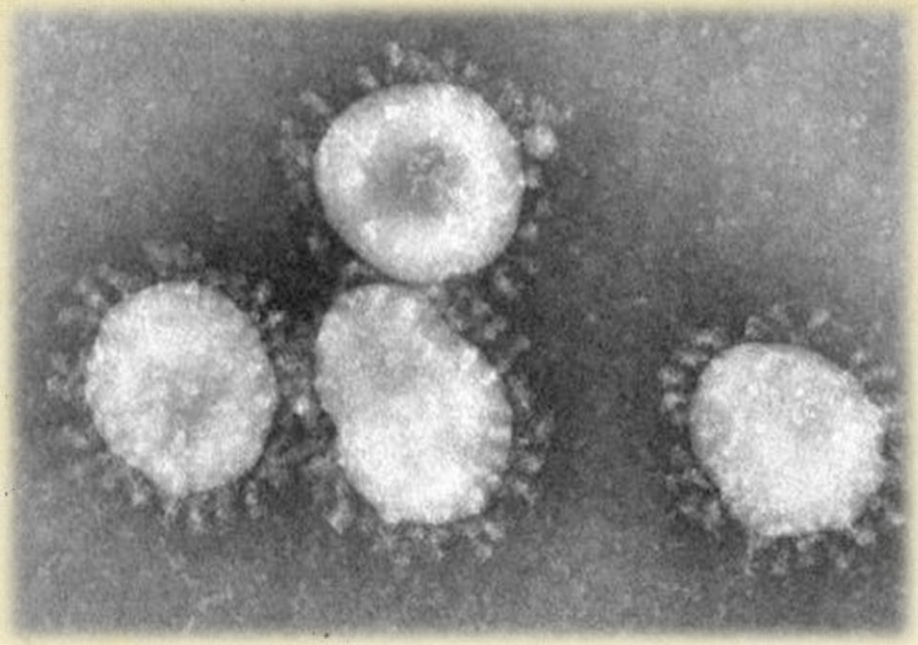


Coronaviruses

Co Vs.

Learning Outcomes

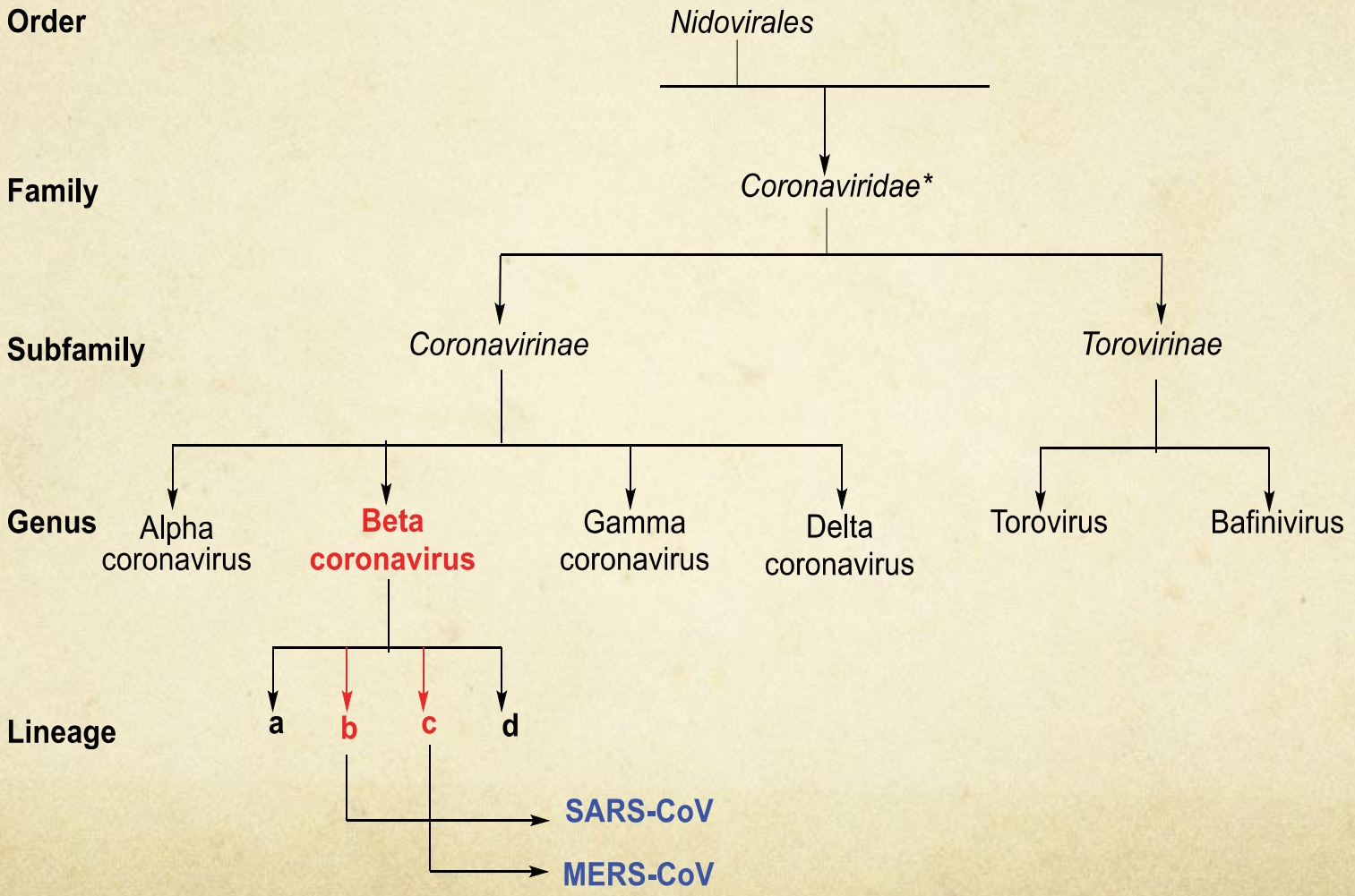
- 4th Example of Human Specific Disease:

- Coronaviruses
- Classification
- morphology and structure.
- Laboratory diagnosis.
- Treatment and Prevention

What are Coronaviruses?

- Human coronaviruses (HCoVs) are known respiratory pathogens associated with a range of respiratory outcomes.
- A Coronavirus is a kind of common virus that causes an infection in your nose, sinuses, or upper throat. Most Co Vs are not dangerous.
- In the past 14 years, the onset of severe acute respiratory syndrome Co Vs (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) have thrust HCoVs into spotlight of the research community due to their high pathogenicity in humans.
- Most coronaviruses first replicate in epithelial cells of the respiratory or enteric tracts.

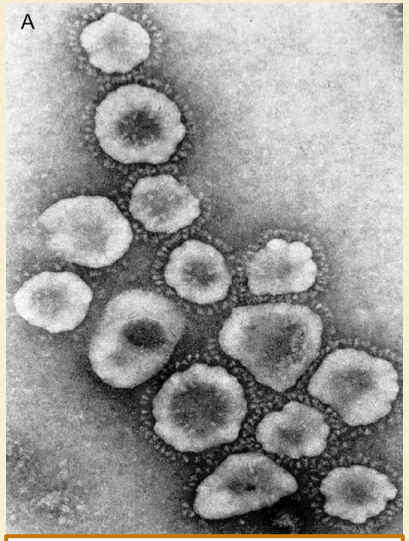
The Classification



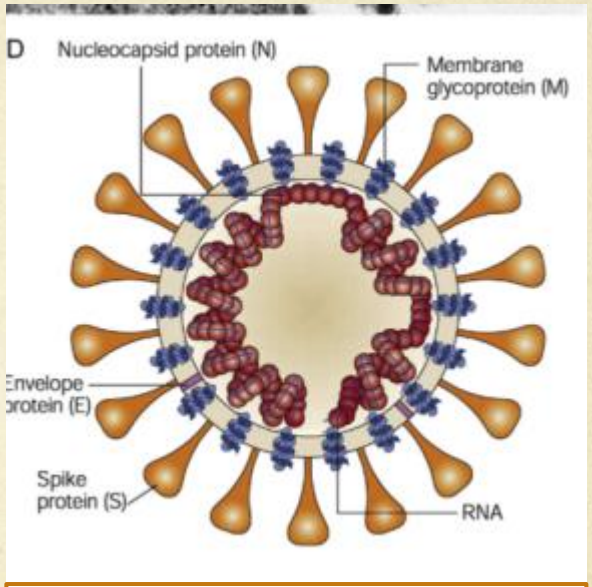
- SARS-Cov
- Appeared in 2002 in China. Emerged from animal reservoir. Incubation period 2-14 days, droplet infection. Affected 8000 patients in 29 countries of the world . no vaccine.
- MERS-Cov
- Appeared in 2012. Human –to-human transmission confirmed. Reservoir of infection not yet determined. (from Bats to Camels to Humans?) .Incubation period (2-14 days) not yet confirmed.

Structure and genome:

- Co Vs are enveloped viruses with a positive-sense single-stranded RNA genome and with a nucleocapsid of helical symmetry.
- The genomic size of Co Vs ranges from approximately 26 to 32 kilobases, the largest for an RNA virus.
- four genes of structural proteins are S(spike) –E(envelope) –M (membrane) –N (nucleocapsid)



Negative contrast electron microscopy of SARS coronavirus (SARS-CoV), showing the large petal-shaped surface projections (spikes, peplomers).



Model of coronavirus virion structure, showing the supercoiling of the viral nucleocapsid under the envelope.

Specimens

- Boold
- Stool
- Nasopharyngeal swab
- Tracheal aspirate

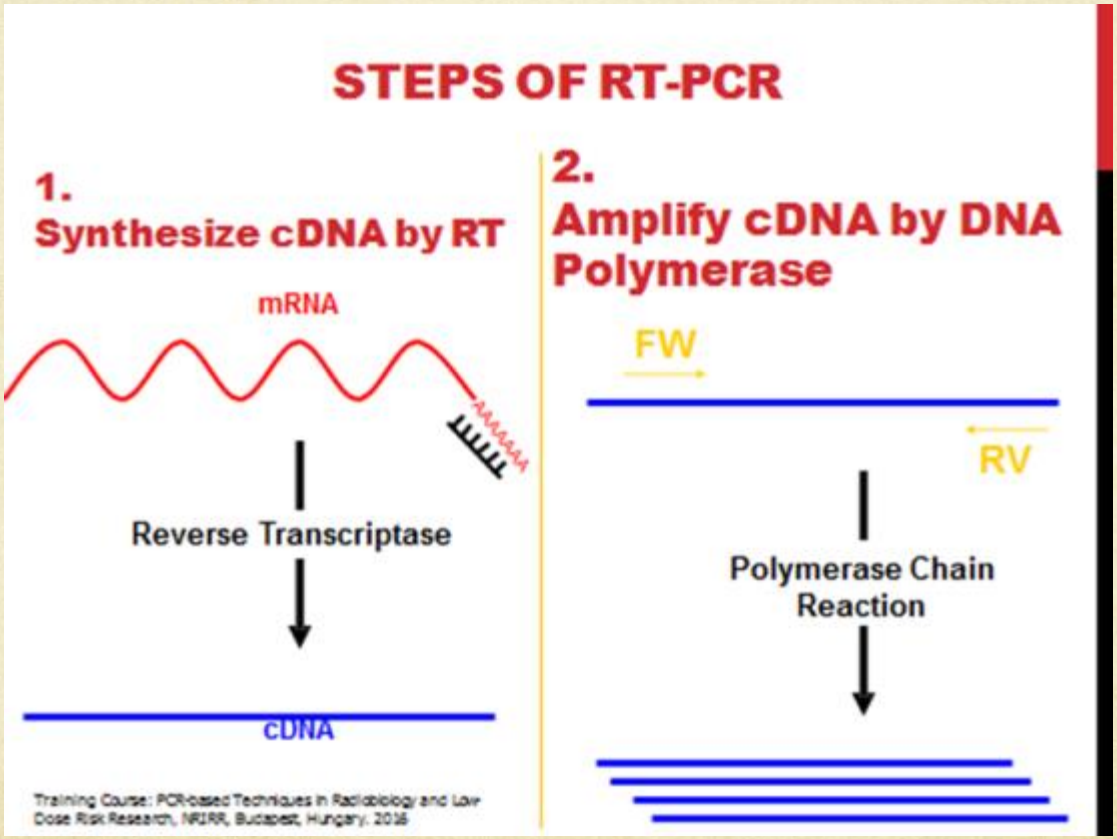
Laboratory diagnosis:

- 1- Direct Detection by ELISA
- showed the presence of SARS-CoV antibodies against the N protein in 50% to more than 80% of sera collected during the first week of illness, and in more than 50% of respiratory and stool specimens collected during the second and third weeks of illness.

- 2-detection in respiratory secretions by RT-PCR assay systems.
- MERS-CoV RNA can be detected in blood, urine, and stool
- as well as in respiratory aspirates by RT-PCR.

- Technique used in molecular biology to detect RNA expression by generation of complementary DNA (cDNA) transcripts from single stranded RNA
- mRNA is the message sent for translation – gene expression
- DNA polymerase cannot read RNA
- RT-PCR reverse transcribes mRNA to cDNA and then amplifies this using traditional PCR.

RT-PCR


STEPS OF RT-PCR
1.
Synthesize cDNA by RT
mRNA
AAAAAA
Reverse Transcriptase
cDNA
2.
Amplify cDNA by DNA Polymerase
FW
RV
Polymerase Chain Reaction
Training Course: PCR-based Techniques in Radiobiology and Low Dose Risk Research, NRRR, Budapest, Hungary, 2016

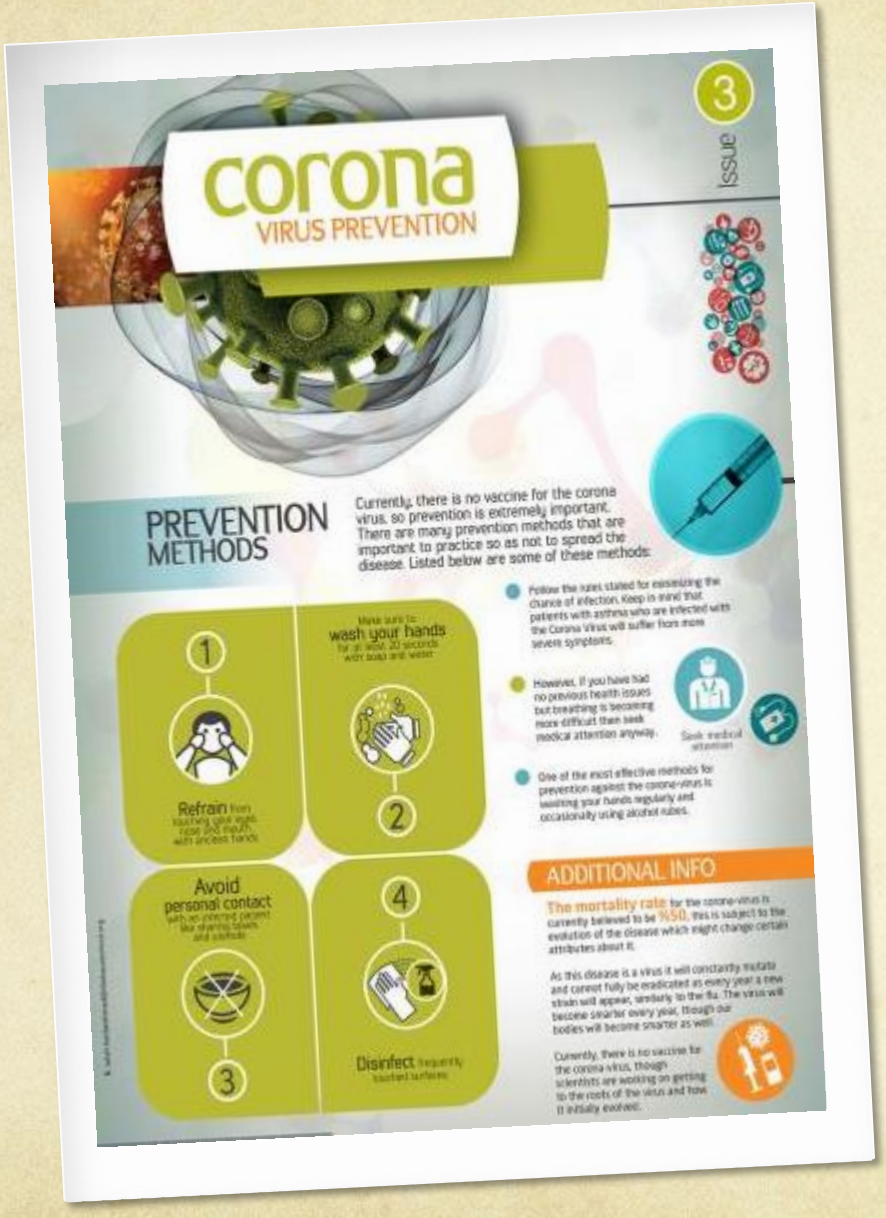
- 3- Isolation: CoV are difficult to grow in cell culture. Reliable isolation of the virus is accomplished using human embryonic tracheal organ cultures.

Treatments:

- No specific treatments.
- Most people with illness will recover on their own.
- Some things can be done to relieve symptoms such as :
  - Taking pain and fever medications(caution: aspirin should not be given to children).
  - Using a room humidifider or taking a hot shower to help ease a sore throat and cough.
  - During sick, drink plenty of liquids, stay home and rest.
  - Contact health care provider.

Who can we prevent Co Vs?

- Keep away from someone with a heavy cough.
- Use a tissue to cover the nose/mouth when coughing, sneezing, wiping and blowing noses.
- If a tissue isn't available, cough or sneeze into the inner elbow rather than the hand.



- Wash hands with hot water and soap at least six or seven times a day
- Disinfect common surfaces as frequently as possible.
- Wash hands or use a sanitiser when in contact with common surfaces like door handles.

Thank you

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