Viruses- Guided Notes 2025

Viruses are much smaller and simpler than cells

Viruses are genes wrapped in a protein coat:
-A _____ is a small, infectious agent made of nucleic acid and protein.

Viruses come in many shapes and sizes
-Each virus has genetic material inside, surrounded by a protein coat, or _____

Viruses infect specific host cells
-The proteins surrounding each virus are shaped to bind with proteins on host cells.
-Each virus has specific target cells that it can match up with to infect.
-This virus is a bacteriophage – it can only bind to and infect _____ cells.

Each virus has a host range
-Viruses can infect plants, bacteria, and human host cells.
-The host range is the types of cells or organisms a virus can infect.

Reservoir hosts help spread viruses to other species
-The Zika virus infects human cells and causes birth defects.
-It is carried and spread by mosquitoes, without harming the mosquitoes.
-The mosquito is a _____ host, providing a continual source of Zika virus infection for humans.

Viruses use cells to replicate
-Viral genes contain instructions for making viruses.
-Viruses cannot replicate on their own, though. They can only replicate by infecting _____ cells.

Viruses use cells to replicate:
-Viral Replication:

1) Virus attaches to host.
2) Virus injects its nucleic acids into the cell.
3) Host transcribes and translates viral DNA as if it were its own.
4) New viruses assemble.
5) Viruses leave the cell.

Viruses can kill cells right away
-Viruses following the lytic pathway burst from their host cells soon after infection.

Viruses can lurk inside cells for _____
-Viruses following the lysogenic pathway “hide” as they replicate, without damaging the host cell.

Virus DNA can combine with host DNA
-A prophage is the DNA of a lysogenic bacteriophage that is inserted into the host chromosome. The prophage replicates when cells divide.

Viruses might or might not kill host cells

-Depending on the condition of the host cell, viruses can shift from a lysogenic infection to the _____ pathway.

Animal viruses can cause illnesses

-When virally infected cells begin to die, symptoms will reflect they type of cells that are destroyed.

Example: HIV infects human T cells

-T cells are needed in the immune system.

-Patients infected with HIV show symptoms that reflect a defective immune response (AIDS).

Some viruses might linger for years

-HIV often remains latent; it does not immediately induce disease symptoms.

Replication of RNA viruses is complex

-HIV contains _____ as its genetic material.

-When HIV does replicate, it requires a few more steps than DNA virus replication does.

-Attachment and penetration

1) Virus binds receptors on cell membrane and enters cell. Enzymes remove viral protein coat.
2) Reverse transcriptase transcribes viral RNA to double-stranded DNA.
3) Double-stranded DNA is incorporated into host cell's genome.

Synthesis

4) Viral genes are transcribed to RNA.
5) Some RNA is packaged into new viruses. Other RNA is translated into HIV proteins at ribosomes in cytoplasm.

Assembly

6) Protein coats surround viral RNA and enzymes. Envelope proteins migrate to cell membrane.

Release

7) New viruses bud from host cell.

Viral RNA is converted to DNA

-HIV must produce a DNA copy of its RNA before incorporating genes into the host's DNA.

-An enzyme called reverse transcriptase carries out the reaction.

Vaccines help prevent viral infections

-A _____ contains inactive virus or viral proteins.

-These molecular components of a virus produce an immune response without causing a disease.

Vaccines jump-start the immune system

-Vaccines "_____" the immune system to recognize a virus.

-If you are exposed to the real virus after being vaccinated, your body will be primed to destroy it before it can infect your cells.

To make a vaccine, scientists inoculate host cells with the virus

-Scientists inject flu viruses into fertilized chicken eggs which are the host cells. The viruses replicate in the eggs.

-Harvesting viruses from the eggs provides the raw materials to produce a vaccine.

Human papilloma viruses (HPV) cause cancer

-Viruses like HPV cause cells to _____ too much, instead of killing the cells.
-HPV is sexually transmitted, and can infect epithelial and cervical cells. It causes cervical, oral, and anal cancers.
-HPV infection can be prevented by vaccine, condoms, and abstinence.

Anti-HIV drugs slow viral replication

-For patients already infected with a virus, vaccines won't be helpful.
-Antiviral drugs prevent the virus from interacting with the host cell and using it for replication.

Anti-HIV drugs block the replication steps

-Drugs can block viral _____ to cells, reverse transcription, integration of viral DNA, or viral release.
-Antiviral "cocktails" are combinations of different drugs that interfere with one virus.

Antibiotics kill bacteria, not viruses

-Antibiotics are drugs that block bacterial proteins from functioning, which prevents bacterial cells from carrying out life's processes.
-Antibiotics are useful for treating bacterial infections.

Antiviral gene therapy is a potential treatment strategy

-Gene therapy would change the _____ in human cells, so they cannot make proteins the virus needs for infecting them.
-The T cell shown here is missing one of the proteins that HIV binds to.

Viruses cause disease in plants

-The color patterns on these plants might look interesting to us, but they're caused by viruses. The pale areas are dead plant cells.
-Viral infections often spread on the mouths of plant-eating insects.

Plants can fight viruses too

-Although plants do not have an active immune system, their cells can undergo apoptosis (suicide) when infected.
-Some plants may prevent viral infections from spreading by degrading viral mRNA.

Viroids are infectious RNA molecules

-_____ are circles of RNA that can infect cells.
-Viroids do not encode proteins, but they do use host cells to replicate.

Viroids can cause diseases

-The potato spindle viroid kills plant cells by preventing production of essential plant proteins.

Prions are infectious protein molecules

-A _____ is a normal cellular protein that sometimes adopts an abnormal shape.
Upon contact with an abnormally formed prion, a normal prion switches to the abnormal shape.

Prions can cause diseases

-Prions are responsible for mad cow disease and some cases of Creutzfeldt-Jakob disease in people.
-It is very difficult to destroy prions. They are unaffected by _____, radiation, and chemicals.