Study shows children's antibodies are highly potent against COVID-19

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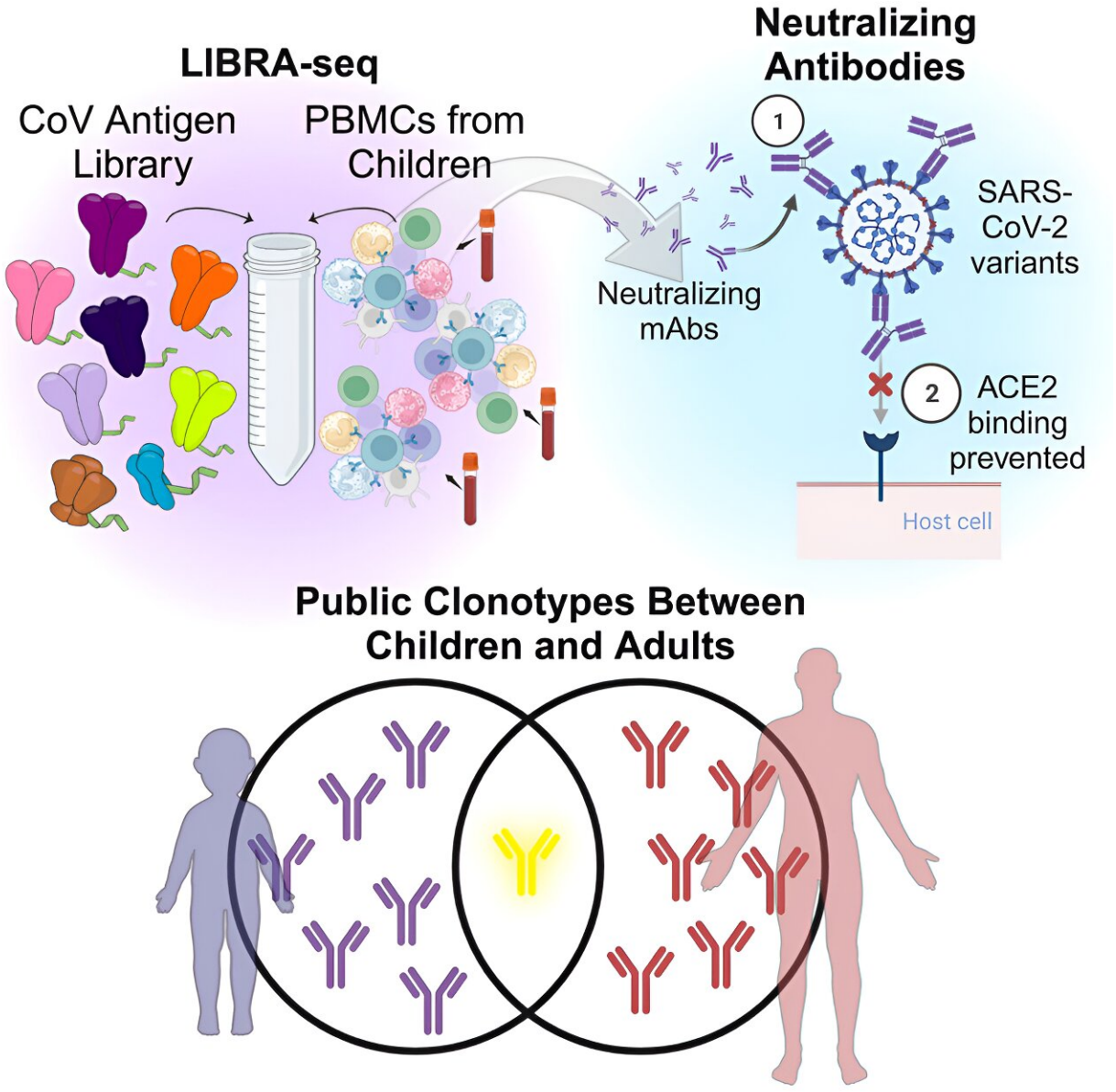

Credit: *Cell Reports Medicine* (2023). DOI: 10.1016/j.xcrm.2023.101267

Children are an underutilized source of potential antibody therapies to counteract the "ever-evolving" COVID-19 pandemic, according to researchers at Vanderbilt University Medical Center.

Reporting Nov. 6 in *Cell Reports Medicine*, Ivelin Georgiev, Ph.D., and colleagues demonstrated that antibodies isolated from children's blood samples displayed high levels of neutralization and potency against variants of the COVID-19 virus, SARS-CoV-2, even when the children had not previously been exposed to or vaccinated against those variants.

"These results indicate that children's samples can play an important role in the discovery of effective SARS-CoV-2 antibody therapeutics," the researchers concluded.

This is important because, while monoclonal antibodies developed at VUMC and elsewhere initially were quite effective in neutralizing SARS-CoV-2, the virus' ability to mutate rapidly has enabled it to escape from every monoclonal antibody product currently on the market.

It is crucial to find antibodies that can broadly neutralize all variants of the virus, said Georgiev, the paper's corresponding author, and associate professor of Pathology, Microbiology & Immunology, Biomedical Informatics, Chemical and Biomolecular Engineering, and Computer Science at Vanderbilt.

Children have been thought to be unlikely sources for new antibody therapies because their immune systems are immature, and they tend to be more susceptible to severe viral illnesses including those caused by influenza, respiratory syncytial virus (RSV), and human

metapneumovirus.

When it comes to SARS-CoV-2, however, children experience significantly less severe disease compared to adults. Even when adolescents have severe disease, they are hospitalized less often than adults, require shorter hospital stays, and are less likely to die from COVID-related complications.

In the VUMC study, blood samples from children ages 5 months to 18 years old were collected between July and August 2021, and divided into two groups: those with no known exposure to SARS-CoV-2 infection or vaccination, and those who had been infected or vaccinated.

The researchers employed a variety of sophisticated techniques including LIBRA-seq (Linking B-cell Receptor to Antigen Specificity through sequencing), which was developed at VUMC, and which rapidly and efficiently identified multiple neutralizing monoclonal antibodies against SARS-CoV-2 in the samples.

Fluorescence-activated cell sorting, next-generation sequencing, and a computational pipeline enabled high-throughput mapping of the amino-acid sequences of antibodies that bound viral antigens.

The researchers found that neutralizing antibodies identified in children had similar genetic features to antibodies from adults, and that children use similar mechanisms for neutralizing the COVID-19 virus.

What was surprising was that the antibodies isolated from children potently neutralized SARS-CoV-2 variants that have become resistant to virtually all approved monoclonal antibody therapeutics.

Not only are children a potential source of new therapies against COVID-19, but deciphering their antigen-specific antibody repertoires

could prove useful in improving the treatment of other infectious diseases, and the development of next-generation pediatric vaccines, the researchers reported.

More information: Steven C. Wall et al, SARS-CoV-2 antibodies from children exhibit broad neutralization and belong to adult public clonotypes, *Cell Reports Medicine* (2023). DOI: 10.1016/j.xcrm.2023.101267

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