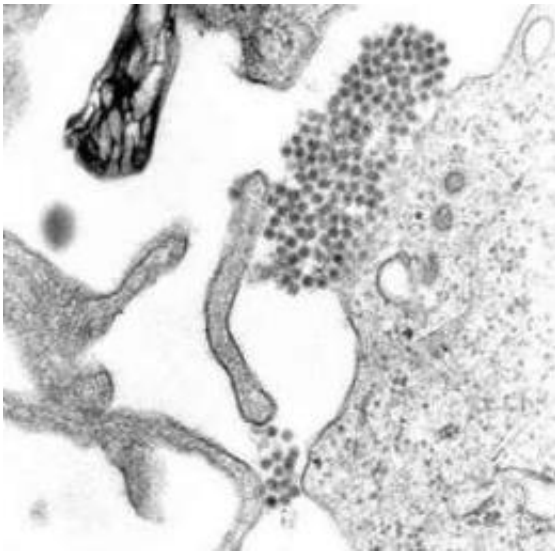


# Biological factors predict which viruses will cause human epidemics

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A TEM micrograph showing Dengue virus virions (the cluster of dark dots near the center). Image: CDC

The identification of biological factors that predict which viruses are most likely to spread among humans could help prevent and contain outbreaks, a study in today's *Proceedings of the National Academy of Sciences* reports.

Most emerging infections arise from the transmission of [viruses](#) from animals to humans, but don't result in the sustained [human](#)-to-human transmission necessary to cause an epidemic. The early detection of [viral](#)

[infections](#) capable of efficient transmission among humans is therefore critical for pandemic planning.

To address this issue, a team from the University of Sydney's Charles Perkins Centre compiled and analysed a database of 203 human viruses and used statistical models to identify [biological factors](#) that predict which viruses are most likely to successfully emerge in human populations.

"The probability of human-to-human transmission was increased by low host mortality and the ability to survive in the host for an extended time, both of which allow a virus more time to spread," said the paper's lead author, Dr Jemma Geoghegan. "A good example of this is polyomaviruses - a family of viruses that infect humans but which rarely cause symptoms or illness.

"In contrast, viruses that possess a particular structure called an 'envelope' seem less able to emerge in humans because they are more easily degradable and not environmentally stable. In the same way, viruses that are transmitted by insect vectors, such as mosquitoes, are also less likely to spread among humans. So, although diseases like dengue and Zika have received a great deal of attention, they are very much the exception rather than the rule," she added.

According to the authors, these biological factors could be used to predict which viruses are more likely to cause epidemics, enabling [public health officials](#) to take appropriate measures to prevent and contain these outbreaks.

**More information:** Virological factors that increase the transmissibility of emerging human viruses, [www.pnas.org/cgi/doi/10.1073/pnas.1521582113](http://www.pnas.org/cgi/doi/10.1073/pnas.1521582113)

Provided by University of Sydney

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