



VIROLOGY

AND VACCINE RESEARCH:
Microplate Reader
SOLUTIONS

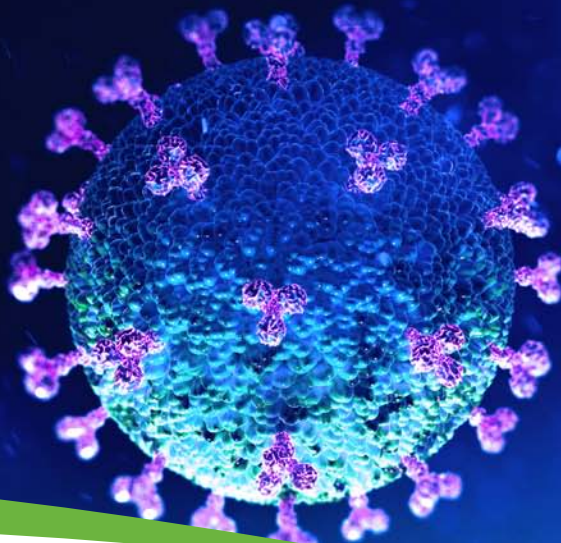
Introduction

From detecting IgG in serum samples to identifying neutralizing antibodies

We understand what a challenging time this is for those who are working to get accelerated testing and medicines to the market as soon as possible and are committed to supporting scientists that are researching cellular response to viruses for the development of therapeutics and vaccines. Learn more about how our technology can help support your research of infectious disease cellular responses.

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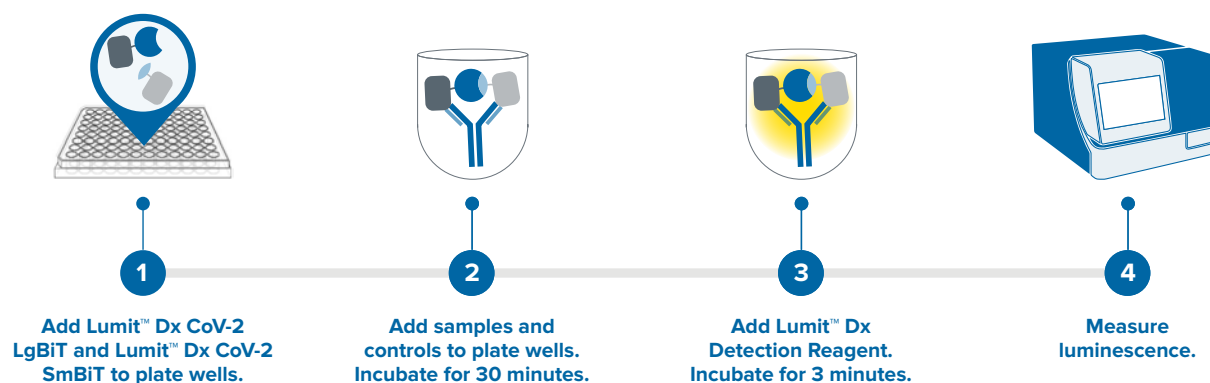


Detect SARS-CoV-2 IgG in serum samples with a luminescent immunoassay

As part of the immune response to SARS-CoV-2, infected individuals produce virus-specific antibodies that are detectable in the blood within one to three weeks after the onset of symptoms. Both immunoglobulin-G (IgG) and IgM appear almost simultaneously, with IgG remaining at a high level for a longer time^{1,2}. The presence of detectable antibodies in serum resulting from infection or vaccination can protect against future infection, but the length of time these antibodies persist and the degree of protection they afford are among the many questions about SARS-CoV-2 that remain under intense investigation.

Benefits

- Scale up for HTS with a homogeneous, no-wash format
- Use a sample volume as little as 15 μ L
- Obtain results in less than one hour



Assay workflow for the Lumit Dx SARS-CoV-2 Immunoassay. The add-incubate-read format enables results in less than one hour and is amenable to automation and high-throughput screening.

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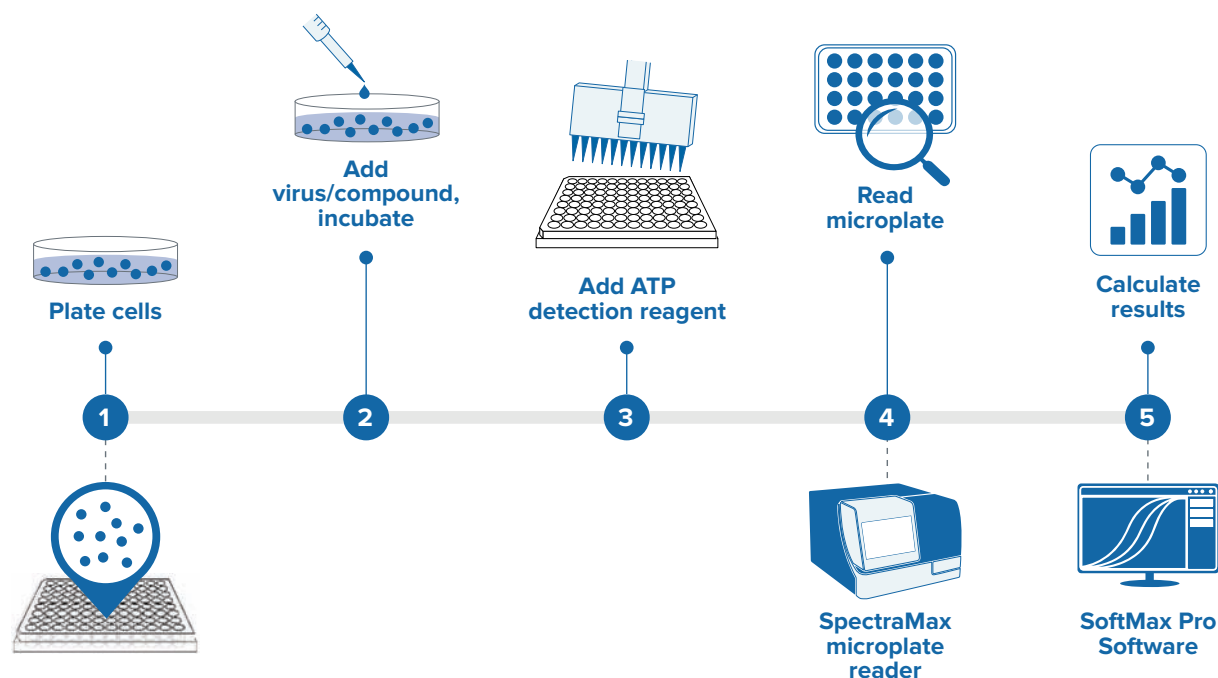
Measure viral-induced cytopathic effects with a quantitative luminescence assay

Viral infection of mammalian cells often reduces cell viability and causes visible effects upon the cells such as changes in shape or size, or fusion with adjacent cells. These changes are called cytopathic effects (CPE), and they can be assessed using light microscopy or imaging systems, or measured using more quantitative means.



Benefits

- Easy mix-and-read method with results in just 10 minutes after reagent addition
- Stable, sensitive luminescence readout suitable for screening
- Generate data and analyze results automatically with SoftMax Pro Software



Viral ToxGlo™ Assay workflow.

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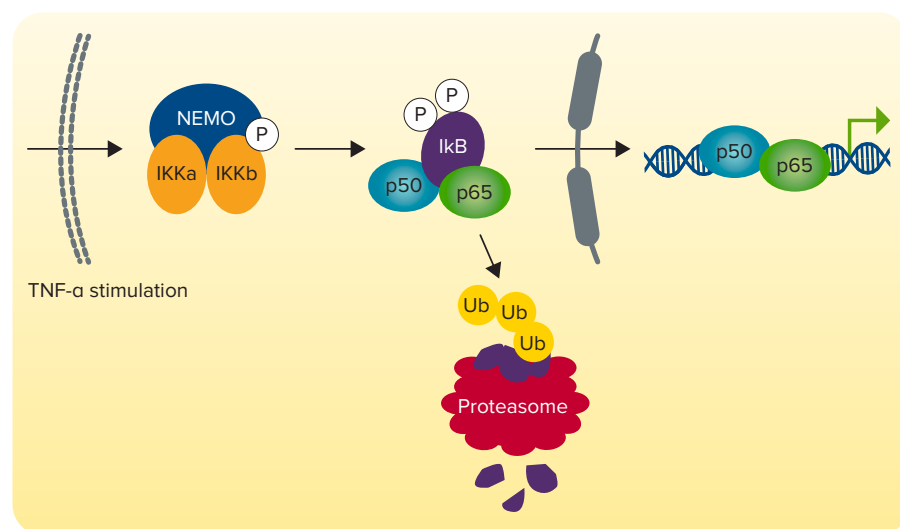
Monitor NF- κ B activation with a sensitive dual reporter assay on the SpectraMax iD5 microplate reader

Reporter gene assays are used to study the expression of eukaryotic genes. In dual reporter gene assays, cells are transfected with two vectors, the first containing an experimental reporter gene coupled to a regulated promoter of interest, and the second containing a control reporter gene coupled to a constitutive promoter. Normalizing the activity of the experimental reporter to the control reporter minimizes experimental variability.

Bioluminescent reporter systems using firefly and *Renilla* luciferases are widely used as co-reporters because the assays are easy to run and exquisitely sensitive. Dual-luciferase assays can elucidate a variety of cell signaling pathways, including disruptions in signaling caused by viral infection.

Benefits

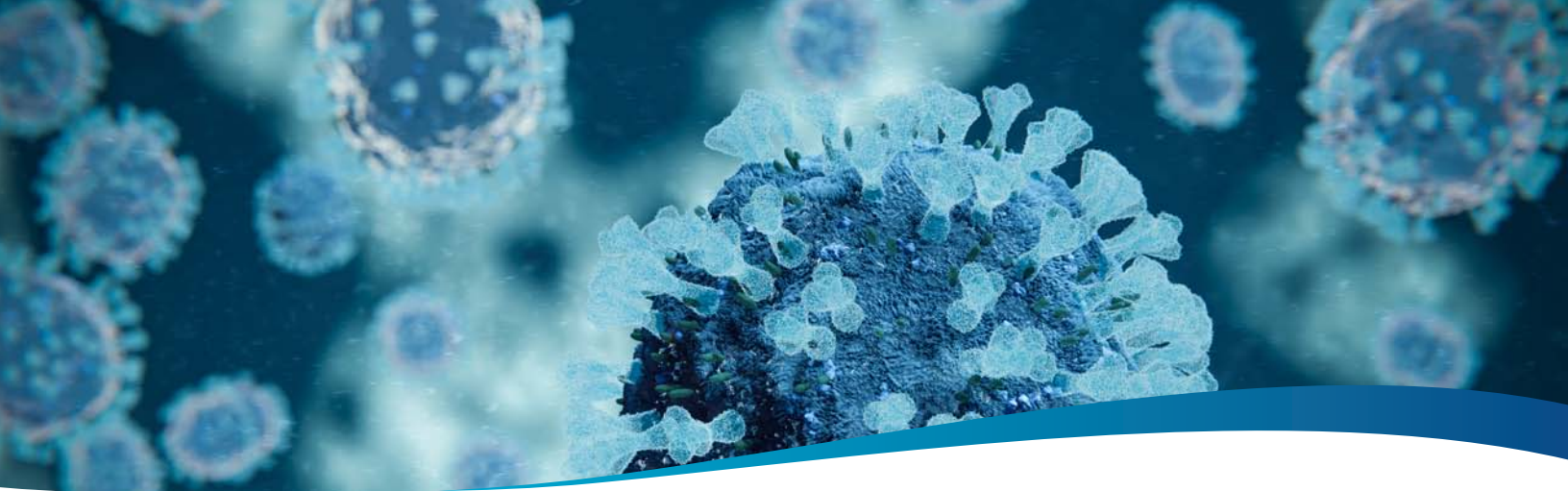
- Detect multiplexed luciferase assay results with a sensitive dual reporter assay
- Improve accuracy of results by normalizing reporter expression to a control
- Expedite results with a preconfigured SoftMax Pro Software protocol



NF- κ B signaling pathway. TNF- α activates a signal cascade resulting in degradation of the NF- κ B inhibitor I κ B and release of NF- κ B transcription factor to the nucleus.

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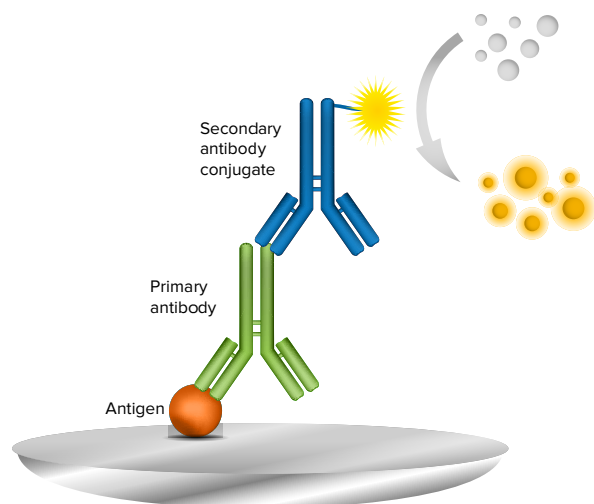


Qualitative measurement of SARS-CoV-2 spike and nucleocapsid IgG antibodies in serum samples

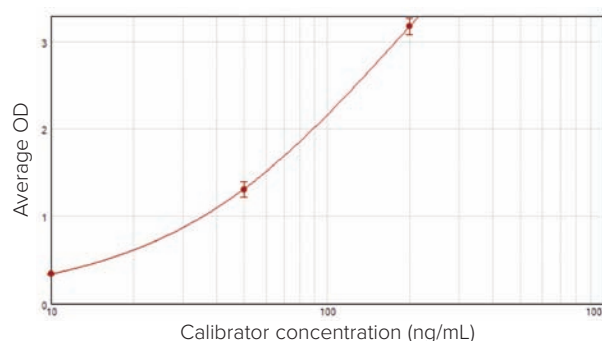
Rapid, accurate, and frequent molecular testing is of critical importance in navigating the SARS-CoV-2 (COVID-19) pandemic. To advance our understanding of the relationship between infection and immunity, it is critical to test not only for infection, but also for antibodies. The fundamental challenge is to identify and implement sensitive, consistent, and accessible testing methods that fulfill these requirements, all at an affordable price.

Benefits

- Gain >95% specificity for nucleocapsid and spike IgG antibodies
- Measure up to 86 samples per kit with high-throughput, qualitative immunoassays
- Acquire colorimetric readout with exceptional inter/intra assay precision



SARS-CoV-2 IgG ELISA (indirect ELISA format). SARS-CoV-2 IgG ELISAs schematic. The bottom of the wells are coated with SARS-CoV-2 Nucleocapsid protein or Spike S1-receptor binding domain (antigen). If present in the serum sample, IgG specific for the antigen binds to the coated wells, and an HRP-conjugated antibody enables detection of the bound IgG with the addition of substrate.



Calibrator curve for the SARS-CoV-2 Nucleocapsid IgG ELISA Kit. The curve was plotted in SoftMax Pro Software using a 4-parameter logistic curve fit. From this curve, results were calculated semi-quantitatively.

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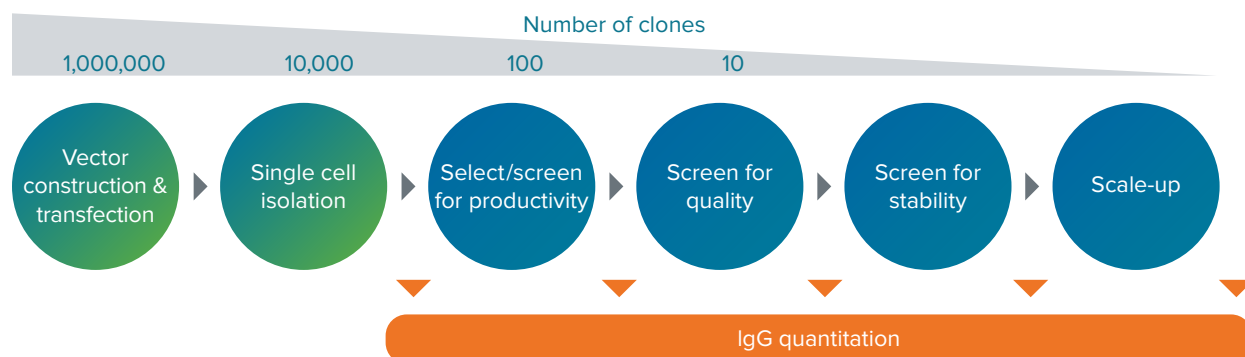


High-throughput IgG quantitation platform for clone screening during drug discovery and development

Biologic drugs are the largest and fastest growing segment of the pharmaceutical industry with sales of €500bn and an annual growth of 8%. Every manufacturing process for potential biologics begins with cell line development, whether it's for clinical trials or a market launch. Monoclonal antibodies (mAb) have established themselves as the leading biopharmaceutical therapeutic modality. The establishment of robust manufacturing platforms is key for antibody drug discovery efforts to seamlessly translate into clinical and commercial successes.

Benefits

- Fast, homogeneous, and automation-friendly assay with results for 96 samples in less than 15 minutes
- Low sample volume and limited test sample pre-preparation, allowing analysis of samples in a crude matrix
- Precise measurement of IgG from 2.5 to 2000 mg/L



The cell line development process from cell transfection to scale-up.

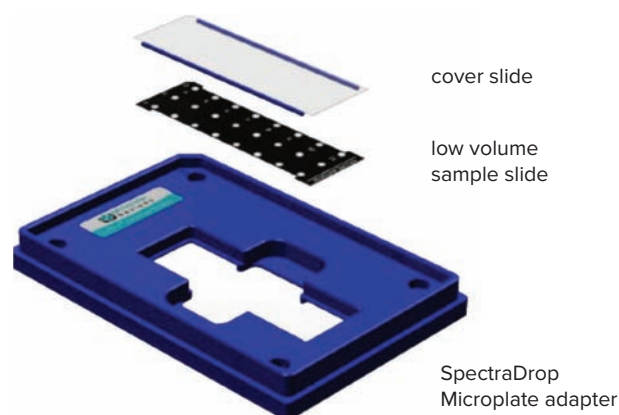
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Low-volume nucleic acid quantitation on the SpectraMax Mini Multi-Mode Microplate Reader

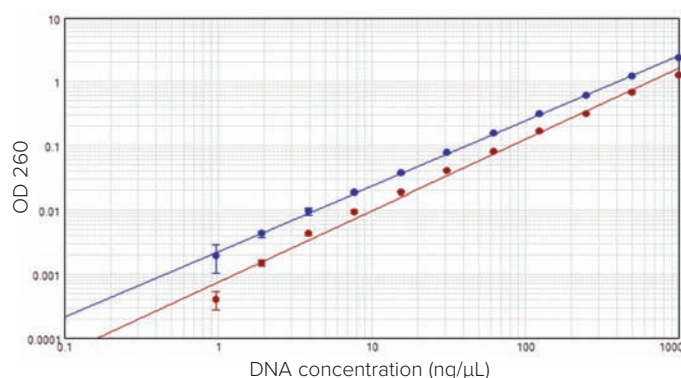
Nucleic acid quantitation is an essential assay that is part of many workflows in genetics, molecular, and cellular biology. The development of nucleic acid vaccines is yet another area where accurate quantitation of material at different steps in the process is critical. Various methods have been developed to quantitate nucleic acids, but the most commonly used technique is still ultra-violet (UV) spectrophotometry. The basis of spectrophotometry is that every molecule absorbs or transmits light over a certain wavelength range, and concentrations can be calculated by using the Beer-Lambert law with preceding knowledge of the sample's molar extinction coefficient and the measurement pathlength.

Benefits

- Low-volume nucleic acid quantitation using as little as 2 μL of sample
- High-throughput measurement of 24 or 64 samples at a time
- Linear dynamic range of 3 decades for accurate quantitation without the need for dilution

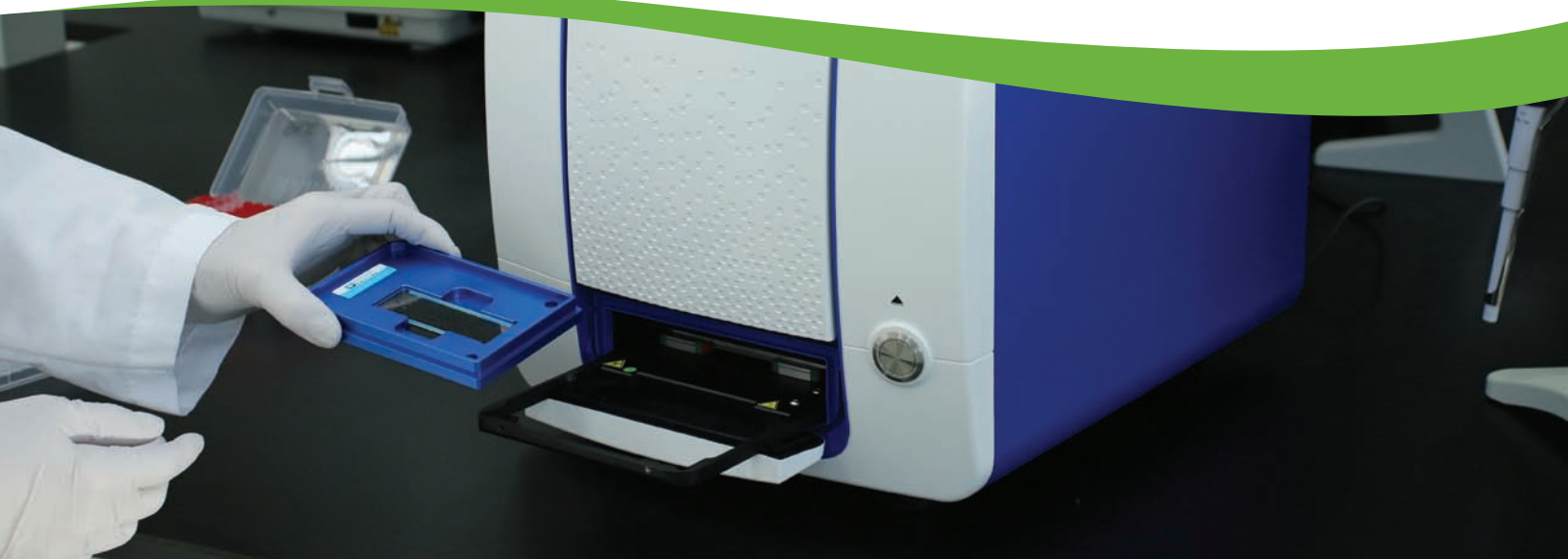


SpectraDrop Micro-Volume Microplate configuration. The low-volume sample slide has a mask delineating spots or 'wells' that hold 24 or 64 samples. The cover slide has 0.5-mm or 1.0-mm spacers for use with 2- μL or 4- μL samples, respectively.



DNA standard curves on the SpectraDrop plate, read on the SpectraMax Mini reader. Blue plot shows 2- μL samples; red plot shows 4- μL samples (r^2 values were 0.991 and 1.000, respectively).

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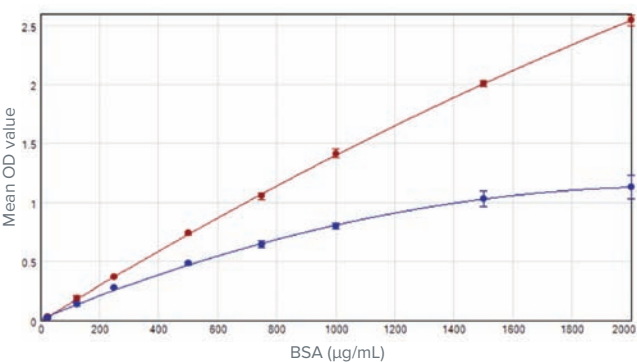
Measure total protein in cell lysates with SpectraMax ABS Plus Microplate Reader

Quantitation of proteins in cell lysates is a key step for many downstream applications including western blots and enzyme linked immunosorbent assays (ELISAs), which are often used to identify viral proteins in clinical or research samples. The most popular protein quantitation assays are colorimetric, relying on the change in color of a reagent in the presence of the protein of interest.

Here, we describe the use of the Pierce Rapid Gold BCA and Pierce Detergent Compatible Bradford assays to quantitate total protein in cell lysates.

- Benefits

 - Accurately assay protein concentrations with minimal incubation time
 - Obtain results quickly with the 8-channel read head
 - Plot standard curves and calculate sample protein concentrations automatically with preconfigured protocols in SoftMax Pro Software



BSA standard curves for the BCA Rapid Gold assay (red plot, $r^2 = 1.000$) and Detergent Compatible Bradford assay (blue plot, $r^2 = 0.999$).

Sample	Wells	Dilution Factor	OD Value	R	Concentration	MeanConc	SD	CV	AdjConc
01	E1	1.000	0.355	0.996	239.916	401.514	252.166	62.8	401.514
	F1		0.996		692.080				
	G1		0.403		272.547				
02	E2	3.000	0.395	0.356	266.970	242.004	24.479	10.1	726.011
	F2		0.356		240.998				
	G2		0.322		218.043				
03	E3	9.000	0.151	0.124	103.796	90.176	12.044	13.4	811.580
	F3		0.124		85.800				
	G3		0.116		80.931				
04	E4	27.000	0.044	0.039	33.386	29.410	4.630	15.7	794.073
	F4		0.039		30.517				
	G4		0.030		24.327				

Mean Adjusted Result: 683.3

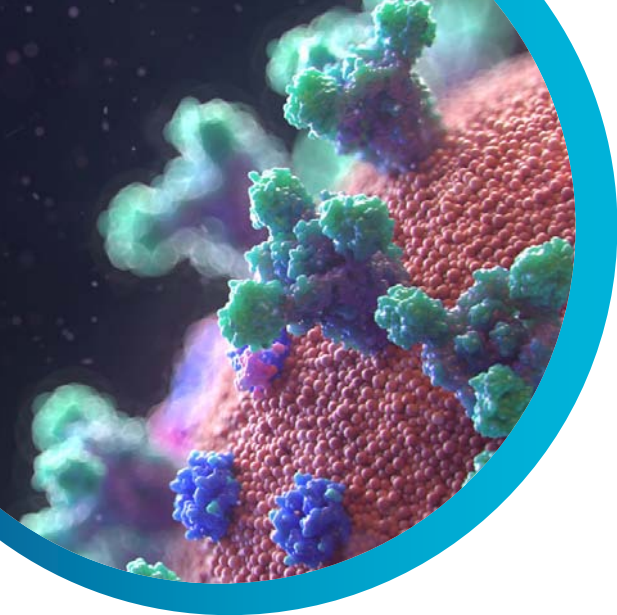
Rapid Gold BCA assay results. SoftMax Pro Software data table shows the calculated concentrations of serially diluted cell lysate.

Sample	Wells	Dilution Factor	OD Value	R	Concentration	MeanConc	SD	CV	AdjConc
01	E1	1.000	0.224	0.188	216.035	203.674	21.969	10.8	203.674
	F1		0.225		216.679				
	G1		0.188		178.309				
02	E2	3.000	0.217	0.251	208.432	223.730	19.160	8.6	671.190
	F2		0.225		217.537				
	G2		0.251		245.221				
03	E3	9.000	0.117	0.107	104.006	98.806	4.895	5.0	889.258
	F3		0.111		98.128				
	G3		0.107		94.286				
04	E4	27.000	0.050	0.039	37.286	34.344	6.235	18.2	927.291
	F4		0.051		38.564				
	G4		0.039		27.182				

Mean Adjusted Result: 672.9

Bradford assay results. SoftMax Pro Software data table shows calculated concentrations of cell lysate with the Detergent Compatible Bradford assay.

Read Application Note



Assess virus neutralization with a rapid, HTS-friendly assay

The worldwide COVID-19 pandemic caused by the SARS-CoV-2 virus has necessitated the fast-tracked development of many research tools for understanding this virus's pathogenesis, as well as vaccine discovery and development. Assays for monitoring the immune response to infection by and vaccination against the virus are important to COVID-19 research.

Benefits

- Rapid, easy assay setup with an ELISA workflow
- No BSL-3 or cell culture required
- Results consistent with data from plaque reduction neutralization test

PRNT assay (BSL3 lab)

Cell and virus preparation

Incubate testing samples with virus for 1 hour

Add the above mixture to Vero-E6 cells and incubate for 1 hour

Overlay 1% agarose and incubate for 2 days

Fix cells and stain

Count plaques

Total assay time = 2.5 days

sVNT kit (BSL2 lab)

Incubate testing samples with HRP-RBD for 30 minutes

Add the above mixture to the wells pre-coated with ACE2 for 15 minutes

Wash wells

Add substrate and incubate for 15 minutes

Add stop solution and read

Total assay time = 1 hour

Comparison of PRNT and sVNT kit workflows. The sVNT assay can be completed in one hour in a BSL-2 lab, while PRNT requires live SARS-CoV-2 virus and cumbersome cell culture techniques, taking more than two days at a BSL-3 lab.

[Read Application Note](#)

Virus reduction neutralization test: A single-cell imaging high-throughput virus neutralization assay for dengue



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Vaccine immunogenicity and clinical efficacy are often assessed by the measure of serum-neutralizing antibodies. The present gold standard for detecting neutralizing antibodies against many viruses, including dengue, is the plaque/focus reduction neutralization test (P/FRNT). The FRNT is a cell-based assay that inherits high variability, resulting in poor precision and has lengthy turnaround times. The virus reduction neutralization test (VRNT) is a high-throughput alternative to the standard low-throughput and laborious FRNT. The VRNT is similar to FRNT using unaltered wild-type virus and immunostaining, yet uses imaging cytometry to count virus-infected cells one day post-infection, reducing assay time and increasing overall throughput 15-fold. In addition, the VRNT has lowered variability relative to FRNT, which may be explained in part by the observation that foci overlap alters foci count and titer over time, in the FRNT.

The ability to count one infected cell, rather than waiting for overlapping foci to form, ensures accuracy and contributes to the precision (7–25% coefficient of variation) and sensitivity of the VRNT. Results from 81 clinical samples tested in the VRNT and FRNT show a clear positive relationship. During sample testing, a 96-well plate edge effect was noted and the elimination of this edge effect was achieved by a simple plate seeding technique. The VRNT is an improvement to the current neutralization assays for its shortened assay time, increased precision and throughput, and an alternative to the P/FRNT.

[Read Scientific Paper](#)



**SpectraMax i3x Multi-Mode
Microplate Reader**



**SpectraMax iD3 Multi-Mode
Microplate Reader**



**SpectraMax iD5 Multi-Mode
Microplate Reader**



**SpectraMax Mini Multi-Mode
Microplate Reader**



**SpectraMax M5 Multi-Mode
Microplate Reader**



**SpectraMax ABS/ABS Plus Absorbance
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