

'10,000 Immunomes' database opens a window on healthy immunity

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Scientists at UC San Francisco have painstakingly assembled a searchable database of normal human immunity that researchers can now use as an instant comparison group in studies of the immune system and immune dysfunction. The new open-access data tool, called the 10,000 Immunomes Project (10KIP), pieces together the results of 83 studies that contain measurements on healthy people of various ages and backgrounds.

The database contains measurements from normal, healthy individuals enrolled in control groups for studies of organ transplantation, autoimmune disease trials, vaccine studies and other work funded by the National Institute of Allergy and Infectious Diseases (NIAID) that were uploaded to a preexisting data portal called ImmPort. The data, which can be found at <http://10kimmunomes.org/>, is available for free and comes with a visualization tool to help interpret results. The work is described in a paper published Tuesday, Oct. 9, 2018, in *Cell Reports*.

"I'm a big proponent of open data, and my lab has been working for years with Northrop Grumman and NIAID to disseminate immunology data through ImmPort," said senior author Atul Butte, MD, Ph.D., the Priscilla Chan and Mark Zuckerberg Distinguished Professor and director of the [Bakar Computational Health Sciences Institute](#) at UCSF (BCHSI). "We realized we had so much data, and especially we had so many control group individuals—healthy folks with no disease, who were treated with placebo or no drug at all—that we could now get a broad survey of what a normal healthy immune system looks like from

all these individuals."

The research team pored through 242 studies that had uploaded their data to ImmPort to find measurements on [healthy people](#), and then "harmonized" the measurements from the 83 relevant studies to overcome differences that arise from making measurements at different times and places, or from using different procedures.

"We found we could compensate for these artifacts with algorithms that had been developed for that purpose in computational genetics," said Kelly Zalocusky, Ph.D., first author of the study, who did the work when she was a postdoctoral scholar at BCHSI. Currently, she is a staff scientist at the Gladstone Institutes, an independent research organization that is academically affiliated with UCSF.

The data is rich enough that the researchers were able to create a custom [control group](#) of women between 18 and 40 years old to compare against 56 pregnant participants who had taken part in a study of the immune changes that take place in pregnancy. This enabled them to see how various immune cells and cell signaling proteins, known as cytokines, changed from pre-pregnancy levels, measurements that the original study lacked.

The researchers also used the data to compare immunity in men and women, over the life span and among people of diverse racial and ethnic backgrounds. They found the data reproduced known differences between men and women, and between people of different ages, while revealing new findings by race that could only be seen by combining data from dozens of different studies.

For example, they found that "natural killer cells," which kill tumor cells and cells infected by viruses, are found at lower levels in Asians than in whites. And regulatory T cells, which suppress immune responses, are

present at higher levels in African American subjects, compared to all other groups.

The effort comes amid several high-profile announcements about open data, including the [Vivli project](#) to share [clinical trial data](#), and Google's new [search engine](#) for [open data](#).

"The ideal is still to recruit and collect measurements on immunity from large cohorts of people, such as what is proposed in the new [UCSF Bakar ImmunoX](#) project, but that will still take a lot of time and resources to complete," Butte said. "Since this data is already available, we want people to make use of it and help their science today. We expect that, as more scientists upload their [data](#) to NIAID's ImmPort database, the power of 10KIP will only grow in value, richness and scale."

Provided by University of California, San Francisco

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