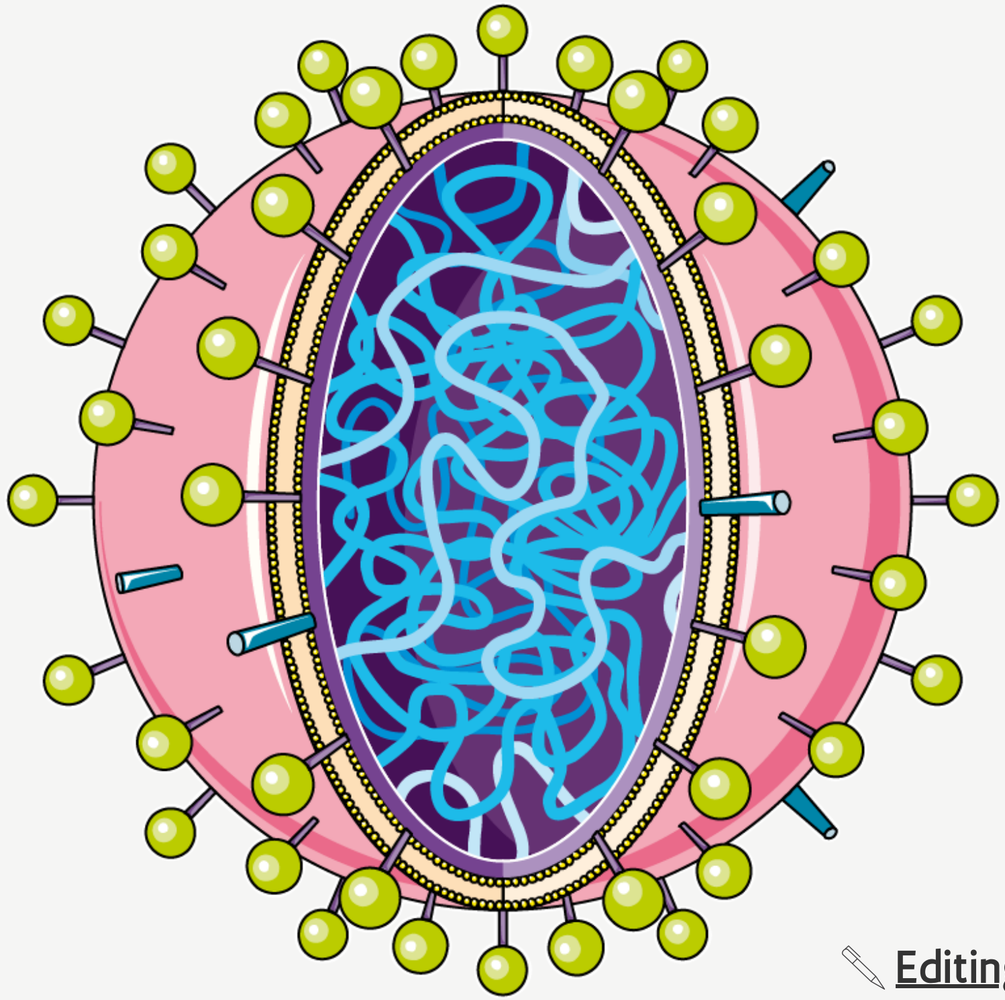
VIRUSES
CAUSING RESPIRATORY INFECTIONS 2

Lecture no.6



Editing File

Color index:

Main text	Girls' slides
Important	Boys' slides
Dr. notes	Extra

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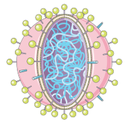
OBJECTIVES

Characteristics of MERS-CoV, SARS-COV-2, Rhinovirus, Coxsackieviruses & other Picronaviruses, Adenovirus, Epstein – Barr virus.

Mode of transmission

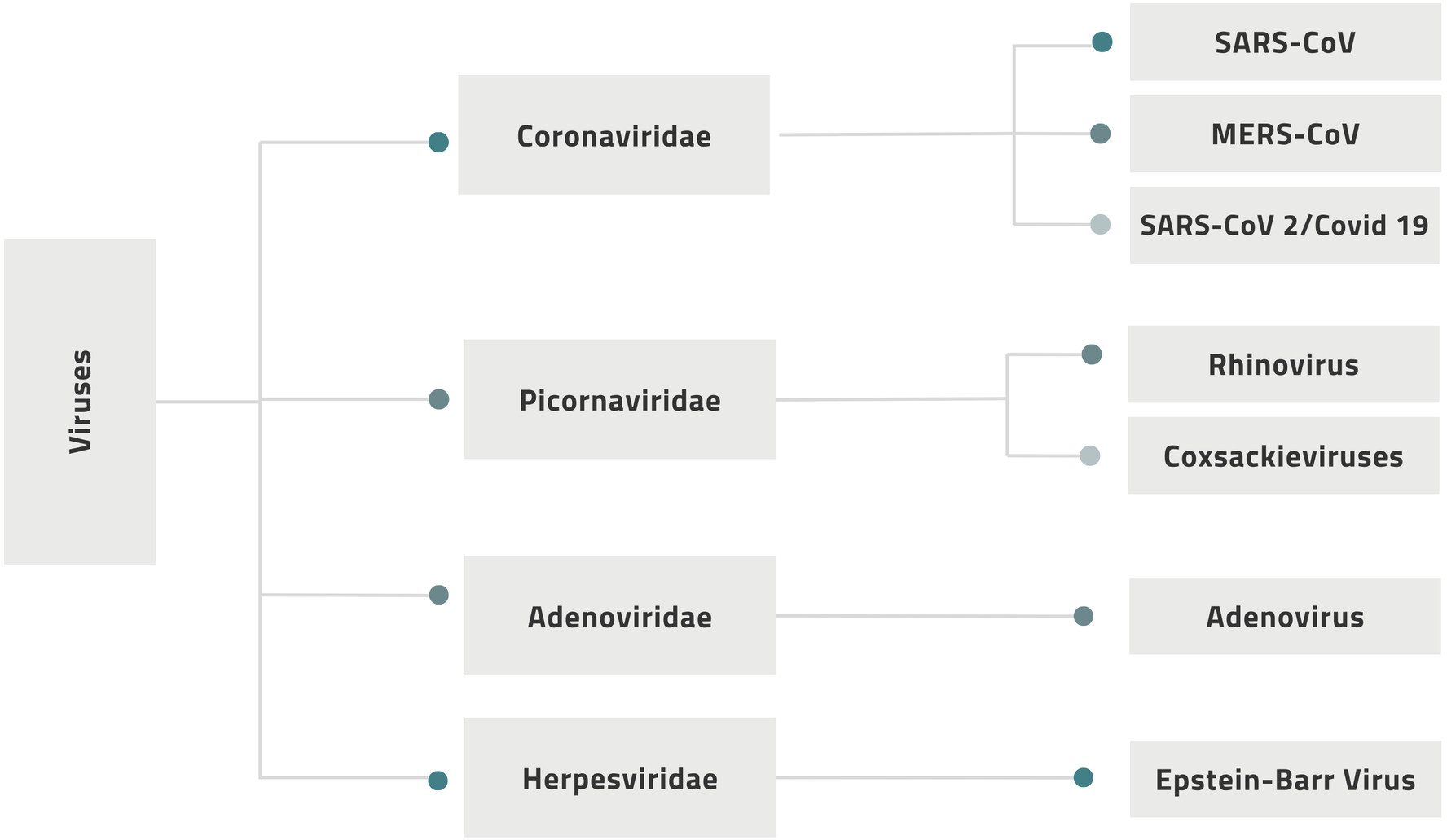
Clinical features & Lab diagnosis

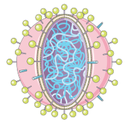
Treatment & prevention



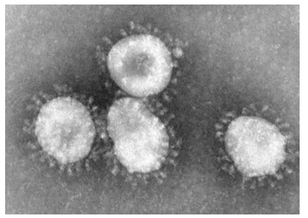
OVERVIEW

extra slide



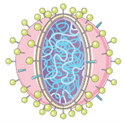


CORONAVIRUS



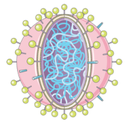
Family	Structural features	Transmission	Clinical symptoms	Epidemiology
Coronaviridae	Enveloped virus with positive polarity ss-RNA genome	Inhalation of infectious aerosol droplets.	The 2nd cause of common cold. - 1st is Rhinovirus -	causes **zoonotic disease** (infects humans and animals including birds, camels, pigs, bats, cats and others).

Positive polarity means the host cell can immediately translate the viral RNA into viral proteins without needing to create a complementary strand.



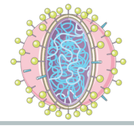
SARS-COV Severe Acute Respiratory Syndrome

Overview	• In winter of 2002, a new respiratory disease known as (SARS) emerged in China after a new mutation of coronavirus. • The disease spread worldwide due to travelling.
Reservoir	The animal reservoir may be rats or cats
Clinical symptoms	• SARS starts with high fever followed by cough with difficulty in breathing (atypical pneumonia). • Associated with high mortality due to respiratory failure.



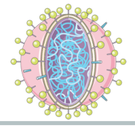
MERS-COV Middle East Respiratory Syndrome

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-coronavirus** (MERS-CoV). It was caused by a coronavirus.
Reservoir	Virus closely related to several **bat** coronaviruses & **camels** 439: Mutations happen inside animal's body for example, MERS-CoV's mutation happened 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 mainly lower respiratory tract more than upper, kidney, intestinal and liver cell.
Epidemiology	• So far, all the cases have been linked to countries in and near the Arabian Peninsula. • Highly infectious • Incubation period 2-14 days.
Transmission	• The virus spread from ill people to others through close contact. • There's no evidence of sustained spreading in community settings. • Evidence also suggest that the virus can be acquired from direct close contact with animals (e.g. Camels, Bats)
Risk groups	• Individuals with weak immune systems • People with pre-existing medical conditions (or comorbidities) such as diabetes, cancer, chronic lung, heart, and kidney disease.



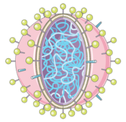
MERS-COV CONT.. Middle East Respiratory Syndrome

Clinical features	• Symptoms may include fever, cough, and shortness of breath. • Some people also had gastrointestinal symptoms including diarrhea and nausea/vomiting. • Some infected people had mild symptoms (such as cold-like symptoms) or no symptoms at all and they recovered completely. • Most people with comorbidities developed severe acute respiratory illness. (لديهم امراض مصاحبة) 439: examples of comorbidities are: 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	• Detection of the viral nucleic acid (NA) by RT-PCR • Other methods: Isolation of the virus from NPA by cell culture.
Treatment	• No specific antiviral treatment, only supportive treatment. • 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 • Boil the camel milk very good • 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



COVID 19 / SARS-COV-2

Overview	In 2019, a new coronavirus emerge in Wuhan, China and cause a respiratory disease known as COVID 19.
Epidemiology	Highly infectious and cause pandemic infection & incubation period is from 2-14 days.
Transmission	Animal (bats) to human or human to human through inhalation of infectious aerosol droplets and close contact.
Clinical symptoms	The symptoms vary from asymptomatic to mild or severe conditions, the main symptoms include fever, headache, sore throat, myalgia, progressive dry cough, diarrhea, loss of taste and smell, vomiting, short of breathing, pneumonia.
Complications	Difficulty in breathing, severe pneumonia and death.
Risk groups	• Individuals with weakened immune systems & smokers • People with pre-existing medical conditions (or comorbidities) such as diabetes, cancer, chronic lung, heart and kidney disease, obesity.
Lab diagnosis	• Detection of the viral nucleic acid (NA) by RT-PCR. • Other methods: Isolation of the virus from NPA by cell culture .

 COVID 19 / SARS-COV-2 CONT..

Treatment

- No specific antiviral therapy,
- Some patients got benefit from dexamethasone treatment.

Prevention

People are advised to protect themselves by taking preventive actions:

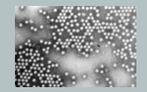
- Always wash hands or use hand sanitizer and often wear a face mask
- make social distancing.

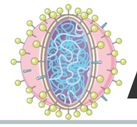
Vaccine

Approved by Saudi FDA:

- Pfizer an mRNA vaccine.
- AstraZeneca a harmless viral vector vaccine.
- Moderna mRNA vaccine

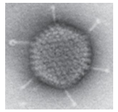
RHINOVIRUS, COXSACKIEVIRUSES & OTHER PICORNAVIRUSES

	Coxsackieviruses & other Picornaviruses 	Rhinovirus 
Family	Picornaviridae	
Structural features	Non-enveloped virus with +ve polarity ssRNA genome.	
Transmission	Inhalation of infectious aerosol droplets. Droplet transmission occurs when a person is in in close contact(within 1 m) with someone who has respiratory symptoms	
Clinical symptoms	▪ **Coxsackieviruses cause herpangina and pharyngitis and hand foot and mouth disease** ▪ Echovirus & other Enteroviruses cause respiratory symptoms Herpangina: small blister like ulcer appear on tongue and roof if oral cavity	▪ **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.	
Notes	Other Picornaviruses would be: Coxsackieviruses group A & B, Echovirus, Enteroviruses.	More than 100 serotypes available.

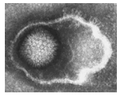
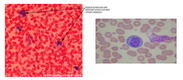
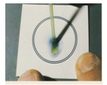


ADENOVIRUS

★**Note :**
EBV and adenovirus are the only DNA viruses (mentioned in our lectures) , the rest are RNA viruses

Family	Adenoviridae
Structural features	Non-enveloped virus with **ds-DNA** genome. 
Pathogenesis	It infects epithelial cell lining respiratory tract, conjunctiva, urinary tract, gastrointestinal tract, genital tract.
Clinical symptoms	1- Pharyngitis and tonsillitis 2- Pharyngo-conjunctivitis 3- Conjunctivitis one of the most dangerous adenoviruses cause red eyes 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) ★Does everything other than meningitis and encephalitis "IT'S NOT RELATED TO THE BRAIN"
Lab diagnosis	▪ Routine testing by direct detection of the Ag from NPA by direct IFA ▪ Other detection method: Tissue culture, PCR
Treatment & prevention	No specific treatment or vaccine

EPSTEIN-BARR VIRUS (EBV): ★Infectious mononucleosis

Family	Herpesviridae
Structural features	▪ Enveloped, icosahedral **dsDNA** virus ▪ Lymphotropic Causes lymphocytosis that produce atypical lymphocytes (especially B cells) which results in production of non-specific antibodies (Heterophile antibodies). ▪ Has **oncogenic properties:** Burkitt's lymphoma, Nasopharyngeal carcinoma 
Epidemiology	Distribution worldwide (Mainly in teenagers & young adults) ⦿ low socioeconomic ⇒ children & teenagers (early childhood) ⦿ High socioeconomic ⇒ adult/adolescence 443 note :It does not go away completely, it hides in the lymphatic system until something triggers it and comes back
Transmission	▪ Saliva (kissing disease) ▪ Blood (rarely)
Lab diagnosis	**1.Hematology tests:** ↑ WBC lymphocytosis (Atypical lymphocytes) ,it's normally 6-11, but in this case it might reach 25-100  **2.Serology tests:**   - **Non-specific AB test:** Heterophile AB test & Paul Bunnell test & monospot test - **EBV-Specific AB test:** Detection of specific **IgM** to EBV capsid antigen by **ELIZA** **3.PCR:** Detecting the DNA ★ The gold standard method is ELIZA (direct linked immunoassay)

EPSTEIN-BARR VIRUS (EBV): CONT..

Clinical features	◎ **Immunocompetent Host:** ▪ Asymptomatic It could be Asymptomatic in some patients, and infectious mononucleosis in others. ▪ **Infectious mononucleosis (glandular fever)** ▪ IP=4-7 weeks ▪ Fever, sore throat, tonsillitis, **pharyngitis**, malaise,hepatosplenomegaly, abnormal LF (liver function), hepatitis ▪ **Complications:** Acute airway obstruction,splenic rupture,CNS infection  ◎ **Immunocompromised Host:** ▪ Lymphoproliferative disease (LD) characterized by the abnormal proliferation of lymphocytes into a monoclonal lymphocytosis ▪ Oral Hairy leukoplakia (OHL) It causes white patches on your tongue. Sometimes the patches happen in other parts of your mouth. 
Treatment & prevention	• No specific treatment & prevention • No vaccine available

Q1: C
Q2: B
Q3: D

MCQs:

Q1/ Hand, foot and mouth disease or herpangina is caused by?

A	Rhinovirus	B	MERS-CoV	C	Coxsackieviruses	D	Epstein – Barr Virus (EBV)

Q2/ Which of the following is a DNA virus?

A	Measles virus	B	Adenovirus	C	Mumps virus	D	Influenza A

Q3/ Adenovirus can cause all of these except ?

A	Pneumonia	B	Conjunctivitis	C	Gastroenteritis	D	Encephalitis

Q4: A
Q5: D
Q6: B

MCQs:

Q4/ Infectious mononucleosis (glandular fever) is a disease caused by which virus?

A	EBV	B	MERS-CoV	C	Adenovirus	D	Influenza B

Q5/ Which one of the following has oncogenic properties?

A	Mumps virus	B	Rhinovirus	C	Coxsackieviruses	D	EBV

Q6/ Camel is a reservoir of :

A	Rhinovirus	B	MERS-CoV	C	EBV	D	Covid-19

Q7: D
Q8: B
Q9: C

MCQs:

Q7/ The mode of transmission of EBV is through :

A	Saliva	B	Animal excretion	C	Blood	D	A & C

Q8/ Which of the following is the primary cause of common cold ?

A	Mumps virus	B	Rhinovirus	C	Coxsackieviruses	D	EBV

Q9/ Which of the following is the secondary cause of common cold ?

A	Mumps virus	B	Rhinovirus	C	Coronavirus	D	EBV

SAQs:

Q1/ A 6-year old patient came to the hospital with glandular fever, sore throat and pharyngitis what is the most likely cause?

EBV

Q2/ Give two examples of DNA viruses?

Adenovirus & EBV

Q3/ List 3 non-specific Ab serology tests used to diagnose EBV:

Heterophile AB test & Paul Bunnell test & monospot test

Meet The Team :)

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