

## Nipah virus and its ophthalmic manifestations

## Virus Nipah e suas manifestações oftalmológicas

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Nipah virus (NiV) is a zoonotic RNA virus classified within the family *Paramyxoviridae* and the genus *Henipavirus*. It was initially discovered during an outbreak in Malaysia in 1998 and has since been associated with epidemics in various countries throughout South and Southeast Asia, frequently causing high fatality rates. Fruit bats belonging to the genus *Pteropus* act as the main natural reservoir, while human infection can lead to severe neurological and respiratory illnesses, representing a major public health concern.<sup>(1-3)</sup>

The epidemiology of NiV is variable. In Malaysia and Singapore, transmission has been predominantly linked to infected pigs, which acted as amplifying hosts, with limited evidence of sustained human-to-human spread. In contrast, in countries such as Bangladesh and India, human infection is often associated with the consumption of date palm sap contaminated by bats and frequently involves person-to-person transmission, particularly in healthcare settings. Genetic differences between viral strains appear to influence regional transmission patterns, clinical presentation, and disease severity.<sup>(1-3)</sup>

The disease has an incubation period of 4 to 21 days and typically begins with nonspecific symptoms, which can rapidly progress to acute encephalitis and/or respiratory failure, with mortality rates reaching up to 70%. Diagnosis is primarily based on molecular techniques, such as RT-PCR, supplemented by serological and immunohistochemical methods, whose use is limited due to the requirement for biosafety level 4 laboratories. Treatment remains essentially supportive, as no widely available antiviral therapies or prophylactic measures, including vaccines, exist. However, monoclonal antibodies and experimental antivirals have shown promising results in preclinical models.<sup>(2-4)</sup>

Disease control requires an integrated approach, including active epidemiological surveillance, prevention of transmission in healthcare settings, community education, and safe animal-handling practices. From a pathophysiological perspective, NiV infection is associated with systemic vasculitis and a strong tropism for the central nervous system, characterized by diffuse endothelial infection in small vessels, leading to thrombosis and cerebral microinfarctions.<sup>(5-8)</sup>

Clinically, characteristic neurological signs may include systemic arterial hypertension, tachycardia, segmental myoclonus, hypotonia, areflexia, and focal neurological deficits, often accompanied by magnetic resonance imaging findings consistent with small-vessel infarctions.<sup>(5-8)</sup>

Ophthalmological manifestations reflect neurovascular involvement and include pupillary abnormalities, oculomotor palsies, abnormal oculocephalic reflexes, nystagmus, and persistent diplopia, particularly due to sixth cranial nerve palsy. In late

presentations, Horner's syndrome (ptosis, miosis, and anhidrosis) and occlusion of the central retinal artery or its branches have been reported, suggesting a common vasculitic mechanism affecting both the central nervous system and ocular circulation. Early recognition of these ophthalmic changes is crucial, as they may serve as markers of neurological severity in this highly lethal multisystem infection.<sup>(5-8)</sup>

Understanding the clinical and ophthalmological phenotypes of NiV infection, a pathogen classified as a priority in the World Health Organization's strategic plan, is crucial not only for the proper management of patients during outbreaks but also for the planning of healthcare systems capable of protecting vision and minimizing long-term sequelae as future epidemic episodes emerge and spread globally.

## AUTHORS' CONTRIBUTION

Thiago Gonçalves dos Santos Martins: Conceptualization, writing of original draft, Writing review & editing. Diogo Gonçalves dos Santos Martins: Conceptualization, writing of original draft, Writing review & editing. Thomaz Gonçalves dos Santos Martins: Conceptualization, writing of original draft, writing review & editing.

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