

# From Immune Surveillance to Therapeutic Development



## How the ZE5 Cell Analyzer Is Involved in COVID-19 Studies



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### 1. Screening for Antiviral Drug Candidates and Antibody-Based Therapeutics

#### Why it is important

Epitope mapping, drug library screening, ligand/receptor binding, antibody screening, dose response, and target killing... Therapeutic development in modern laboratories demands maximal productivity and reliability.

#### How the ZE5 Cell Analyzer can help

The high-throughput and automation-ready ZE5 Cell Analyzer greatly shortens time to results and helps scientists get high quality and reliable results quicker.

#### Customer publications and how the ZE5 Cell Analyzer was used

Scientists at Humabs Biomed SA identified and characterized potent SARS-CoV-2 neutralizing antibodies isolated from a 2003 SARS survivor, and mapped neutralizing and immunodominant sites on the spike receptor-binding domain. Recombinant SARS-CoV-2 proteins were expressed on CHO cell surfaces, monoclonal antibodies isolated from SARS patients were tested for binding to cell surface SARS-CoV2 antigens using high-throughput flow analysis on the ZE5 Cell Analyzer.

#### Related publications

Pinto D et al. (2020). Cross-neutralization of SARS-CoV-2 by a human monoclonal SARS-CoV2 antibody. *Nature*. 583(7815), 290-295.



Piccoli L et al. (2020). Mapping neutralizing and immunodominant sites on the SARS-CoV-2 spike receptor-binding domain by structure-guided high-resolution serology. *Cell*. 183(4), 1024-1042.



### 2. Profiling Cellular Immunity against SARS-CoV2

#### Why it is important

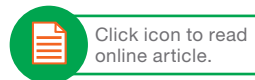
Characterizing cell-mediated immune responses to SARS-CoV2 provides critical insights into COVID-19 pathogenesis and immune correlates of protection and disease progression, which paves the way for the development of effective diagnostics and therapeutics.

#### How the ZE5 Cell Analyzer can help

The high parameter ZE5 Cell Analyzer, with up to 27 colors and a dozen configurations, enables high-dimensional analysis of both phenotypic and functional targets in a single sample at unparalleled speed and throughput.

#### Customer publications and how the ZE5 Cell Analyzer was used

Scientists at La Jolla Institute for Immunology documented potent SARS-CoV-2-specific T cell immunity in COVID-19 convalescent patients, and observed prevalent T cell cross-reactivity in unexposed individuals.



A follow-up study provided further evidence that preexisting T cell reactivity against SARS-CoV-2 may come from the memory T cell response to common cold coronaviruses. In both studies, the ZE5 Cell Analyzer was used to detect activation-induced markers and intracellular cytokines.

### Related publications

Grifoni A et al. (2020). Targets of T cell responses to SARS-CoV-2 coronavirus in humans with COVID-19 disease and unexposed individuals. *Cell* 181(7), 1489-1501.

Mateus J et al. (2020). Selective and cross-reactive SARS-CoV-2 T cell epitopes in unexposed humans. *Science* 370(6512), 89-94.



## 3. Characterizing Cross-Reactive Humoral Immunity against SARS-CoV2

### Why it is important

Detecting antibody cross-reactivity between seasonal human coronaviruses and SARS-CoV-2 provides deep insights into the natural course of COVID-19 and cross-protection mediated by preexisting humoral immunity. Developing a robust serological testing pipeline is important for regular surveillance and better protection of frontline healthcare workers.

### How the ZE5 Cell Analyzer can help

The high-speed, high-throughput, and automation-capable ZE5 Cell Analyzer enables fast and unattended serological screening for actionable results.

### Customer publications and how the ZE5 Cell Analyzer was used

The Francis Crick Institute established a robust serology pipeline to facilitate screening of serum antibodies reactive to SARS-CoV-2 antigens. HEK293T cells expressing SARS-CoV-2 spike protein subunits were incubated with participant serum, stained with fluorescence-conjugated anti-IgG, IgM, and IgA antibodies, before high-throughput screening was performed on the ZE5 Cell Analyzer. Using this serology pipeline, researchers at The Francis Crick Institute demonstrated the prevalence of preexisting antibodies cross-reactive to SARS-CoV-2 in uninfected individuals, and identified conserved epitopes in S2 targeted by SARS-CoV-2 neutralizing antibodies.

### Related publications

Ng KW et al. (2020). Preexisting and de novo humoral immunity to SARS-CoV-2 in humans. *Science*. Nov 6; eabe1107.

Emma R et al. (2020). Adapting to the coronavirus pandemic: building and incorporating a diagnostic pipeline in a shared resource laboratory. *Cytometry A*. Oct 29.

Houlihan CF et al. (2020). Pandemic peak SARS-CoV-2 infection and seroconversion rates in London frontline health-care workers. *Lancet*. 396(10246), e6-e7.



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