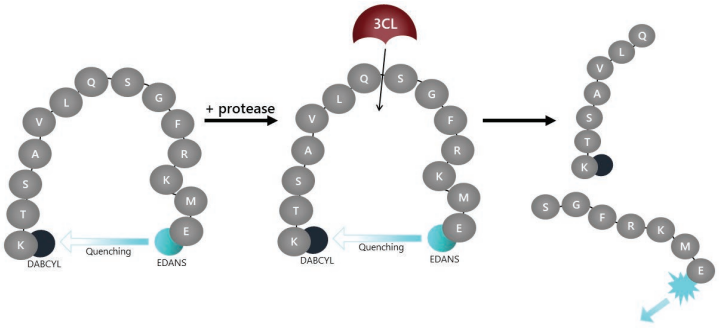
SARS-CoV-2 Research Solutions

The COVID-19 pandemic, caused by SARS-CoV-2 coronavirus, has infected over 700 million people and caused >7 million deaths worldwide. Ending the pandemic has required a combination of diagnostics, therapeutic interventions, and vaccines. While vaccines have been effective at reducing hospitalizations and deaths, new variants will likely continue to emerge and spread, requiring further research in diagnosis and patient care. BPS Bioscience supports end-to-end research and development efforts from protein design to assay kit development and screening services. Our proven innovative solutions have been utilized by pharma and vaccine developers worldwide.

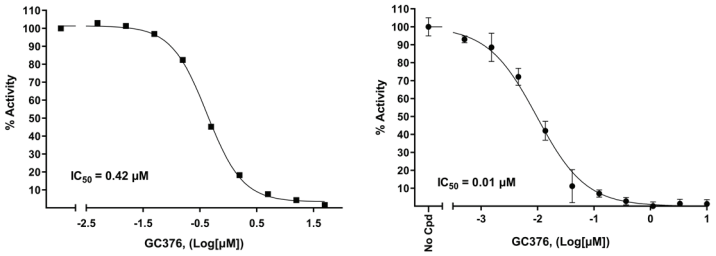
BPS Bioscience's biochemical assay kits support early phases of drug discovery and development by providing simple and efficient solutions for compound screening and titration.

3CL Protease Fluorogenic Assay Kits

The 3CL (Mpro) protease processes the poly-proteins translated from the viral RNA. Inhibitors of 3CL block viral replication and are promising drug candidates to treat COVID-19 patients. Our homogeneous, fluorogenic assays are designed to measure the activity of the 3CL protease wild-type, mutant, or Omicron variant.



Assay principle: the 3CL Protease Substrate is an internally quenched fluorogenic peptide. Upon proteolysis, a highly fluorescent peptide fragment is released. The fluorescence signal increases proportionally to the activity of 3CL.

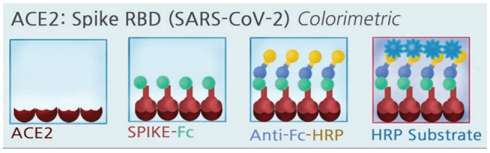


Inhibition of (SARS-CoV-2) 3CL protease enzyme activity by increasing concentrations of GC376. Left: 3CL wild-type (#79955); right: 3CL mutant P252L (#78839).

Spike/ACE2 Binding Kits

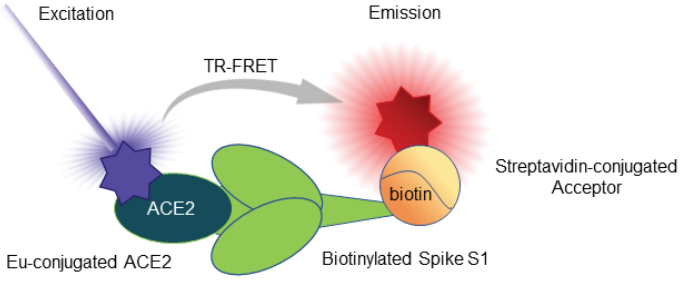
These assay kits measure the interaction between SARS-CoV-2 Spike protein and human ACE2, and are designed to detect compounds that prevent this interaction. Thus, ACE2 decoys, neutralizing anti-Spike antibodies, and other similar candidate drugs can be assessed. Variations of the assay focus on the wild-type or variant Spike receptor binding domain (RBD), S1 subunit, or Spike trimer (S1+S2). They exist in colorimetric and chemiluminescent ELISA, and in homogeneous TR-FRET formats.

Spike/ACE2 ELISA



The ACE2 protein is coated onto a nickel plate before addition of Fc-tagged Spike S1 protein. The plate is treated with HRP-labeled anti-Fc, followed by addition of an HRP substrate to produce color or chemiluminescence.

Spike/ACE2 TR-FRET Assay



The test compound is incubated with biotinylated Spike S1, Eu-labeled ACE2, and the dye-labeled acceptor for one hour. The resulting fluorescence signal is measured using a TR-FRET-capable plate reader.

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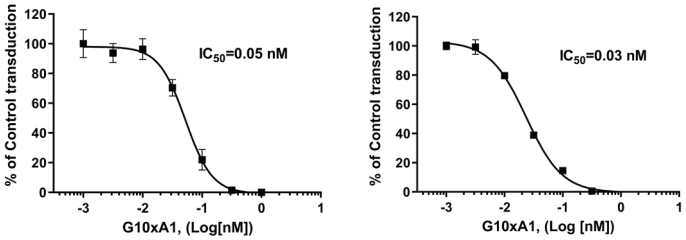
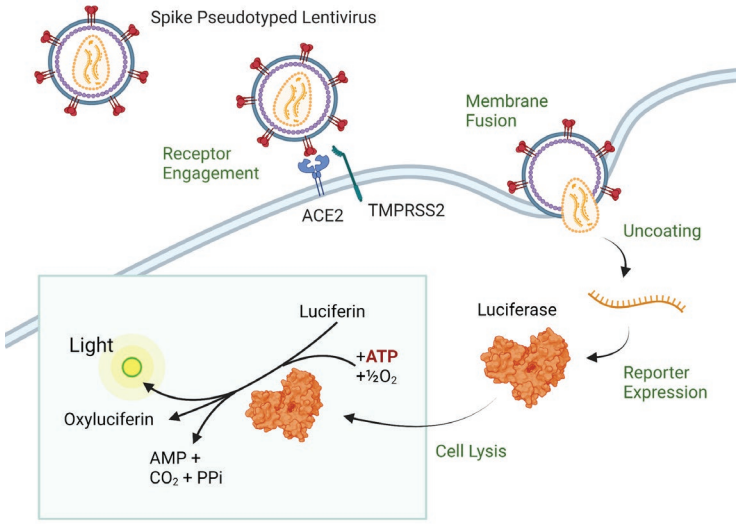
Modeling Infection with Pseudoviruses

Lentivirus and VSV vectors can be pseudotyped, which involves replacing the native envelope protein with another viral protein of interest. Thus, variant-specific SARS-CoV-2 Spike protein can be expressed on lentivirus or VSV delta G particles for infection of ACE2-expressing cells. Transduction of reporter genes such as luciferase or eGFP enable sensitive, quantitative readouts of infection. These systems are safe and ideal to screen for infection-blocking compounds in cellular models.



Neutralization assay using Spike Neutralizing Antibody Clone G10xA1 (#101326), performed in Vero-E6 cells infected with Spike pseudotyped VSVΔG Luciferase Reporter. Data show results obtained with Spike wild-type (#78637) and Omicron variant BA.1.1 (#78641), from left to right.

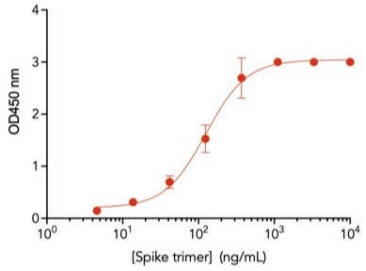


Options for Optimal Experimentation

Virus Type	Reporter	Target cell	Spike variant
• Lentivirus • VSVΔG (preferred for Vero E6 infection)	• Luciferase • eGFP • Dual (Luc+GFP)	• ACE2-HeLa • ACE2-CHO • ACE2-HEK293 • Vero E6 (TMPRSS2)	• Spike Omicron Variants: BA.1, BA.2, BA.4/5, etc. • Previous variants of interest • Wild-type

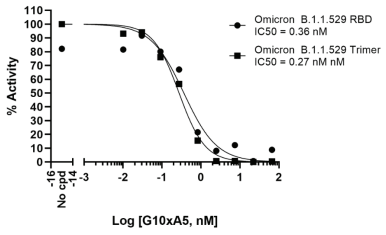
BPS Bioscience's advantages: High titers; safe viral particles; simple protocols; bald virus controls; off-the-shelf validated cellular models; rapid release of new products to study emerging variants or new viruses.

Proteins and Antibodies



Binding to ACE2 by Spike trimer Omicron variant BQ.1.1 (#101666) was determined by ELISA.

- Neutralizing antibodies that recognize Spike across variants are ideal to optimize new cell-based assays and serve as internal control when evaluating new antibodies.
- Proteins serve as a source of antigen to generate antibodies or as control during the development of new diagnostic tests. Choose from a selection of Spike RBD, S1, or Trimer (S1+S2) proteins in wild-type or variant forms, including Omicron variants.

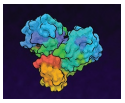


Anti-Spike neutralizing antibody clone G10xA5 (#101327) blocks the binding of ACE2 to Omicron B.1.1.529 Spike protein using Spike RBD:ACE2 assay kit (#78339).

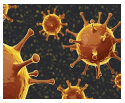
Available on bpsbioscience.com/resources

Brochure:
Research Tools for Drug Discovery, Diagnostics & Vaccines

SARS-CoV-2 Coronavirus Variants Table: Available Spike Proteins with Mutation Maps



Tech note:
Proteases as Targets for SARS-CoV-2 Treatment



Videos:
- Assay Kits for Research on COVID-19
- First Responders: SARS-CoV-2 and the Immune System

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