

Why humans are more sensitive to certain viruses: Primate immune system differences identified

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The greater susceptibility of humans to certain infectious diseases when compared to other primates could be explained by species-specific changes in immune signaling pathways, a University of Chicago study finds. The first genome-wide, functional comparison of genes regulated by the innate immune system in three primate species discovers potential mediators of differences in disease susceptibility among primates. These findings are published on December 16 in the open-access journal *PLoS Genetics*.

Humans are more sensitive than chimpanzees to the severe effects of certain viral infections, such as progression of HIV to AIDS or severe complications from [hepatitis B](#). Genomic comparisons of humans and their close primate relatives reveal many changes in immune system genes. By stimulating [immune cells](#) from humans, chimpanzees and rhesus macaques, Luis Barreiro and colleagues tested functional differences in primate immune pathways.

The "core" response, critical to fight any invading pathogen, was found to be evolutionarily conserved, with similar gene expression patterns across all three species. However, the regulatory response associated with genes involved in fighting certain viral and microbial infections produced unique effects in each species, probably reflecting rapid adaptation cycles between specific hosts and viruses. Interestingly, many HIV-interacting genes responded uniquely in chimpanzees, animals

which do not routinely develop AIDS after HIV/SIV infection, possibly pointing to mechanisms of chimpanzee resistance to the virus. In humans, immune responses were particularly enriched for genes known to be involved in cell death (apoptosis) and cancer biology.

Though detailed species-specific gene expression patterns were identified in this study, more experiments will be required to assess the phenotypic impact of those unique immune responses. Future studies will also test the immune response of each species to specific infectious agents. According to the authors, the present findings are "only the first step in characterizing inter-species differences in [immune response](#)."

More information: Barreiro LB, Marioni JC, Blekhman R, Stephens M, Gilad Y (2010) Functional Comparison of Innate Immune Signaling Pathways in Primates. PLoS Genet 6(12): e1001249.
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