

Human-specific evolution in battling bugs and building babies

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Although human and chimpanzee immune systems have many identical components, this is not the case for the family of killer cell immunoglobulin-like receptors (KIR) controlling white blood cells known as natural killer (NK) cells.

Published in the open-access journal [PloS Genetics](#) on November 4, a paper by Stanford University researchers describes qualitative KIR differences, acquired after humans and [chimpanzees](#) separated 6 million years ago and mainly a consequence of innovation in the [human](#) line. These differences open up an exciting avenue for explaining the differential susceptibility of humans and chimpanzees to devastating [infectious diseases](#) such as HIV/AIDS and malaria.

While immunological research has increasingly concentrated on the inbred laboratory mouse for the last half century, mice actually represent a poor model for human KIR because their NK cell receptors are so disparate from the simian primate counterparts. As a result, the researchers looked at chimpanzee KIR so that they could accurately compare them with the well-characterized human versions.

NK cells serve in both immune defense and reproduction; they contribute to early defense against infection and are implicated during the early phase of pregnancy, when uterine NK cells orchestrate enlargement of maternal arteries that will supply blood to the placenta and nourish the fetus. These vital NK cell functions seem subject to variable and competing selective pressures that have driven rapid KIR

evolution and produced striking differences between humans and chimpanzees, as closely related as they are.

These distinctions derive from adaptations in the human line in response to selective pressures on human NK cells due to the competing needs of defense and reproduction. Whereas chimpanzees have a potent battery of KIR that appears aimed at fighting infection, the human KIR represent a functional compromise between battling bugs and building babies.

More information: Abi-Rached L, Moesta AK, Rajalingam R, Guethlein LA, Parham P (2010) Human-Specific Evolution and Adaptation Led to Major Qualitative Differences in the Variable Receptors of Human and Chimpanzee Natural Killer Cells. PLoS Genet 6(11): e1001192. [doi:10.1371/journal.pgen.1001192](https://doi.org/10.1371/journal.pgen.1001192)

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