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NIPAH VIRUS

Medicine

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KEYWORDS

INTRODUCTION

A disease outbreak in Malaysia's states of Perak, Negeri Sembilan, and Selangor as well as Singapore's pigs and pig farmers led to the discovery of the Nipah Virus (Niv) in 1998. More than 1 million pigs were killed to help control the outbreak, which by mid-1999 had resulted in 300 human cases and more than 100 fatalities. The epidemic also had a significant economic impact. In India, there were more than 200 cases between 2001 and 2023, with a 75% fatality rate. The disease has a high mortality rate and is brought on by the bat-borne Nipah virus, which also infects other animals. The species belongs to the Paramyxoviride family and the Henipavirus genus. A single nonsegmented, single-stranded, negative sense RNA makes up the genome.

It is enveloped with shaped varying to filamentous or spherical-contains helical nucleocapsid.

Ephrins B2 and B3 have been identified as the primary receptors for the Nipah virus; B2 has a complicated distribution of expression whereas B3 has a high expression in forebrain areas. The evolution of viruses takes place over a decade, and the driving forces behind it include

Contact with other viruses: Recombination between NiV and other viruses could lead to the development of new genes or proteins.

Environmental modifications: Environmental modifications, such as deforestation, may affect the bat population, which may in turn affect the virus.

Human intervention: Human action, like the slaughter of pigs, could also favor more virulent types of bacteria.

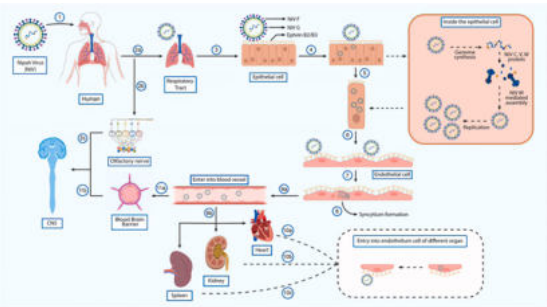
There are currently 2 Nipah virus strains.
Malaysian strain (NiVM): This strain was discovered for the first time during the Malaysian outbreak in 1998–1999. The Bangladesh strain is thought to be more virulent than this one.

Bangladesh strain (NiVB): This strain was originally discovered in Bangladesh during the outbreak that year. The Malaysian strain is expected to be less virulent than this one.

According to estimates, the Nipah virus mutates between 10-7 and 10-8 times per site per generation. Accordingly, each time the NiV virus multiplies, there is an average 1 in 10 million to 1 in 100 million chance of a mutation taking place at a specific spot in the genome.

Pathophysiology

NiV can be spread naturally by the inhalation or ingestion of infected material, as well as through direct contact with the secretions or excretions of NiV-infected animals.



Nipah virus replication

Various organs experience Nipah virus replication. It first enters the body through the upper respiratory tract's epithelium (Figs. 1-3,4). The virus then spreads throughout the body as it enters blood vessels and can harm the heart, kidneys, spleen, and other organs, primarily in the CNS via the blood-brain barrier. Multifocal encephalitis is the outcome of NiV infection of the CNS's microvascular endothelial cells, which affects both humans and several other species.

Immunity

The host cells are constantly being protected by the immune system. Innate and adaptive immune reactions are triggered when a pathogen enters and multiplies within the host system. In order to circumvent the immune system and establish their harmful potential inside the host, microorganisms have developed unique ways.

Symptoms

Typically, 4 to 14 days after a viral exposure, symptoms start to manifest. Initial symptoms of the sickness include 3–14 days of fever, headache and vomiting. It frequently includes respiratory illness symptoms such sore throat, cough, and dyspnea. Drowsiness, disorientation, abnormal pupillary reflexes seizures, myoclonic jerks and mental confusion may potentially be symptoms of an encephalitis-related brain swelling event, which can quickly progress to coma within 24 to 48 hours.

In 45-75% of instances, death may occur. Those who have survived the nipah virus may experience long-term negative effects such as persistent convulsions and personality abnormalities.

Diagnosis

Real-time polymerase chain reaction (RT-PCR) laboratory tests from blood, urine, cerebrospinal fluid, and throat, nasal, and throat swabs can be performed in the early stages of the illness. An enzyme-linked immunosorbent assay (ELISA), which is used to identify the NiV antigen and assess the antibody response, could be used to conduct an antibody test later and after the sickness has healed. Vero cells are frequently used in virus neutralization tests (VNT), where the avoidance of the cytopathic effect by the test serum is regarded as a positive neutralization.Anti-NiV antibodies have been utilized in immunohistochemistry (IHC) to stain formalin-fixed tissues of the CNS, lung, spleen, lymph nodes, kidney, and heart with the purpose of detecting viral antigens. It is feasible to recognize NiV-associated proteins in tissue slices sections, such as necrosis and vasculitis.

The Nipah virus is now untreatable; only supportive care and symptomatic treatment are available.There are currently no vaccinations that have been licensed, and immunotherapeutic therapies are being developed and evaluated.