How bats carry viruses without getting sick

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Big eared townsend bat (Corynorhinus townsendii) Credit: Public Domain

Bats are known to harbor highly pathogenic viruses like Ebola, Marburg, Hendra, Nipah, and SARS-CoV, and yet they do not show clinical signs of disease. In a paper published in the journal *Cell Host & Microbe* on February 22, scientists at the Wuhan Institute of Virology in China find that in bats, an antiviral immune pathway called the STING-interferon pathway is dampened, and bats can maintain just enough defense against

illness without triggering a heightened immune reaction.

"We believe there is a balance between bats and the pathogens they carry," says senior author Peng Zhou. "This work demonstrated that in order to maintain a balance with viruses, bats may have evolved to dampen certain pathways."

In humans and other mammals, an immune-based over-response to one of these and other pathogenic viruses can trigger severe illness. For example, in humans, an activated STING pathway is linked with severe autoimmune diseases.

"In human history, we have been chasing infectious diseases one after another," says Zhou, "but bats appear to be a 'super-mammal' to these deadly viruses." By identifying a weakened but not defunct STING pathway, researchers have some new insight into how bats fine-tune antiviral defenses to balance an effective, but not an overt, response against viruses.

The authors hypothesize that this defense strategy evolved as part of three interconnected features of bat biology: they are flying mammals, have a long lifespan, and host a large viral reservoir. "Adaptation to flight likely caused positive selection of multiple bat innate immune and DNA damage repair genes," Zhou says. These adaptations may have shaped certain antiviral pathways (STING, interferon, and others) to make them good viral reservoir hosts and achieve a tolerable balance.

More information: *Cell Host & Microbe*, Jiazheng Xie, et al: "Dampened STING-Dependent Interferon Activation in Bats" www.cell.com/cell-host-microbe … 1931-3128(18)30041-6 , DOI: 10.1016/j.chom.2018.01.006

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