

# New virus transmission route discovered in pigs

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The JE Virus can be transmitted between pigs directly without mosquitoes.  
Credit: Wikimedia Commons / Scott Bauer, USDA

Japanese Encephalitis (JE) virus causes serious inflammation of the brain in people and fertility problems in pigs. Mosquitoes were previously the only known transmission route. However, the virus can

also be spread from pig to pig by direct contact, and this could enable it to circulate in pigs during the mosquito-free winter season.

The JE virus is the main cause of serious encephalitis in people in Asia. The virus is found in large parts of Southeast Asia and is now also widespread in India. It circulates between birds and [mosquitoes](#) and between [pigs](#) and mosquitoes, and is passed to humans through mosquito bites. In children in particular, infection can lead to acute encephalitis and permanent impairment or even death.

In pigs, the main effect of the virus alongside fever and encephalitis is [fertility problems](#). The virus is closely related to the West Nile, Zika and dengue viruses. All are transmitted by mosquitoes and are flaviviruses, which cause serious illness in humans and animals.

Previously, the only known transmission route for JE viruses was mosquitoes. A team of researchers from the Institute of Virology and Immunology and the University Bern at the Vetsuisse Faculty led by Dr. Meret Ricklin and Prof Artur Summerfield have now shown that JE viruses can also be passed directly from pig to pig. The study has just been published in the journal *Nature Communications*.

## **Virus persists in pigs**

Up to now, there had been no explanation for how the JE virus could survive over winter in regions such as the northern Japanese island of Hokkaido, and cause new outbreaks the following year. Outbreaks in some cases occurred on the same farms as in the previous year, despite the fact that no [infected mosquitoes](#) could be found in the area. In Taiwan, too, pigs were infected with JE viruses during the winter, but no infected mosquitoes found.

As the researchers have now been able to show, infected pigs discharge

the virus in their saliva for several days, and the animals are also susceptible to infection through the mouth or nose with very low doses of the virus. In pigs – as in humans – the virus was found to spread through the brain and cause inflammation. The virus was, however, found to grow most in the tonsils, where it was detectable for several weeks or even months. The authors suggest that JE viruses could possibly circulate in pigs and survive for up to months. When the virus is secreted again, for example as a result of a different infection that weakens the immune system, a new infection cycle could then begin. However, the researchers say that further studies are needed to prove this link.

## **No cases in Europe so far**

The study published shows that even for viruses that are spread by insect bites, direct transmission through animal to animal contact cannot be ruled out. "This means that the virus could circulate within the pig population without mosquitoes, and thus spread even to regions with a temperate climate", says Artur Summerfield. This would theoretically also mean a higher risk to humans. A vaccine is, however, available for both people and animals. The [virus](#) has to date only occurred in Europe in travellers returning from Asia and in those cases did not lead to any further infections.

## **Fighting animal diseases**

The Institute of Virology and Immunology (IVI) with sites at Mithelhäusern and Bern is the Swiss reference laboratory for the diagnosis, surveillance and control of highly infectious animal diseases. IVI is part of the Swiss Federal Food Safety and Veterinary Office (FSVO).

As part of cooperation with the Vetsuisse Faculty of the University of Bern, the IVI is responsible for teaching and research in the field of virology and immunology. Research activities include both basic and applied research, and provide an important basis for the control of animal diseases and zoonoses (infectious diseases that can be spread between humans and animals).

**More information:** Meret E. Ricklin et al. Vector-free transmission and persistence of Japanese encephalitis virus in pigs, *Nature Communications* (2016). [DOI: 10.1038/ncomms10832](https://doi.org/10.1038/ncomms10832)

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