

Differences in immune responses due to age, sex and genetics

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Age, sex, and specific human genetic variants are the key factors behind differences between immune responses among healthy humans, finds a study of 1,000 individuals carried out by EPFL and the Pasteur Institute.

Over the course of our life, we are continuously exposed to pathogens such as viruses and bacteria, meaning that our immune system is constantly at work. When stimulated by either pathogen or vaccine, the

immune system notably mounts what is known as a "humoral response," which corresponds to the production of antibodies that can help fight infections and provide long-term protection.

The intensity of humoral responses differs from person to person. Understanding why, and identifying the specific determinants of this variability could help us improve vaccines, predict a person's susceptibility to a particular pathogen, or get a deeper understanding of autoimmune diseases.

In a new study published in *Genome Medicine*, the lab of Jacques Fellay at EPFL, working with the Pasteur Institute in Paris, have examined the humoral responses of 1,000 healthy people to common infections and vaccines. The scientists measured antibody responses to fifteen antigens (molecules that trigger humoral responses) from twelve infectious agents: cytomegalovirus, Epstein-Barr virus, herpes simplex virus 1 and 2, [varicella zoster virus](#), influenza A virus, measles, mumps, rubella, and hepatitis B virus, *Helicobacter pylori* and *Toxoplasma gondii*.

In order to assess the importance of non-[genetic](#) factors, the researchers looked at the impact of numerous demographic variables. They identified age and sex as the most important determinants of humoral response, with older individuals and women showing stronger antibody responses against most antigens.

For the genetic factors, the scientists performed genome-wide association studies, which allow the exploration of the potential impact of genetic variation throughout the human genome. The studies showed that differences in response to Epstein-Barr virus and rubella associate with variation in the human leucocyte antigen (HLA) gene region, which encodes proteins involved in the recognition of foreign antigens.

"To combat infectious and [autoimmune diseases](#), we need to better

understand variation in the healthy [immune response](#)," says Jacques Fellay. "Our study is a necessary first step toward individualized healthcare in infection and immunity."

More information: undefined undefined et al. Human genetic variants and age are the strongest predictors of humoral immune responses to common pathogens and vaccines, *Genome Medicine* (2018). [DOI: 10.1186/s13073-018-0568-8](#)

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