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A Viral Misfire

Bats get a bum rap in new disease research

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A recent wave of scientific literature on viral diseases finds some virologists – and then the mass media – suggesting that bats pose a serious health risk to people. Reality, however, rarely matches the sensational headlines: “Scientists have discovered an unexpected but potent threat to global health: bats.” When we carefully examine this issue, we find some surprising leaps from initial facts to sweeping suppositions. And those suppositions too often are presented as facts in newspapers and television newscasts.

While antibodies to several disease-related viruses have been found in bats, the critical question remains: What does it really mean? The answer is far from clear. Some researchers even believe that having natural antibodies makes bats less likely to transmit a disease. Antibodies for the Hendra virus, for example, were isolated from captive flying foxes that had been maintained in very close contact with their human caretakers for many years. Yet there have been no cases of disease transmission from these bats. What about the highly publicized SARS-like virus found in some species of horseshoe bats in Asia? That virus is Bat CoV – not the SARS virus that infects humans. In fact, researchers have been unable to grow the Bat CoV virus in cultures that support the growth of the human SARS virus.

Relevant statistics are often lost in such discussions. How common are Ebola antibodies in bats? Ninety-six percent of the 679 African bats tested did not harbor the antibodies or related nucleotide sequences, but 27% of domestic dogs tested in one outbreak region did.

In general, virologists concede that it is unlikely these diseases are transmitted from bats to humans. In the case of the Nipah and Hendra viruses, they speculate that viruses present at relatively low levels in bats may be transmitted to intermediate hosts, such as pigs or horses, where the virus is amplified (concentrated) until it is capable of transmission to people.

Obviously, it is important for researchers to study relationships between animals and human diseases. But it is imperative that preliminary results do not lead to unsupported speculation that bats pose a serious health risk to people.

Bats are vital to the health of countless ecosystems and human economies around the world through their control of harmful insects and the pollination and seed-dispersal of a broad array of commercially valuable plants. Yet even today, bats and their roosting caves are intentionally destroyed because of baseless fears that grow out of myths and misinformation.

Contrary to common misconceptions, bats have an above-average record when it comes to living safely with humans. Just ask the people of Austin, Texas, who have benefited greatly from sharing their downtown area with 1.5 million bats for nearly 25 years without a single case of bat-related illness – despite initial public health warnings.

Ebola: A viral infection that causes massive hemorrhaging of the internal organs. Once



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diagnosable symptoms are detected, it is often fatal in humans and other primates, although high death rates may be linked in part to limitations of medical care in the developing world. Naturally occurring antibodies to Ebola have been found in three species of monkeys, in baboons and in a few fruit bats. There are four recognized subtypes, in the Sudan, Zaire and Ivory Coast areas of Africa and in the Philippines. Three of these subtypes have been transmitted to humans from other primates. Transmission between humans appears to require direct contact with infected blood or other secretions.

Ebola has been accidentally imported into both the United States and Europe in shipments of monkeys destined for medical research and through a scientist who became ill after performing an autopsy on a wild chimpanzee. Humans exposed to infected lab monkeys developed antibodies without exhibiting symptoms. The scientist was successfully treated after returning home. In Ivory Coast, 37 humans contracted Ebola when 19 people participated in butchering and eating a chimpanzee found dead in the forest. At least three major airlines have already refused to carry primates destined for medical experiments, based on their stated fear of Ebola.

Recovered humans have continued to shed live virus for more than two months after recovery, and more than one-fourth of dogs from a human outbreak area were reported to serve as asymptomatic carriers for the virus. It is difficult to understand why bats, which are not known to have transmitted a single case, are presented as the prime suspects for an Ebola virus reservoir despite so much evidence that points elsewhere.

SARS: A coronavirus that causes acute respiratory syndrome, SARS was discovered in China in 2002. By 2003, it had killed 774 of more than 8,000 humans who had contracted diagnosable cases. Civets and raccoon dogs sold in local markets originally were the suspected reservoirs. Then virologists found antibodies to a coronavirus that is related to SARS in some horseshoe bats; they speculated that this virus from bats had infected civets and raccoon dogs, which then infected humans. This untested hypothesis was transformed into a “fact” almost overnight as international newspaper headlines claimed bats were the source of SARS. The February 24, 2006, issue of Science carries a Letter to the Editor in which leading bat researchers objected to such speculation being presented in that journal. Despite a long history of Chinese people eating bats, there is no evidence that SARS has ever been transmitted from bats to humans. In fact, there is no evidence of transmission from bats to any other animal.

Hendra: A virus that causes acute respiratory illness in horses and respiratory infection or encephalitis in humans. It was discovered in 1994 in Hendra, a suburb of Brisbane, Australia, where 21 horses and two humans became infected, killing 14 horses and one person. Additional cases have been reported, all in North Queensland. In 1995 and 1999, three horses contracted the disease, and one horse and one human died. In 2004, two more horses died; an associated person recovered fully.

Based on finding Hendra antibodies in four species of flying foxes, virologists concluded that these bats serve as the reservoir for this disease. However, there is no clear evidence of how transmission to horses may have occurred, and alternative sources may exist. The original isolation of antibodies was from captive flying foxes that for years were maintained in very close contact with human handlers, none of whom was infected with the virus.

Nipah: A virus related to Hendra, Nipah is capable of causing fatal encephalitis in humans.

It was discovered in Malaysia and Singapore in 1998 and 1999, first in pigs, then in pig farmers and butchers. Of 265 people with diagnosable symptoms, 108 died. No human-to-human transmission has been reported. The virus is also known from Cambodia, and antibodies were found in humans in Sarawak, Malaysia.

Again, because antibodies were also found in flying fox bats, virologists concluded that these animals were the disease reservoir. It has been speculated, but not demonstrated, that pigs get the virus by eating fruit dropped from trees by feeding bats. The fruit, in this hypothesis, is infected by bat saliva.

An outbreak involving 16 people in Bangladesh was speculated to be associated with people who drank raw coconut sap from cans that may have been visited by flying foxes. However, transmission from flying foxes to humans was not confirmed and would have to be exceedingly rare, since people throughout Southeast Asia and Africa have a long tradition of eating flying foxes, and they do not appear to have been harmed.

Recent history demonstrates a clear pattern of blaming bats for disease transmission, even when evidence to the contrary is overwhelming. Skepticism is clearly justified, and vigilance in defending against such biases is essential.

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