

Unit 4 – The Natural Environment and Species Survival

HIV AND AIDS:

What is the structure of HIV?

- Glycoprotein and a lipid bilayer constitute a HIV envelope derived from the host membrane.
- 2 copies of mRNA
- Capsid is made up of protein units.
- Layer of viral protein
- Viral proteins inside the capsid e.g. reverse transcriptase and integrase

How is AIDS formed?

- Acquired immune deficiency syndrome is caused by infection with HIV.

How does HIV invade T helper cells?

- Particular glycoprotein molecules called gp120 located on the virus surface bind to the CD4 receptors on the surface of the T helper cells.
- They then combine with a second receptor.
- This allows the envelope surrounding the virus to fuse with the T helper cell membrane, enabling the viral RNA to enter the cell.
- Macrophages also have CD4 receptors so HIV can also infect them.

How does HIV hijack the cell's protein synthesis?

- HIV nuclear material is in the form of RNA not DNA.
- The first step is to reverse transcribe and manufacture DNA from the RNA template.
- The virus uses an enzyme called reverse transcriptase.
- Once the HIV DNA strand is produced, it is integrated into the host's DNA by another HIV enzyme integrase.
- Once the HIV genome is integrated into the host cell's genome, it can be transcribed and translated to produce new viral proteins.

PHASES OF HIV:

What is the acute phase of HIV?

- HIV antibodies appear in blood after 3-12 weeks.
- Experience of symptoms
- Rapid replication of the virus and loss of T helper cells
- Infected T helper cells are recognised by T killer cells which start to destroy them.

What is the chronic phase of HIV?

- The virus continues to reproduce rapidly.
- There may be no symptoms during this phase.
- Dormant diseases like TB and shingles can be reactive.
- This phase can last for many years.