PUBLIC RELEASE: 1-AUG-2012

New study finds strong evidence of humans surviving rabies bites without treatment

First indication of people naturally protected against rabies found in remote Amazonian communities regularly exposed to vampire bats

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This press release is available in Spanish.

Deerfield, IL (August 1, 2012) Challenging conventional wisdom that rabies infections are 100 percent fatal unless immediately treated, scientists studying remote populations in the Peruvian Amazon at risk of rabies from vampire bats found 11 percent of those tested showed protection against the disease, with only one person reporting a prior rabies vaccination. Ten percent appear to have survived exposure to the virus without any medical intervention. The findings from investigators at the U.S. Centers for Disease Control and Prevention (CDC) were published today in the August 2012 issue of the *American Journal of Tropical Medicine and Hygiene.*

"The overwhelming majority of rabies exposures that proceed to infections are fatal. However, our results open the door to the idea that there may be some type of natural resistance or enhanced immune response in certain communities regularly exposed to the disease," said Amy Gilbert with the CDC's National Center for Emerging and Zoonotic Infectious Diseases, who is the paper's lead author. "This means there may be ways to develop effective treatments that can save lives in areas where rabies remains a persistent cause of death."

Rabies experts estimate the disease kills 55,000 people each year in Africa and Asia alone, and appears to be on the rise in China, the former Soviet Republics, southern Africa, and Central and South America. According to the CDC, in the United States, human deaths from rabies have declined over the past century from 100 annually to an average of two per year thanks to an aggressive campaign to vaccinate domestic animals against the disease.

In general, people who believe they may have been exposed to rabies are advised to immediately seek treatment which involves post-exposure prophylaxis (PEP) - a series of injections - to prevent the exposure from causing an active infection. These preventive treatments, when administered promptly, are 100 percent successful at preventing disease. Scientists have documented only a small number of individual cases, including one last year in California, in which an exposure to rabies proceeded to infection and the victim survived. Most of those survivors still required intensive medical attention, including one case in Wisconsin in which doctors induced a coma, though this approach has not been successful in most subsequent cases.

This CDC study was conducted in collaboration with the Peruvian Ministry of Health as part of a larger project to understand better bat-human interactions and its relation to rabies and emerging diseases that may be transmitted by bats. For their research, scientists traveled to two communities (Truenococha and Santa Marta) in a remote section of the Peruvian Amazon where outbreaks of fatal infections with rabies caused by bites from vampire bats--the most common "natural reservoir" for the disease in Latin America-- have occurred regularly over the last two decades. They interviewed 92 people, 50 of whom reported previous bat bites. Blood samples were taken from 63 individuals and seven (11 percent) were found to have "rabies virus neutralizing antibodies."

One out of the seven individuals reported receiving a rabies vaccination--which generates antibodies to the rabies virus--but there was no evidence that the other six had received anti-rabies vaccine prior to the blood sampling or had sought out any medical attention for a bat bite, evidence that they had harbored the virus itself.

The researchers acknowledged that they could not conclusively determine whether the antibodies were caused by an exposure to the virus that was somehow insufficient to produce disease. But they believe their evidence "suggests that (rabies virus) exposure is not invariably fatal to humans."

Gilbert said non-fatal exposures may happen more often than some think because "unless people have clinical symptoms of the disease they may not go to the hospital or clinic, particularly where access is limited."

"We all still agree that nearly everyone who is found to be experiencing clinical symptoms of rabies dies," Gilbert said. "But we may be missing cases from isolated high-risk areas where people are exposed to rabies virus and, for whatever reason, they don't develop disease."

In the Amazon region where the study was conducted--the Province Datem del Maranon in the Loreto Department of northern Peru--vampire bats, which live off of mammalian blood, regularly come out at night and prefer to feed on livestock. But in the absence of those food sources, they are known to seek out a meal from humans. They can use their extremely sharp teeth and the anticoagulant that naturally occurs in their saliva (appropriately referred to as "draculin") to feed on a sleeping person without awakening them. The rabies virus circulates extensively among vampire bat colonies in the region, and when an infected bat feeds, it passes along the virus to its host.

"This type of thorough and persistent scientific rabies investigation lends continued support to the belief that even the most dangerous of infectious diseases may be amenable to treatment," said James W. Kazura, MD noted infectious disease expert and president of the American Society of Tropical Medicine and Hygiene (ASTMH). "Continued investment of resources is essential for us to protect the health and well-being of innocent people whose lives and livelihoods are needlessly threatened by infectious diseases like rabies."

Gilbert and her colleagues hope their findings will prompt further studies in remote, at-risk communities to see if the results are replicated. In an editorial accompanying the study, Rodney E. Willoughby, a pediatric disease specialist at Children's Hospital of Wisconsin, said if it turns out there are distinct populations of people with "complete or relative resistance to rabies," there could be the potential to use whole genome sequencing to help develop new, life-saving treatments for rabies infections.

"Careful, respectful genetic study of these genetically unique populations may provide information on which pathways in human biochemistry and physiology promote resistance to human rabies," he wrote. "Equally important, knowing that there is a continuum of disease, even for infectious diseases like rabies, should push us harder to try for cures when confronted by so-called untreatable infectious diseases...."

Gilbert noted that the study was done as part of a larger public health effort to address a series of rabies outbreaks in the Amazon, where some health officials are now considering conducting pre-emptive vaccination campaigns in areas where risk of rabies is high and availability of medical care low. She said that while her study highlights people who appear to have survived an exposure to the virus, the fact remains that rabies outbreaks in small communities in the region have left tragic results.

"These are very small villages and, when they witness ten people dying from what is a horrible disease, it is incredibly traumatic," Gilbert said. "We want to help raise awareness of the problem and try to develop a more proactive response."

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