Researchers create first chikungunya animal model

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Researchers have developed the first animal model of the infection caused by chikungunya virus (CHIKV), an emerging arbovirus associated with large-scale epidemics that hit the Indian Ocean (especially the French Island of La Réunion) in 2005, later spreading to India, and Italy in 2007. Using this mouse model, scientists of the Institut Pasteur and INSERM determined which tissues and cells are infected by the virus in both the mild and severe forms of the disease it causes. They detail their findings in an article published February 15 in the open-access journal PLoS Pathogens.

The main symptoms of CHIKV —fever, joint and muscle pains, and skin rash— are now well known by the medical community and the general public. However, the pathophysiology of this infection remains poorly understood, notably the factors responsible for severe disease with neurological manifestations, which are mainly observed among newborns and the elderly.

The CHIKV animal model carries a deletion of a gene encoding one of the key proteins in the innate antiviral immune response. When only one of the two copies of the gene is deleted, the mice mimic the disease in its benign form. With both versions deleted, and therefore no ability to produce the protein, they constitute a model for the severe forms of the infection.

With this model, the researchers show how after an initial phase of viral replication in the liver, the infection extends to the joints, muscles and

skin — where the symptoms materialize in humans. In the most severe cases, it then disseminates to the central nervous system. The model also allowed the investigators to study the mother-to-child transmission of the virus, a complication that was recorded for the first time during the La Réunion outbreak.

The development of this first mouse model provides chikungunya researchers with an experimental tool that sheds light on the pathophysiology of the infection, paving the way for future treatments and vaccine candidates against this emerging viral disease in vivo.

Citation: Couderc T, Chré´tien F, Schilte C, Disson O, Brigitte M, et al. (2008) A mouse model for Chikungunya: young age and inefficient type-I interferon signaling are risk factors for severe disease. PLoS Pathog 4(2): e29. doi:10.1371/journal.ppat.0040029

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