

Scientists learn how pathogens hack our immune systems to go undetected

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A new report appearing in the March 2014 issue of The FASEB Journal helps shed light on what drives the evolution of pathogens, as well as how our bodies adapt to ward them off. Specifically, the report shows that our bodies naturally employ a mechanism, called "CD33rSiglecs," that not only dampens unwanted immune responses against one's own cells, but also evolves rapidly to recognize foreign invaders. What's more, the report explains how pathogens exploit this immunological "vulnerability" of "self-recognition" to evade our bodies' defenses. This leads to a seemingly endless "arms race" between constantly evolving pathogens and immune systems. Understanding this phenomenon may become crucial for developing novel drugs against various pathogens that try to take advantage of this system.

"Our data explain why the CD33rSiglec-encoding cluster of genes is undergoing rapid evolution via multiple mechanisms, driven by the need to maintain self-recognition by innate immune cells, even while escaping two distinct mechanisms of subversion by pathogens," said Ajit Varki, M.D., a researcher involved in the work from the Departments of Medicine and Cellular and Molecular Medicine at the University of California in San Diego, CA.

Please note: Non-human samples used for these studies were collected under ethical standards and approval processes similar to those that apply to humans, and that no animals were harmed in these studies.

To make this discovery, Varki and colleagues compared three major

CD33rSiglecs from humans, chimpanzees and baboons. While chimpanzees and baboons express two types, Neu5Ac and Neu5Gc, humans express only one, Neu5Ac. They then compared specific binding properties and expression patterns of these CD33rSiglecs and found that while related CD33rSiglecs from humans, chimpanzees and baboons recognize pathogenic bacteria, they do so differently. Additionally, different types of CD33rSiglecs within the same species also showed similar variances.

"Just like malicious computer software programs, these pathogens 'hack' our immune systems with the goal of going undetected," said Gerald Weissmann, M.D., Editor-in-Chief of *The FASEB Journal*. "Now that we understand how these [pathogens](#) are hacking our immune systems, we can understand how evolution has permitted us to distinguish the 'self' our [immune system](#) ignores from the 'non-self' the system evolved to combat."

More information: *FASEB J.* March 2014 28:1280-1293; [DOI: 10.1096/fj.13-241497](#)

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