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## Nipah Virus—An Epidemic in the Making and a Vaccine Strategy

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### Perspective

A new emerging virus holds the potential to cause epidemics of unseen proportions in the tropical lands. First isolated from a patient in Kampung Sungai Nipah village of Malaysia in 1998, the Nipah virus (NiV) affects the neurological and respiratory systems of humans [1] and was determined to lead to a case fatality ratio (CFR) of ~40% [2]. Categorized as the henipavirus genus of the Paramyxoviridae family, the primary reservoir for Nipah virus is found to be bats (*Pteropus* spp.), and pigs as intermediate hosts [3,4].

The NiV was next found to have spread to Bangladesh where infections have been reported every year since 2001. There the virus was surmised to be transmitted from bats to humans through consumption of palm sap, the main ingredient of a local Bangladeshi drink, contaminated by infected bats [5]. As CFR rose to almost 100% in Bangladesh [5], which may have been partially due to inadequate public health infrastructure, human-to-human transmission was suspected in 22% cases arising from viral infection in epithelial cells and expulsion of virion laden cough [5-8]. In 2018 the virus was found to have infected a large number of people in Kerala where out of 19 persons reported infected by 2<sup>nd</sup> June, 17 had died of the infection [9], but fortunately prompt and effective action by the local authorities limited the spread of the disease [10].

Given the severity of the outcome of the Nipah virus infection, there is surprisingly little evidence for urgent concern in affected countries or countries likely to be affected. Contrast with the global scare of the H5N1 avian flu, a basically epizootic virus with human case fatality ratio of ~60% (375 deaths out of cumulative confirmed 630 human cases from 2003 to 2013 [11]), occasioned in part by the prospect of development of human-to-human transmissibility of the virus. In the case of the Nipah virus we already have reported cases of human-to-human transmission and a CFR of 75%-100% [5-8], and yet has not raised a global scare. This may be in part due to limited transmission in small population pockets, or perhaps the virus has not gained the potency required for large scale infectivity. Nevertheless, it is of utmost importance to monitor the virus's progress through proper surveillance and to devise effective therapeutics and preventive measures against the virus to thwart any possibility of the viral disease turning into an epidemic. Developing drugs and traditional vaccines require huge commitments in time and money, even if pharmaceutical firms could be found to undertake such programs for a neglected tropical disease. Computational approaches to rational design of peptide vaccines [12] provide a rough and ready method to create new vaccines within reasonably short time and capable of being deployed readily to stem a growing epidemic if one should develop [13,14]. Such vaccines have not been marketed yet for human use, but alternatives such as these may be needed in extremely urgent situations, which may develop if the human-to-human transmissibility of the Nipah virus becomes more efficient.

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