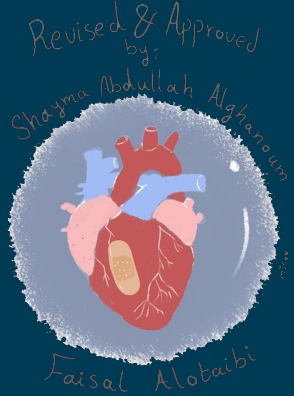
Viral Respiratory Tract Infections 2

TEAM 439
MICROBIOLOGY



VERSION 1

Objectives

- Characteristics of MERS-CoV, Rhinovirus, Coxsackieviruses & other Picornaviruses, Adenovirus, Epstein – Barr virus.
- Mode of transmission.
- Clinical features.
- Lab diagnosis.
- Treatment & prevention.

Colour index:

Red: Important & Doctor's notes.

Grey: Extra info & explanation.

Purple: Only in girl's slides.

Orange: Only in boy's slides.

Green: Lecture notes

Any future corrections will be in the editing file, so please check it frequently.

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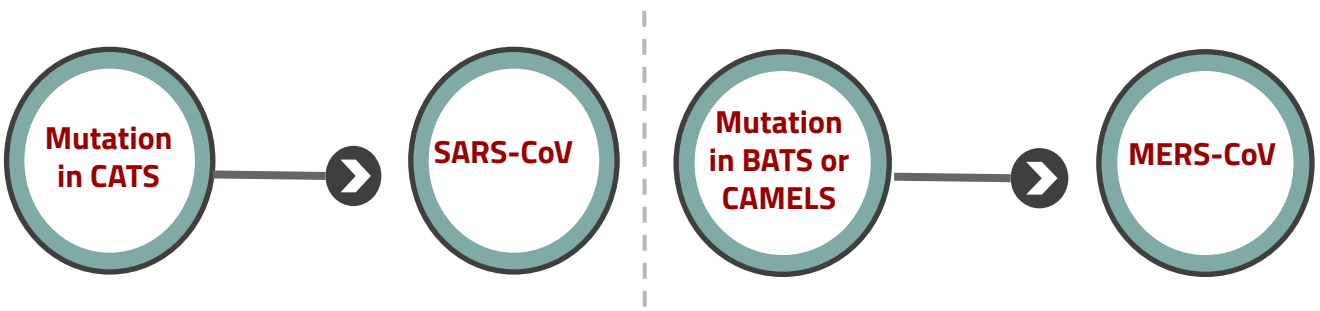
Coronavirus

Family:	Coronaviridae
Structural features:	Enveloped virus with +ve Polarity single stranded RNA genome.
Transmission:	Inhalation of infectious aerosol droplets.
Clinical symptoms:	The 2nd cause of **common cold.** **Coronavirus without mutation causes only common COLD .**
Epidemiology	Coronavirus also causes **zoonotic disease** (the virus is capable of infecting **humans and animals** including birds, camels, pigs and others).

كورونا فايروس كان بسيط وحده يسبب common cold بس صارت له طفرات وطلع أشكال جديدة منه

Severe Forms of Coronavirus:



1- SARS-CoV

Severe Acute Respiratory Syndrome (SARS)

Overview	❖ In winter of 2002, a new respiratory disease known as (SARS) emerged in China after a new **mutation of coronavirus.** Mutations can change the virus structure and affect the same person more than one time. الفيروس يغير تركيبته ويدخل جسم الإنسان كأنه فيروس جديد ❖ The disease spread worldwide due to travelling.
Reservoir	The animal reservoir may be rats or cats or bats. (Usually cats) تصير الطفرات داخل جسم الحيوان بعدين ينتقل الفيروس للإنسان.
Clinical Syndrome	❖ SARS starts with high fever followed by cough with difficulty in breathing (atypical pneumonia). ❖ Associated with high mortality due to respiratory failure.

2- MERS-CoV

Middle East Respiratory Syndrome (MERS)

Overview	In September 2012, a case of novel coronavirus infection was reported involving a man in Saudi Arabia who was admitted to a hospital with **pneumonia** and **acute kidney failure.** This virus has been named Middle East Respiratory Syndrome (MERS)
Source	Virus closely related to several **Bat coronaviruses & Camel** Mutations happen inside animal's body for example, MERS-CoV's mutation happens inside the bat's body, then the bat which carries the virus passes its stool on the palm tree and dates, which then will infect the camels and humans.
Infection Caused	MERS-CoV infected several human cells , including lower, but **NOT** upper respiratory tract, kidney ,intestinal, and liver cells.
Epidemiology	- All the cases have been linked to countries in and near the Arabian Peninsula. - Highly infectious. - Incubation period 2-14 days.
Transmission	- This virus spread from ill people to others through **close contact.** - There is no evidence of sustained spreading in community settings. - Evidence also suggested that the virus can be acquired from **direct close contact with animals.**
Risk group	- Individuals with **weakened immune systems** - People with **pre-existing medical conditions** (or comorbidities) such as: diabetes, cancer, and chronic lung, heart, and kidney disease.
Clinical Features	**Symptoms may include:** (Symptoms vary from mild (asymptomatic) to severe) - Fever, cough, shortness of breath - Some people also had GIT symptoms including diarrhea, nausea,and vomiting. - Some infected people had mild symptoms (**Cold-like symptoms**) or no symptoms at all and they recovered completely. - Most people with **comorbidities developed severe acute respiratory illness.** comorbidities: for example Age, diabetes mellitus, HIV, immunocompromised, Heart diseases...etc
Complications	★ Severe complications include **pneumonia** and **kidney failure**. - About 30% of people infected with MERS died.
Lab diagnosis	1- Detection of the viral nucleic acid **(Nasopharyngeal aspirate, NPA)** by PCR. **2- Other methods:** Isolation of the virus from NPA by cell culture.
Treatment	No specific antiviral treatment, but for severe cases, current treatment includes care to support vital organ functions.
Prevention	People are advised to protect themselves from respiratory illnesses by taking everyday preventive actions: -Wash hands often with water and soap or use an alcohol-based hand sanitizer. -Cover nose and mouth with a tissue when cough or sneeze. -Avoid touching eyes, nose and mouth with unwashed hands. -Avoid personal contact with sick people. -Clean and disinfect frequently touched surfaces such as toys and doorknobs.

Rhinovirus

Most common viral infection of URT

Family	Picornaviridae
Structural features	Non-enveloped virus with + polarity ssRNA genome, more than 100 serotypes available.
Transmission	Inhalation of infectious aerosol droplets.
Clinical symptoms	★ **The 1st cause of common cold.** The main symptoms of common cold are sneezing, clear watery nasal discharge with mild sore throat, and cough.
Lab diagnosis	routine testing by detection of the viral NA from NPA using PCR.
Treatment and prevention	Usually self- limiting disease, no specific treatment, and no vaccine available.

Coxsackieviruses & other Picornaviruses

Family	Picornaviridae
Structural features	Non-enveloped virus with + polarity ssRNA genome
Transmission	**Inhalation of infectious aerosol droplets.**
Coxsackieviruses group A & B	
Echovirus, Enteroviruses.	
Clinical symptoms	★ **Coxsackieviruses cause herpangina and pharyngitis** Echovirus & other Enteroviruses cause respiratory symptoms Herpangina: small blister like ulcer appear on tongue and roof of oral cavity
Lab diagnosis	routine testing by detection of the viral NA from NPA using PCR.
Treatment and prevention	Usually self-limiting disease, no specific treatment, and no vaccine available.

Epstein – Barr Virus (EBV) Very aggressive virus

Causes Infectious mononucleosis

Also called chronic fatigue syndrome, and it's symptoms is characterized by: fatigue, pharyngitis and lymph node enlargement

Family		Herpesviridae
Structure		Enveloped , icosahedral double stranded DNA virus
Type		**It is lymphotropic** Causes lymphocytosis that produce atypical lymphocytes (especially B cells) which results in production of non-specific antibodies (Heterophile antibodies). Lymphotropic = Likes to go to the lymphatic system. Lymphocytosis =production of lymphocytes (B&T lymphocytes).
Properties		★ **It has oncogenic properties; (causes cancer)** **Burkitt's lymphoma** **Nasopharyngeal carcinoma**
Epidemiology	**Distribution:**	Worldwide (Mainly in teenagers & young adults)
	Transmission:	- **Saliva [this is why it was called kissing disease]** - Blood [rarely]
	Age:	Socio-economic status: SE - Low SE class: early childhood - High SE class: adolescence
Clinical Features:	**Immuno-competent**	- Asymptomatic Or Infectious mononucleosis اعرفوا انها Asymptomatic عند البعض، لكنها infectious mononucleosis عند ثانيين [or glandular fever] - IP = 4-7 weeks - Fever, sore throat, tonsillitis, pharyngitis, malaise, hepatosplenomegaly & abnormal liver function, hepatitis. - **Complications**: (acute airway obstruction, splenic rupture, CNS inflammation)
	Immuno-compromised	- Lymphoproliferative disease (LD) - Oral hairy leukoplakia (OHL)
Diagnosis	**Hematology**	- ↑ WBC Normally it's 6-11 but in this case it might reach 25-100 - **lymphocytosis** - **(Atypical lymphocytes)** > that's why it tends to be oncogenic
	Serology tests:	**Non-specific AB test:** -Heterophile antibodies +ve -Paul-Bunnell or monospot test
		EBV-specific AB test: Detection of IgM antibodies to EBV capsid antigen by ELISA Base diagnosis
Management	**Treatment:**	There is no treatment for Infectious mononucleosis
	Prevention:	No vaccine

Adenovirus

Family	Adenoviridae Adenovirus : DNA
Structural features	Non-enveloped virus with **Double stranded DNA** genome.
Pathogenesis	Adenovirus infects epithelial cell lining respiratory tract, conjunctiva, urinary tract, gastrointestinal tract and genital tract.
Clinical Syndrome	1. Pharyngitis and tonsillitis. 2. Pharyngoconjunctivitis 3. Conjunctivitis. One of the most dangerous adenovirus causes red eye where the whole conjunctiva becomes red and it's highly transmitted to other patients 4. Pneumonia: in preschool children. 5. Gastroenteritis. 6. Acute hemorrhagic cystitis. 7. UTI (Cervicitis and urethritis). urinary tract infection ★ **Does everything other than meningitis and encephalitis (IMPORTANT) As it does not go to the brain**
Lab diagnosis	Routine testing by direct detection of the antigen from NPA by direct IFA. The specimen we take the swab from is based on the disease pharyngitis:throat , gastroenteritis:stool , conjunctivitis:eye , UTI:urine
Other detection methods	Tissue culture, PCR.
Treatment and prevention	No specific treatment or vaccine.

★ **In this lecture we have two DNA viruses: EBV and adenovirus، as the rest of the viruses are RNA**

MCQs

Q1: Which of the following is **not** caused by Adenovirus?			
A- Pharyngitis & tonsillitis	B- Conjunctivitis	C- meningitis & encephalitis	D- Gastroenteritis
Q2: What causes herpangina and pharyngitis?			
A- MERS-CoV	B- Coxsackieviruses	C- Rhinovirus	D- SARS-CoV
Q3: Which virus has an oncogenic property?			
A- Coxsackieviruses	B- CoronaVirus	C- Epstein – Barr Virus	D- Rhinovirus
Q4: Adenovirus genome is a:			
A- ss-DNA	B- ss-RNA	C- ds-RNA	D- ds-DNA
Q5: What's the 2nd cause of common cold?			
A- SARS-CoV	B- MERS-CoV	C- Rhinovirus	D- CoronaVirus
Q6: Which virus causes Infectious mononucleosis?			
A- Epstein – Barr Virus	B- Coxsackieviruses	C- CoronaVirus	D- SARS-CoV
Q7: MERS-CoV virus infect all of the following human cells except:			
A- Upper respiratory tract	B- Liver cells	C- Lower respiratory tract	D- Intestinal cells
Q8: Diagnosis of Epstein – Barr Virus includes:			
A- Detection of IgM Abs & virus capsid antigen by ELISA	B- Detection of the viral nucleic acid (NA) by PCR.	C- Isolation of the virus from NPA by cell culture	D- None of the above

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
C	B	C	D	D	A	A	A

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