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Dormant ancient chimp virus revived

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(PhysOrg.com) -- Researchers in New York have identified the receptor of an ancient chimpanzee retrovirus that has been dormant for at least a million years. Now the scientists have resurrected a key part of the virus to determine how it infected cells.

Endogenous viruses, which are ancient viruses now engulfed into the host's genome, are usually studied on the basis of their DNA sequence, but the new research has essentially brought the ancient chimp virus, CERV2, back to life to enable it to be studied in the same way as ordinary viruses. CERV2, or chimpanzee endogenous retrovirus 2, is in the genome of chimpanzees and other Old World primates but is absent from the human genome. This suggests the virus was active after the chimpanzee and human lines diverged about 5 or 6 million years ago.

Virologist Paul Bieniasz, head of the Rockefeller University Laboratory of Retrovirology led the team, which aimed to try to understand how host defenses have evolved, because mimicking these defense mechanisms could help in the fight against modern viruses. They had previously discovered two proteins in humans that ward off retroviruses within cells, but these proteins do not explain why chimpanzee ancestors were infected but not human ancestors because one protein is similar in humans and chimps, while the other is ineffective against the CERV2 chimp virus.

The team proposed the mechanism that protected ancient humans from the virus lay in preventing the virus from entering the cell rather than fighting off after it had entered. In experiments with mice, and hamsters

with parts of the human genome in their DNA, they were able to identify a protein, CTR1, as the receptor for the virus. The protein is normally involved in the transportation of copper into and out of cells.

The results of the research are published in this week's Proceedings of the National Academy of Sciences (*PNAS*). Bieniasz said that their findings are not the only explanation for why the ancestors of chimpanzee were infected but ancestors of humans were not. Behavior such as biting each other could have played a part in virus transmission, and the groups could also have been isolated from each other so the human ancestors were not exposed to the virus.

Bieniasz's earlier work involved another ancient retrovirus HERV-K, which was brought back to life and found to be capable of infecting human cells, but the cells had two antiviral proteins to ward off the virus.

More information: Identification of a receptor for an extinct virus, Steven J. Soll et al., *Proceedings of the National Academy of Sciences*, Published online before print October 25, 2010, doi:10.1073/pnas.1012344107