Rabies Virus

Rabies virus is an enveloped negative sense single stranded RNA virus that causes fatal rabies disease in humans and animals. The virus has helical symmetry and has a characteristic bullet shaped viral envelope. This virus is transmitted when a human or animal is injected with infected saliva, usually during a bite. The virus binds to acetylcholine receptors in cells and replicates at the site of inoculation. The virus then travels quickly along the peripheral nervous system via retrograde axonal transport to the CNS. From the CNS, the virus spreads to other organs including the salivary glands. These tissues in the mouth and cheeks receive high concentrations of the virus allowing it to be further transmitted in saliva. Neurons infected by the rabies virus can be identified via visualization of Negri bodies, which are eosinophilic inclusion bodies found in the cytoplasm of neurons that represent ribonuclear proteins produced by the virus. The Negri bodies are often found in purkinje cells of the cerebellum and can be used as definite histological proof of rabies infection.

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Characteristics

Enveloped
Envelope
This virus has an envelope covering its protein capsid.

RNA Virus
RNA-rhino
Rabies virus has an RNA genome.

SS Negative Linear
SS Negative (-)
Negative-sense 3 to 5 viral RNA genome is complementary to viral mRNA. Therefore, the genome must be converted to positive-sense RNA by an RNA polymerase before translation can occur. Viruses with negative-sense genomes must carry an RNA polymerase inside the virion in order to replicate.

Helical
Helical-shape
Rabies virus has helical symmetry with infectious particles that have a cylindrical shape.

Bullet-Shaped Envelope
Bullet-Shaped Envelope
The rabies virus has a characteristic bullet-shaped envelope.

Binds to Acetylcholine Receptor
A-seagull-cola receptor
Rabies virus attaches to the acetylcholine receptors of cells.

Retrograde Fashion
Backwards bullet
Retrograde transport is the movement of molecules or organelles away from the synapse of a neuron toward the cell body and is mediated by dynein. The rabies virus travels quickly along the peripheral nervous system via retrograde axonal transport to the CNS.

Migrates to Saliva
Saliva
From the CNS, the rabies virus travels to other organs including the salivary glands. These tissues in the mouth and cheeks receive high concentrations of the virus allowing it to be further transmitted in saliva. Therefore, rabies virus is normally transmitted via a bite from an infected host.

Diagnosis

Negri Bodies

Nigerian

Neurons infected by the rabies virus can be identified via visualization of Negri bodies, which are eosinophilic inclusion bodies found in the cytoplasm of neurons that represent ribonuclear proteins produced by the virus.

Cytoplasmic Inclusions in Neurons

Ink-blot

Neurons infected by the rabies virus can be identified via visualization of Negri bodies, which are eosinophilic inclusion bodies found in the cytoplasm of neurons that represent ribonuclear proteins produced by the virus.

Purkinje Cells of Cerebellum

Purple pinky Silver-cerebellum-bell

Negri bodies are often found in purkinje cells of the cerebellum and can be used as definite histological proof of rabies infection.