = means Crown
• small non enveloped virus(20-30 nm) • SS-RNA virus.	• ssRNA enveloped • With positive polarity.
one of PICORNAVIRUS family.	_
Transmitted directly by respiratory droplet.	_
• responsible for 60% of common colds cases. • More than 100 serologic types . • RHINOVIRUS are acid labile(sensitive).	the second cause of common cold .

common cold

Complication

- due to secondary bacterial infection
- Acute sinusitis
  - Acute otitis media.
  - Exacerbation of chronic bronchitis ,bronchial asthma.

Symptoms

- runny nose, sneezing and nasal obstruction, mild sore throat, headache and malaise
- NO FEVER

Laboratory Diagnosis

- no need.

Treatment and Prevention

- No specific treatment.
- No vaccine available.

4- SARS Severe Acute Respiratory Syndrome	5- Para – Influenza Viruses	6- (RSV) Respiratory Syncytial Virus
A new mutation of coronavirus IN CAT .	• Enveloped • SS RNA	• Enveloped • ss RNA .
---	paramyxoviridae family	One of the paramyxoviridae family.
---	Transmitted by respiratory droplets.	by respiratory droplets.
• causes Atypical pneumonia. • suspected to be originated in China and Hong Kong.	• There are four para–influenza viruses: 1, 2, 3, 4 . • occur mainly in winter. • Heamagglutinin HA , Neuroamindase NA	• RSV invade the lower respiratory tract of infant <6 months >> causes Bronchiolitis & pneumonia • very contagious infection • mainly in winter.

Para – Influenza Viruses

Croup or Acute Laryngotracheobronchitis

in infants & young children < 5 years.

Harsh cough, inspiratory stridor with Hoarse voice and difficult inspiration which need hospitalization to do tracheotomy

Bronchiolitis and pneumonia

in young children

Common Cold

In older children and adult.

Immunocompromized

especially in bone marrow transplant patient.

RSV

common cold

In old children and adult

Bronchiolitis & pneumonia

In infant < 6 months

Cont.

	Para – Influenza Viruses	RSV
Laboratory Diagnosis	direct immunofluorescent	ELISA and immunofluorescent * will appear as multinucleated giant cell (syncitia).
Treatment and Prevention	• Hospital admission for infant having Croup for careful • monitoring of upper airway (endotracheal intubation and tracheotomy) • No antiviral treatment, • no vaccine.	For hospitalized infant : • oxygen inhalation due to hypoxia . • Ribavirin , inhaled to treat severe Bronchiolitis and pneumonia. • Passive immunization with anti-RSV immunoglobulin • Hospital staff have to follow control measure as hand washing, wearing of gowns, goggles and mask. • No vaccine

7- Adenoviruses

General	dsDNA >> the only one - non-enveloped
Transmission	• **Fecal** – oral route by fingers, fomit and poorly chlorinated swimming pool. • **Respiratory** – via respiratory droplets. • **Contaminated instruments at eye** – clinics. • Adenovirus has been cultured from semen, so can be spread by sexual transmission
Clinical Syndrome	• infect epithelial cells in all body except the brain . • Viremia may occur . • have the tendency to become latent in lymphoid tissue and can be reactivated if immunity become low. • Adenovirus primary can infect all age group. • Reactivation occur if the patient become immunocompromised in children or adult.
Laboratory Diagnosis	• **Specimens :** nasopharyngeal aspirate (respiratory cells), Conjunctival swab and Stool. • **Immunofluorescence and ELISA.**
Treatment, Prevention	**No treatment** **No vaccine** >> doctor said that the vaccine in the lec is experimental so we consider that there is no vaccine .

Questions

The influnza vaccine can detect which type of influenza ?

1) Type A 2) Type B 3) type C 4) type A & B

Type A influenza can cause …

1) Antigenic shift 2) antigenic shift & drift 3) only antigenic drift

The dsDNA type virus is :

1) RHINOVIRUSES 2) RSV 3) Adenoviruses 4) Para – Influenza Viruses

Which virus causes Atypical pneumonia :

1) Adenoviruses 2) Para – Influenza Viruses 3) influenza virus
4) Coronaviruses

True of False:

1) Influnza type B can cause pandemic ( )
2) Corona virus is a ds DNA virus ( )
3) Adeno virus causes meningitis ( )
4) Croup is syndrome of RSV ( )
5) RHINOVIRUSES has positive polarity ( )
6) Para – Influenza Viruses appear as multinucleated giant cell ( )