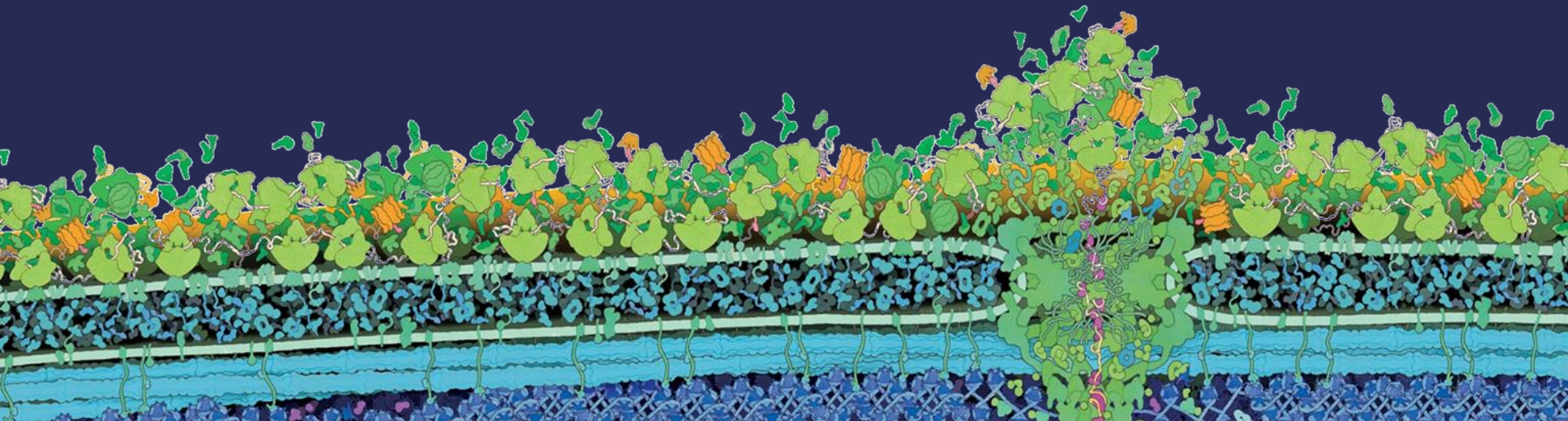


Tools to Monitor Biology in 3D Culture

Cell Health Changes • Metabolic Changes
Expression Changes • Genome Analysis

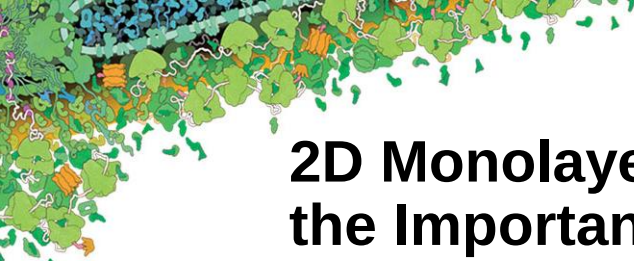
May 2024





Tools to Monitor Biology in 3D Culture

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2D Monolayer Cultures can Mask the Importance of Oxygen and Metabolic Restriction

“The nature and importance of metabolic restriction in cancer has often been masked owing to the use of *tissue culture conditions in which both oxygen and nutrients are always in excess.*”

Cairns, R.A., Harris, I.S. and Mak, T., (2011) [Regulation of Cancer Cell Metabolism](#). *Nature Reviews: Cancer* **11**, 85-95.



3D Cell Culture More Physiologically Relevant

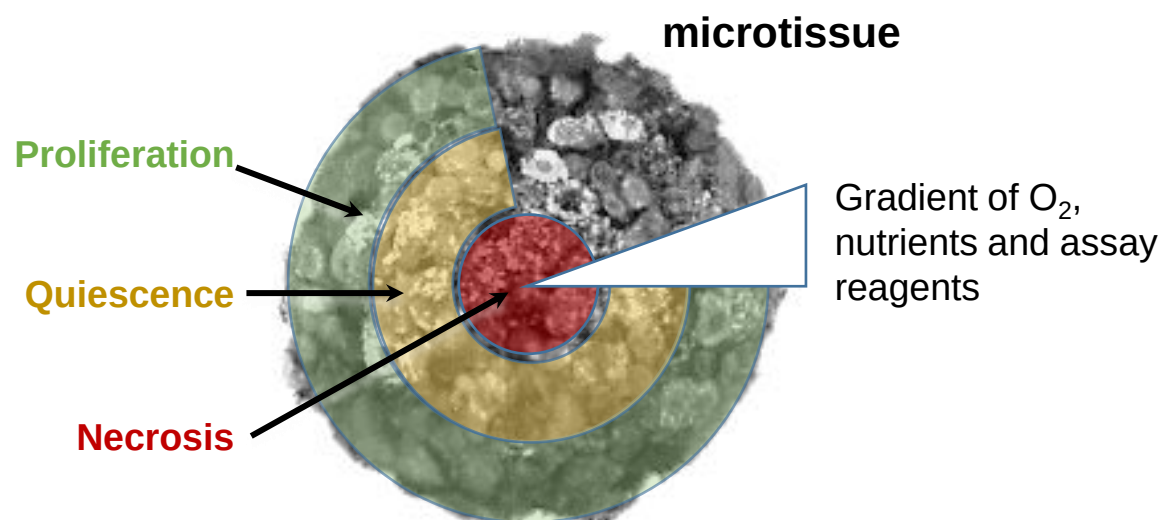
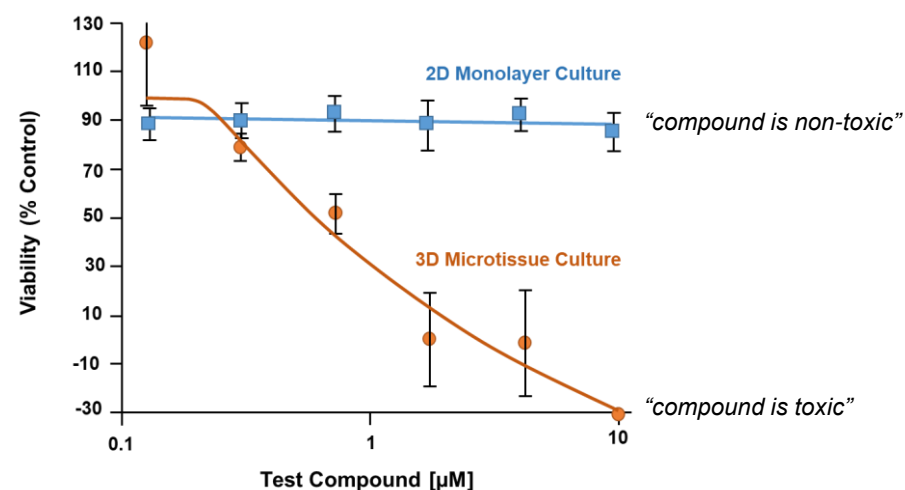
Mimics tissue/tumor more closely:

- Center is more hypoxic
- Nutrients more limiting

Allows more natural
3D cell-to-cell contacts

Allows more natural interactions
with matrix (and matrix creation)

3D Culture can Reveal Dramatic Differences in Cellular Responses



3D Webinar Resources

Factors to Consider for Designing and Optimizing Assays Applied to 3D Cultures

In this webinar, we'll explore the challenges of applying traditional assay chemistries and imaging methods, originally developed for 2D cell monolayers, to 3D cell culture models. We'll discuss key considerations for designing and optimizing assays for 3D cultures, share case studies on reagent design to address detection limitations in large 3D models, and introduce novel applications for real-time detection methods.



Terry Riss, Ph.D.
Global Strategic
Marketing Manager,
Former R&D Director
for Cell Health



[Watch Now](#)

Originally Webinar Date:
September 26, 2017



Ask the Experts: 3D Cell Culture and Assays

What are the different types of 3D models? How can I evaluate cell-based assays for use in 3D culture? If you're new to 3D cultures or have questions about your current assay, join us on this live Q&A session where 3D culture experts will help you get the answers you need!



Austin Mogen, Ph.D.
Field Application Scientist
Corning Life Sciences

Terry Riss, Ph.D.
Global Strategic
Marketing Manager,
Former R&D Director
for Cell Health



[Watch Now](#)

Original Webinar Date
September 17, 2019



View all 3D
[webinars](#)



3D Webinar Resources continued

Setting Up Easy-to-Analyze Physiologically Relevant 3D Cultures for in vitro Studies

Recent advancements in synthetic tunable peptide hydrogels, like PeptiGels®, are addressing the limitations of traditional 3D cell culture materials by more accurately mimicking in vivo tissue environments. In this webinar, Dr. Olayanju will showcase the application of PeptiGels® in organoid and cancer research, emphasizing their reproducibility and precision. Dr. Marta Rucka will also discuss how to validate traditional 2D assays in 3D microtissues and introduce specialized assays for real-time cell health monitoring and data-rich multiplexing in 3D models.



Adedamola (Dammy) Olayanju, Ph.D.
Senior Scientist
Manchester BioGel

Marta Rucka, Ph.D.
Product Manager,
Promega UK



[Watch Now](#)

Original Webinar Date
2021



Using Transcriptomics to Study Drug-Induced Liver Injury in 3D Cellular Models

3D cell cultures and assays are advancing the field of predictive toxicology. In this webinar, Dr. Jim Cali will discuss how to choose the best assays for use in 3D cultures, with a focus on CellTiter-Glo® 3D as a tool to assess cell viability. Dr. Alicia Rosell-Hidalgo will present how to use high-content screening (HCS) and high-throughput RNA-seq techniques in 3D liver models to gain a mechanistic understanding of compound effects and develop novel predictive models.



Alicia Rosell-Hidalgo, Ph.D.
Associate Principal Scientist in
Toxicology
Cyprotex Discovery Ltd.



Jim Cali, Ph.D.
Director, R&D Assay Design
Promega Corporation



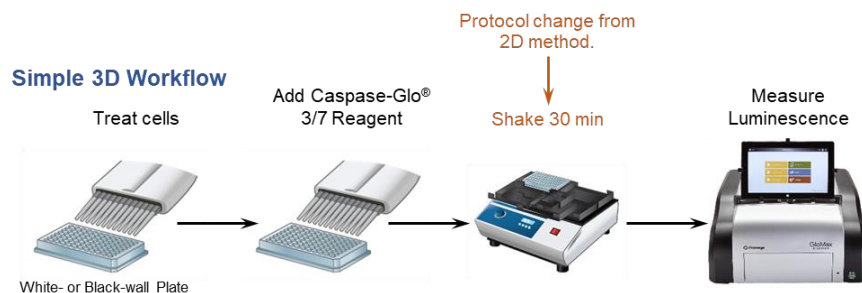
[Watch Now](#)

Original Webinar Date
2021

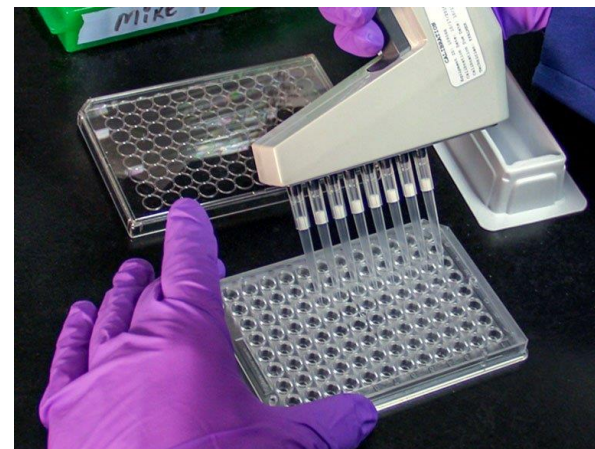
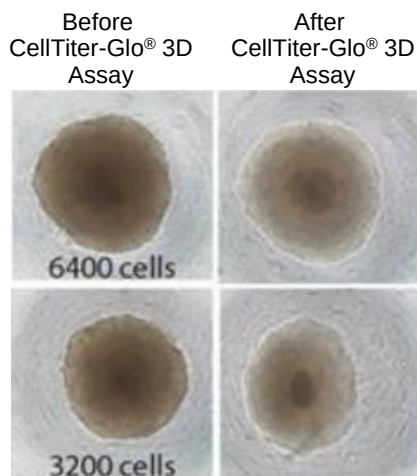


Some advice on working with 3D cultures...

Most cell-based assays are developed for monolayer cultures. These standard protocols likely will not work with 3D cultures if you must liberate a protein or a compound from the cytoplasm. We find that increasing the detergent (e.g., CellTiter-Glo® 3D), lengthening the shaking (physical disruption) and/or the time in the lysis solution makes the assay perform well with the microtissues. Throughout this document, you will see the assay workflow with the changes from the standard protocol noted.



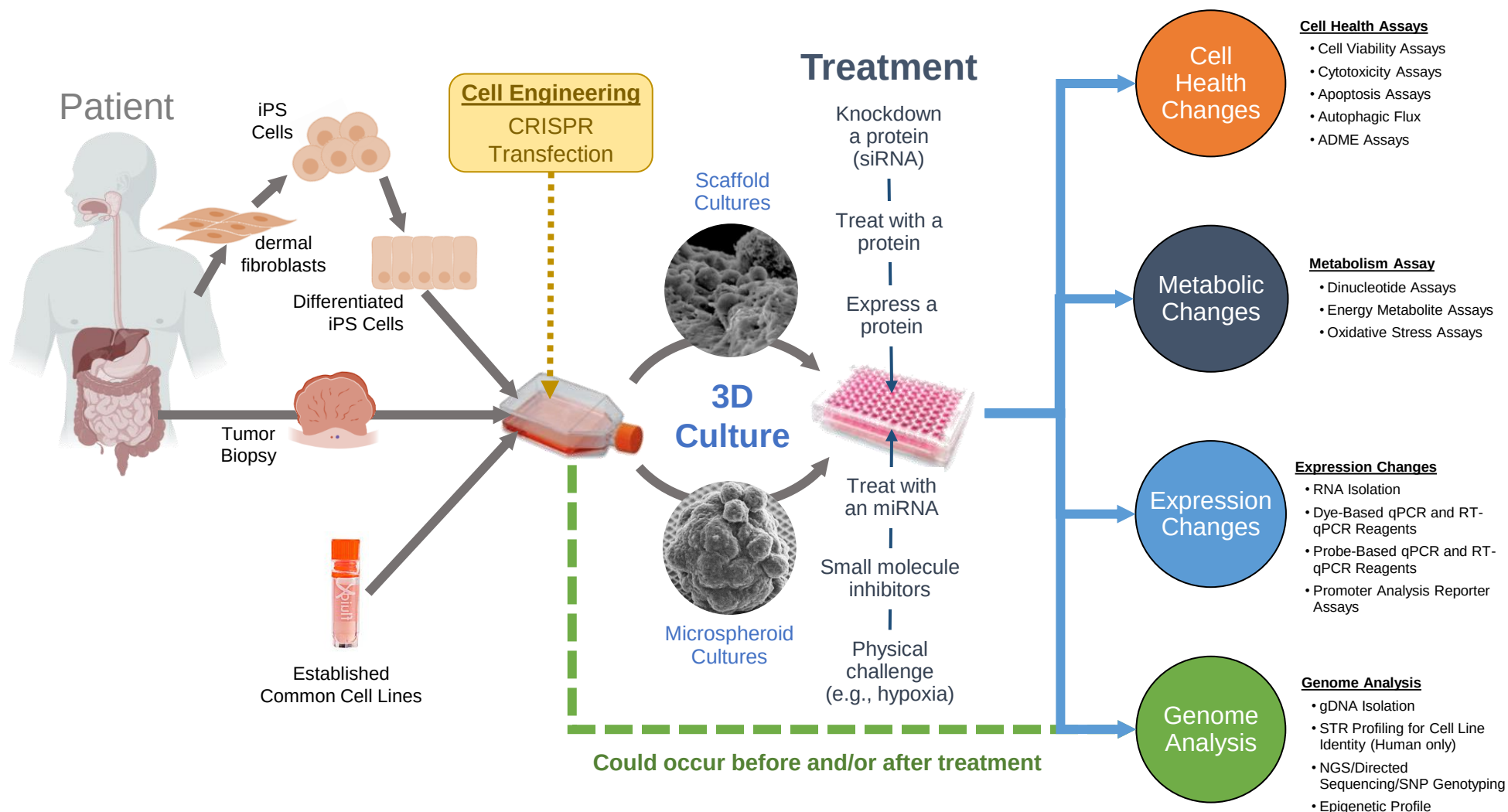
Don't be alarmed if you see a structure in the well after you perform your assay. Terry Riss, Ph.D., relates that the membranes could be lysed, releasing the contents, but the extracellular matrix produced by the cells and other cell:cell interactions could hold the overall structure of spheroid together so that it remains visible.



“You have to be careful about how fast you pipette because the microtissues will move around. We actually had to buy pipetters that can run at less than 10µl per second. We go as slowly as possible.”

Mike Valley, PhD,
Sr. R&D Scientist

Monitoring Biology in 3D Cultures





Assessment

Tools to Monitor

TOOLS TO MONITOR
BIOLOGY IN 3D CULTURE



Assay Guidance Manual



The National Center for Advancing Translational Sciences (NCATS) manages the content of the Assay Guidance Manual with input from industry, academia and government experts. More than 100 authors from around the globe have contributed content to this **free resource**, which is updated quarterly with contributions by experienced scientists from multiple disciplines working in drug discovery and development worldwide.

Overview of the most commonly used assay methods to estimate the number of viable cells in multi-well plates. This chapter describes assays where data are recorded using a plate-reader; it does not cover assay methods designed for flow cytometry or high content imaging. The assay methods covered include the use of different classes of colorimetric tetrazolium reagents, resazurin reduction and protease substrates generating a fluorescent signal, the luminogenic ATP assay, and a novel real-time assay to monitor live cells for days in culture. The assays described are based on measurement of a marker activity associated with viable cell number. These assays are used for measuring the results of cell proliferation, testing for cytotoxic effects of compounds, and for multiplexing as an internal control to determine viable cell number during other cell-based assays.

In this chapter we focus on assessment of spheroid viability by measuring intracellular ATP content. This primary assay performed on 3D cell culture system is a powerful tool to predict with high confidence health, growth and energy status of tissue of interest. The 3D spheroid model is particularly useful to mimic solid-tumors from a physiologically relevant architectural perspective, when they are grown with multiple cell types prevalent in these tumors. However, this assay is equally applicable for other non-spheroid 3D tissue models to quantify viability and toxicity.



Cell Health Changes in 3D

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ADME Assays

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Autophagy Detection

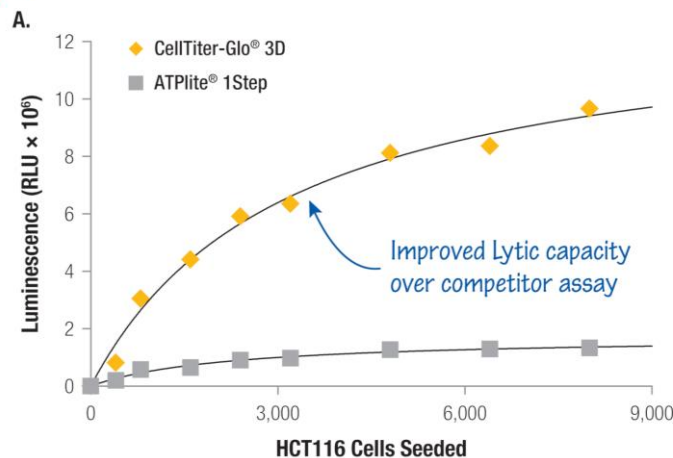
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Inflammation

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CellTiter-Glo® 3D Cell Viability Assay

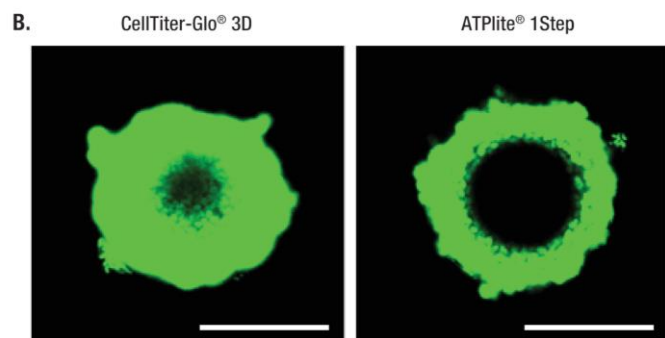
Greater Lytic Power for More Accurate 3D Tissue Viability Assessment



Improved 3D Microtissue Penetration, More Accurate Viability Data

HCT116 colon cancer spheroids were generated by seeding cells in the InSphero GravityPLUS™ 96-well hanging-drop platform and grown for 4 days.

Panel A. An equivalent volume of reagent was added to all samples, and after 5 minutes of shaking, luminescence was recorded at 30 minutes.



Panel B. A 2X concentration of CellTox™ Green Dye was added to CellTiter-Glo® 3D Reagent (left) or ATPlite™ 1Step Reagent (right) prior to sample addition as an indicator of cell lysis and images were acquired at 30 minutes. The spheroids in Panel B are ~300µm in diameter, and the scale bars in each image represent 200µm.

The CellTiter-Glo® 3D Cell Viability Assay is designed for determining cell viability in 3D microtissue spheroids. The assay reagent penetrates large spheroids and has increased lytic capacity—allowing more accurate determination of viability compared to other assay methods.

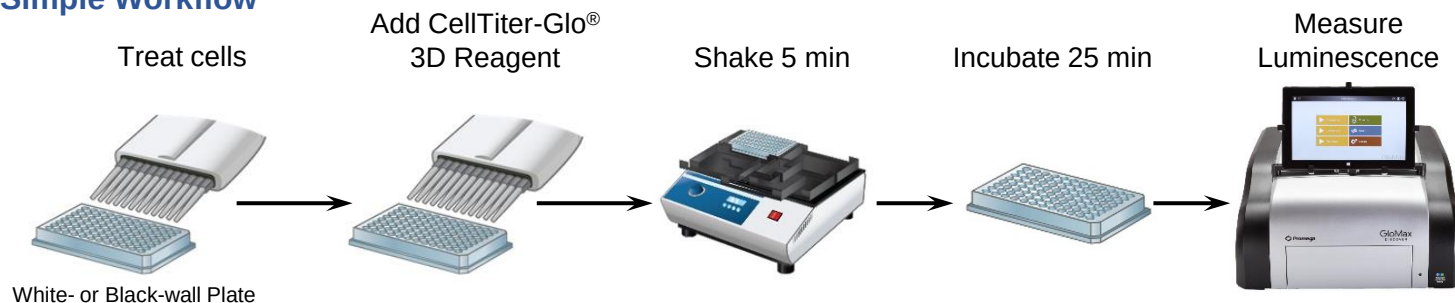
- Based on the same chemistry used in the classic CellTiter-Glo® Assay measuring ATP as an indicator of viability
- Ultra-Glo™ rLuciferase is the key to this assay, providing more tolerance to detergent compared to the more common *Photinus pyralis* luciferase.
- Provides a luminescent readout that yields more sensitive results than colorimetric or fluorescence-based methods
- Obtain quick results with the simple, 30-minute protocol and ready-to-use reagent

Product	Cat. #	Size
CellTiter-Glo® 3D Cell Viability Assay	G9681	10ml
	G9682	10x10ml
	G9683	100ml

[Explore product citations since 2023](#)



Simple Workflow



Assay Summary:

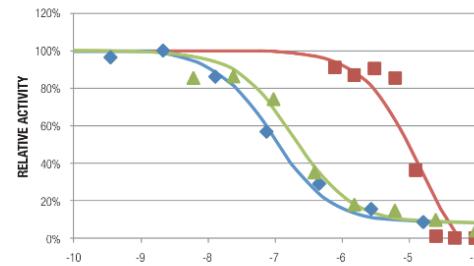
- Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation Requires Duplicate Wells
- 3D Performance verified

CellTiter-Glo® 3D Cell Viability Assay

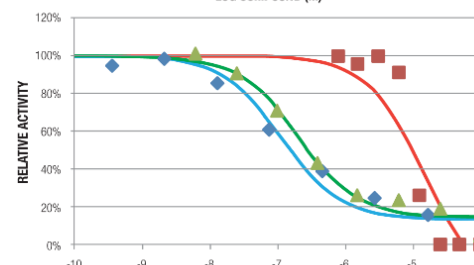
Greater Lytic Power for More Accurate 3D Tissue Viability Assessment

Compatible with a variety of 3D culture systems

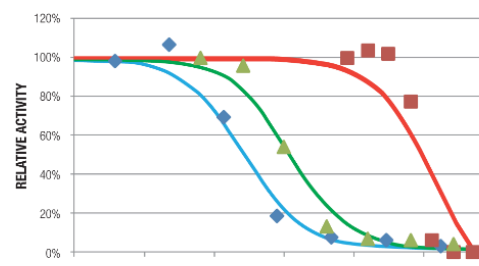
Hanging Drop Method



ULA



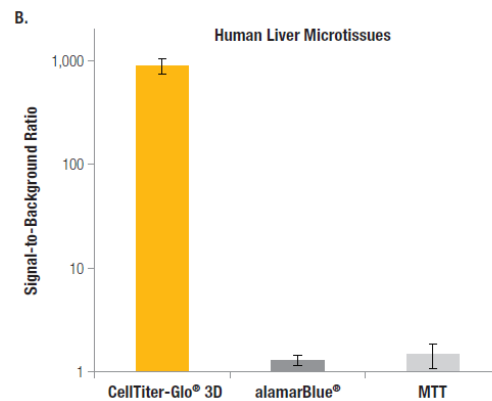
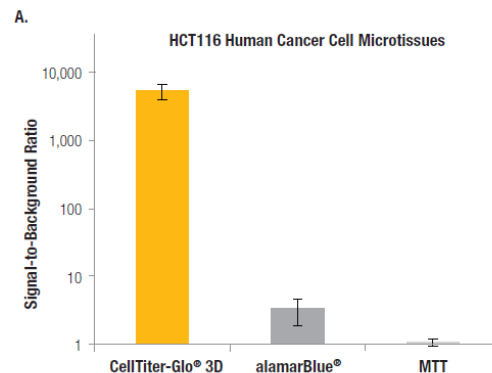
Matrigel



◆ panobinostat ■ terfenadine ▲ trichostatin A

HCT116 colon cancer cells were seeded in the different formats (400 cells in hanging-drop and 1,000 cells in ULA or Matrigel® matrix) and microtissues were grown for 4 days. Microtissues were treated with compounds for 48 hours and then assayed by adding an equal volume of CellTiter-Glo® 3D Reagent, shaking for 5 minutes, and recording luminescence at 30 minutes.

More Sensitive than Colorimetric or Fluorometric Cell Viability Assays Designed for 2D Cultures



CellTiter-Glo® 3D Assay sensitivity compared to other fluorescent and colorimetric viability assays. Panel A. HCT116 colon cancer cells were seeded into an InSphero GravityPLUS™ 96-well hanging-drop platform and grown for 4 days to generate ~340µm spheroids. Panel B. Insight™ human liver microtissues (~250µm) were provided by InSphero. All microtissues were assayed using the CellTiter-Glo® 3D, alamarBlue® and MTT assays according to manufacturers' protocols. The total assay times for the CellTiter-Glo® 3D, alamarBlue® and MTT assays were 30 minutes, 3 hours, and 8 hours, respectively.

The **CellTiter-Glo® 3D Cell Viability Assay** is designed for determining cell viability in 3D microtissue spheroids.

- More robust lytic capacity allows measurement of ATP, a key viability biomarker, from larger microtissues
- More sensitive detection of viability in small to large microtissue spheroids compared to colorimetric or fluorometric viability assays
- Faster to results, in as little as 30 minutes
- Flexible chemistry adapts to 96- to 384-well plate assays
- Multiplex with other assay chemistries (e.g., CellTox™ Green Cytotoxicity Assay)

Product	Cat. #	Size
CellTiter-Glo® 3D Cell Viability Assay	G9681	10ml
	G9682	10 x 10ml
	G9683	100ml

Google Scholar hits since 2023 "CellTiter-Glo 3D" + ...



[spheroid](#)



[hydrogel](#)



[organoid](#)



[microfluidic](#)

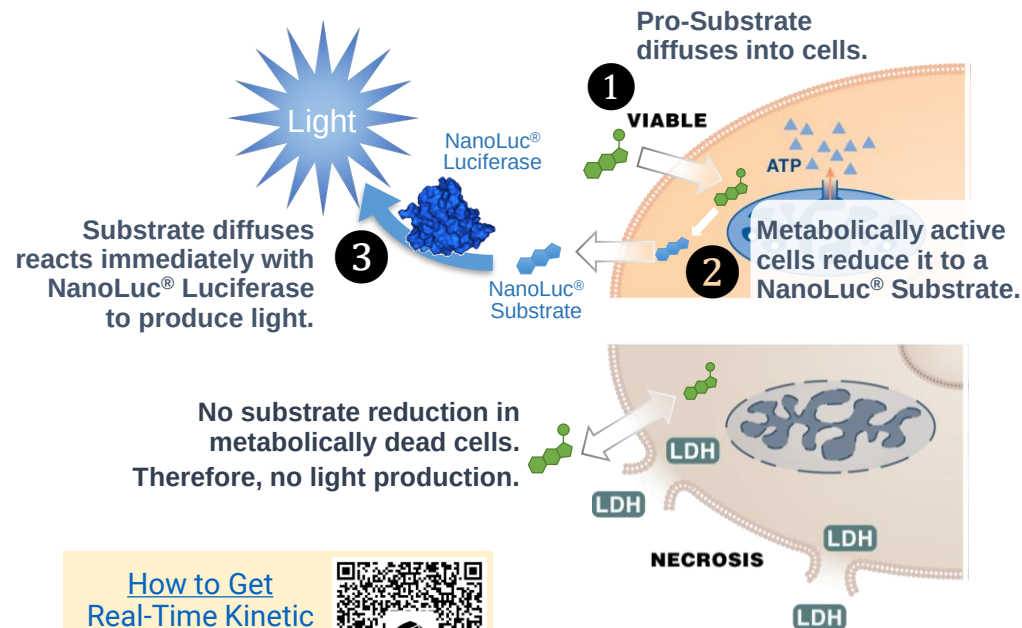
RealTime-Glo™ MT Cell Viability Assay

Monitor Cell Viability in Real Time

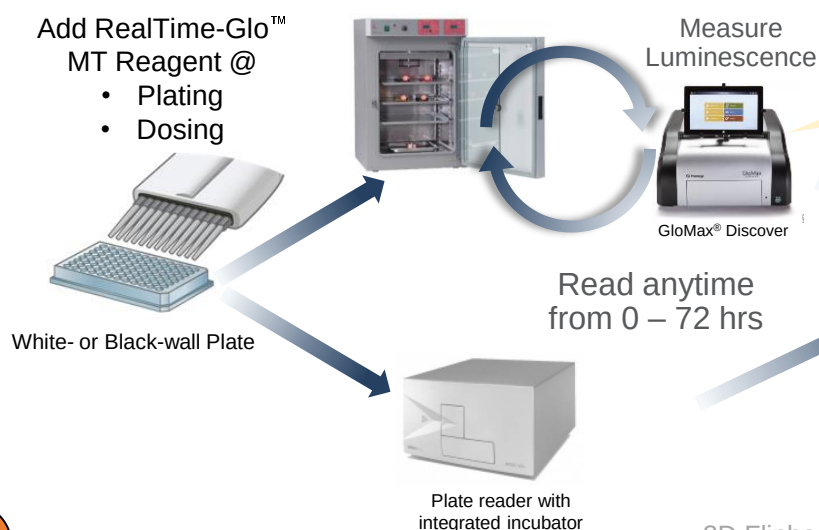
With the RealTime-Glo™ MT Cell Viability Assay, you can monitor cell viability continually in the same sample well out to 72 hours to obtain more information about the mode of action of a treatment with regard to time and dose dependence. The assay reagent can be added to cells during plating, during treatment or at the end of treatment. No cell washing, media removal or further additions are required.

The nonlytic nature and rapid response of the assay make it possible to monitor cell viability over time in the same well, and enables easy multiplexing with other cell-based assays or downstream applications. The assay measures the reducing potential of viable cells, and is ATP-independent, providing an orthogonal method for viability or cytotoxicity determination.

Assay chemistry uses the reducing potential of the cell – a metabolic marker for viability.



Adaptable Workflow



[How to Get Real-Time Kinetic Data With GloMax® Microplate Readers](#)



RealTime-Glo™ MT is non-lytic.

Cells can be used for other assays.

- Other Cellular Assays
- RNA Isolation
- DNA Isolation

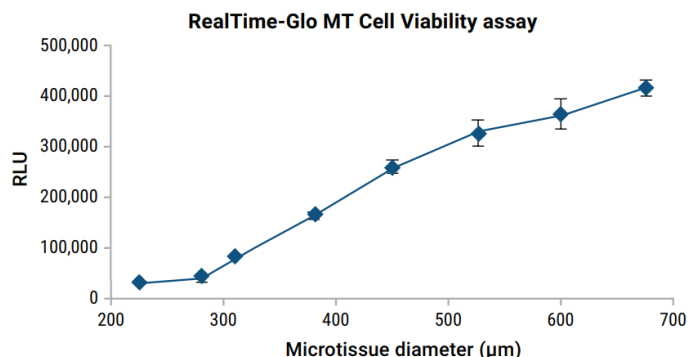
Assay Summary:

- Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation from same well

RealTime-Glo™ MT Cell Viability Assay

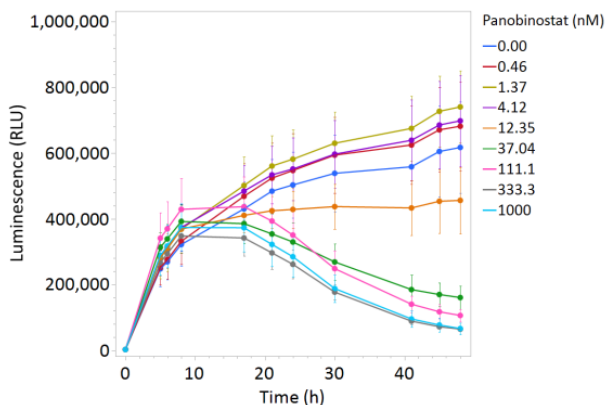
Monitor Cell Viability in Real Time

Cell viability from increasing microtissue sizes correlates with luminescent output.



Cells were diluted two-fold in McCoy's medium from 2.5×10^3 cells/ml to 3.2×10^5 cells/ml and grown according to the GravityPLUS™ 3D Culture and Assay Platform Technical Manual. RealTime-Glo™ Reagent (100μl) was added to the microtissues. Luminescence was recorded 10 minutes after reagent addition using the GloMax® Discover System. Values present represent the mean of 3 replicates of each cell concentration. Error bars are ± 1 standard deviation.

Measure cell viability following drug treatment of 3D microtissues in real time.



250 HCT 116 cells were embedded in MatriGel® Growth Factor Reduced Basement Membrane Matrix in a white 96-well, flat bottom, TC-treated plate. Microtissues were allowed to form for 4 days. Medium was removed from each well and new medium was added, which was supplemented with RealTime-Glo™ Viability Assay reagent at 1X final concentration and included in different concentrations of Panobinostat (as indicated) or vehicle control. Luminescence (RLU) was read with the GloMax® Discover Microplate Reader over 48 hours at the indicated timepoints. Mean $\pm$ standard deviation for n=6 is shown.

- **One Plate, Multitudes of Data:** Simply time course experiments and reduce cell culture use and resource time.
- **Real-Time Monitoring:** Assess cell viability in the same sample well for days, allowing you to determine the onset of toxicity.
- **Flexibility:** Add reagent to cells before plating, with drug dosing, or at any point.
- **Multiplexing:** Nonlytic, live-cell assay allows multiplexing with other cell-based or molecular applications.
- **Automation:** Reactions are scalable and adapt to 96-, 384-, or 1,536-well plates

Product	Cat. #	Size
RealTime-Glo® MT Cell Viability Assay	G9711	100 rxn
	G9712	10 x 100 rxn
	G9713	1,000 rxn

Read about the design and use of this assay:

Duellman, S.J., et al. (2015) [Bioluminescent, nonlytic, real-time cell viability assay and use in inhibitor screening](#). *Assay Drug Dev. Technol.* **13**, 456-65. PMID: [26383544](#)



What is NanoLuc® Luciferase? Read about the origin:

Hall, M.P., et al. (2012) [Engineered luciferase reporter from a deep sea shrimp utilizing a novel imidazo-pyrazinone substrate](#). *ACS Chem. Biol.* **7**, 1848-57. PMID: [22894855](#)



Google Scholar hits since 2023 "RealTime Glo MT" + ...



[spheroid](#)



[hydrogel](#)

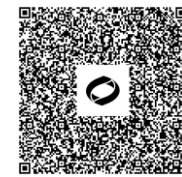


[organoid](#)



[microfluidic](#)

[RNA isolation](#) from 3D microtissues is possible after performing the RealTime-Glo™ MT Cell Viability Assay

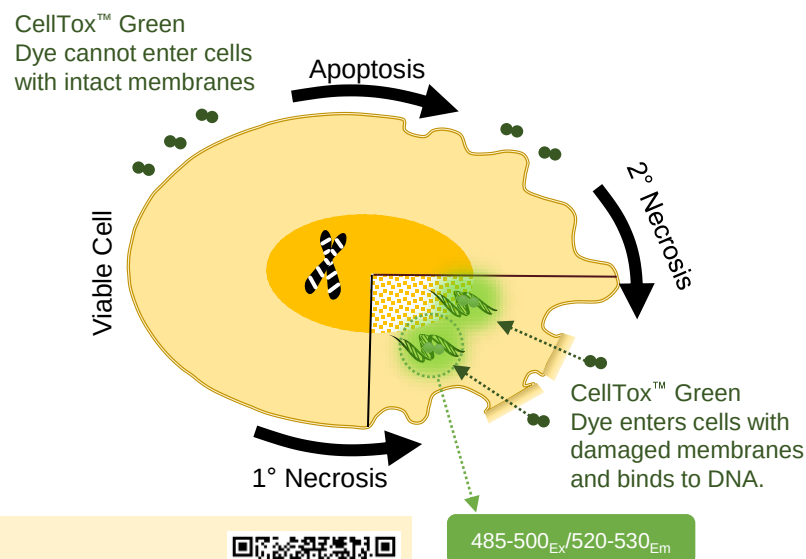


CellTox™ Green Cytotoxicity Assay

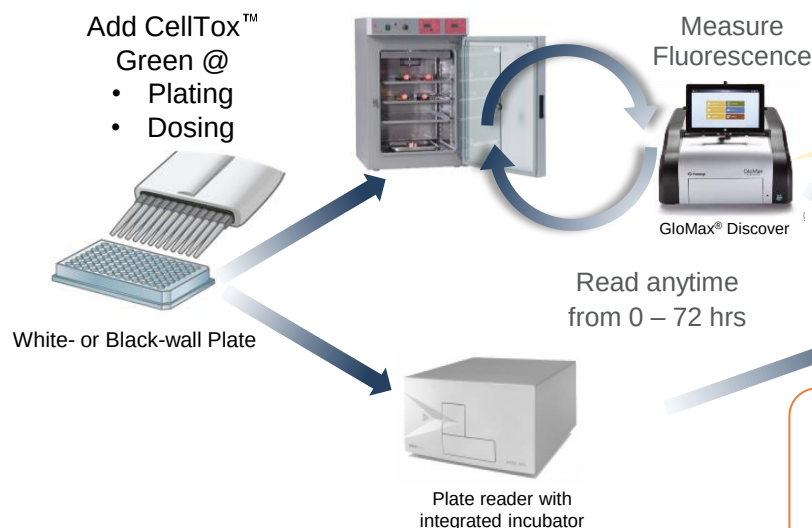
Kinetic Assay for Cytotoxicity, Simplifies Time Course Experiments

Cytotoxicity assays based on detection of biomarkers released into the media can underestimate cytotoxicity in long-term exposures of 72 hours or more because of limited stability of the biomarker detected. The CellTox™ Green Cytotoxicity Assay provides an easy, fast and accurate method to determine toxic effects during or after long-term exposure of cells in culture. CellTox Green can be combined with other methods in multiplex assays to determine mechanism of toxicity.

**Kinetically determine onset of toxicity and
multiplex to determine mechanism of action**



Adaptable Workflow



[How to Get
Real-Time Kinetic Data
With GloMax®
Microplate Readers](#)



CellTox™ Green
is a non-lytic reagent

Cells can be used for other assays.
• Other Cellular Assays
• RNA Isolation
• DNA Isolation

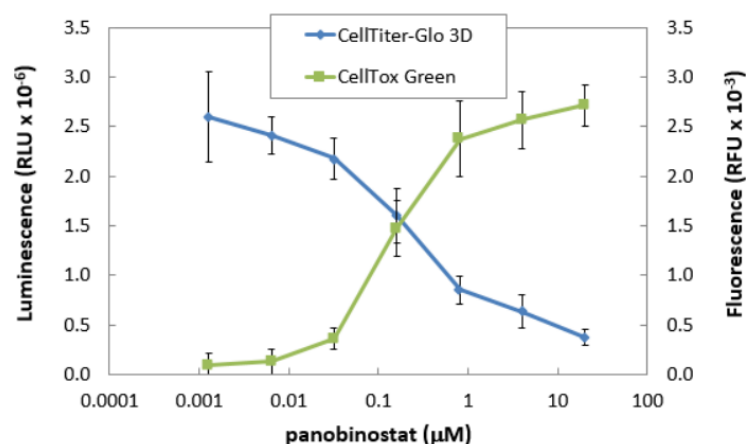
Assay Summary:

- Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation from same well

CellTox™ Green Cytotoxicity Assay

Kinetic Assay for Cytotoxicity, Simplifies Time Course Experiments

Multiplexing ATP Detection & DNA Staining using 3D Spheroids



HCT116 cells were cultured in InSphero GravityPLUS™ 3D Cell Culture system for 4 days to form ~350 μm microtissues. Samples were treated with CellTox™ Green and panobinostat for 48 hr. After recording fluorescence, an equal volume of CellTiter-Glo® 3D Reagent was added, plate shaken for 5 minutes and incubated at room temperature for 25 minutes prior to measuring luminescence.

Can CellTox™ Green be used with cells grown on or within Matrigel® Matrix?

The Matrigel® Matrix is formed by the Engelbreth-Holm-Swann (EHS) mouse sarcoma. Being a product of cultured cells, the matrix can contain remnants of cell death, like EHS DNA. Exogenous DNA in the well can complicate the use of CellTox™ Green Cytotoxicity Assay to the point that the contaminating DNA can make the assay unsuitable for use. The more Matrigel Matrix used, the greater the background signal.

The CellTox™ Green Cytotoxicity Assay provides an easy, fast and accurate method to determine toxic effects during or after long-term exposure of cells in culture. CellTox™ Green can be combined with other methods in multiplex assays to determine mechanism of toxicity, and is easily scalable from 96- to 1536-well plate formats.

- Use in extended incubations out to 72 hours and don't underestimate cytotoxicity.
- Simple and Flexible protocol- add with cells at plating or with treatment at dosing or use as an endpoint assay with a 30 minute incubation.
- Incorporate upstream of your lytic bioluminescent assays to normalize data to dead cell number.
- Get more informative data per well and stop making parallel plates to assay two parameters. Reduce cell culture and resources.

Product	Cat. #	Size
CellTox™ Green Cytotoxicity Assay	G8741	10ml
	G8742	50ml
	G8743	100ml
CellTox™ Green Express Assay (no step assay)	G8731	200μl

Google Scholar hits since 2023 “celltox green” + ...



[spheroid](#)



[hydrogel](#)



[organoid](#)



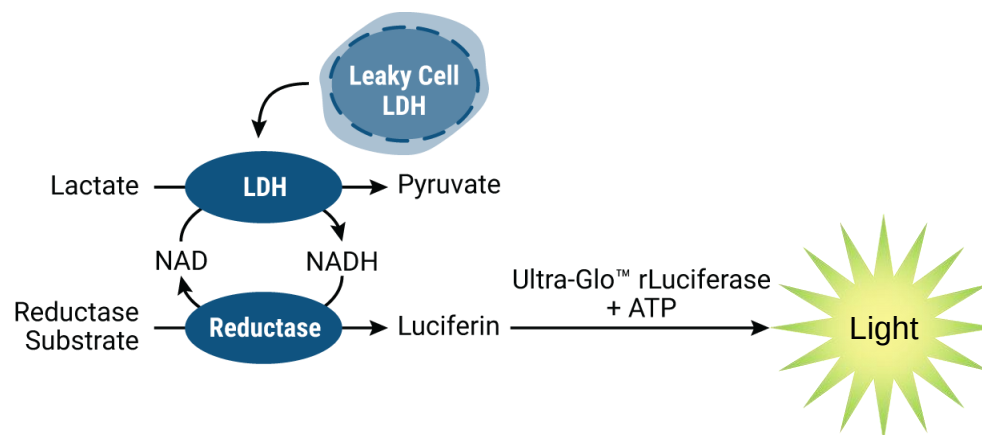
[microfluidic](#)

LDH-Glo™ Cytotoxicity Assay

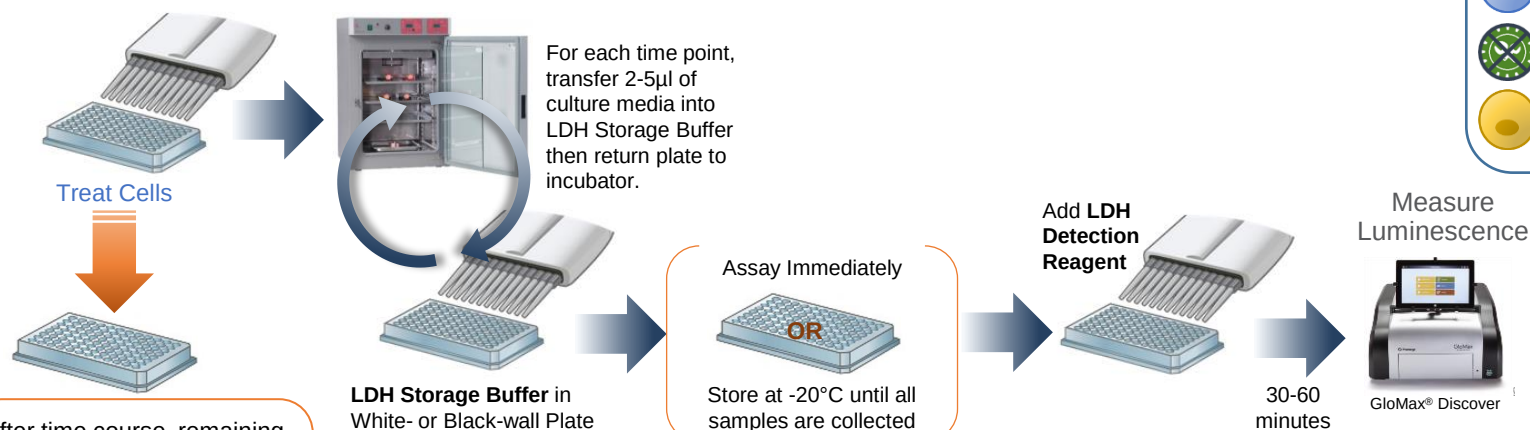
Simple, More Sensitive LDH-based Method to Determine Cytotoxicity

The LDH-Glo™ Cytotoxicity Assay is a bioluminescent plate-based assay for quantifying lactate dehydrogenase (LDH) release into the culture medium upon plasma membrane damage. The bioluminescent detection is more sensitive than colorimetric or fluorescent methods, allowing accurate detection of LDH from a small number of cells, including primary cells and 3D cell cultures.

The assay involves removing only a small amount of cell media (2–5µl) from each treated well, allowing you to get more data by sampling the same well over time, and by using the remaining media and cells for other cell-based assays.



Adaptable Workflow



Assay Summary:

- Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation from same well

After time course, remaining cells can be assayed further:

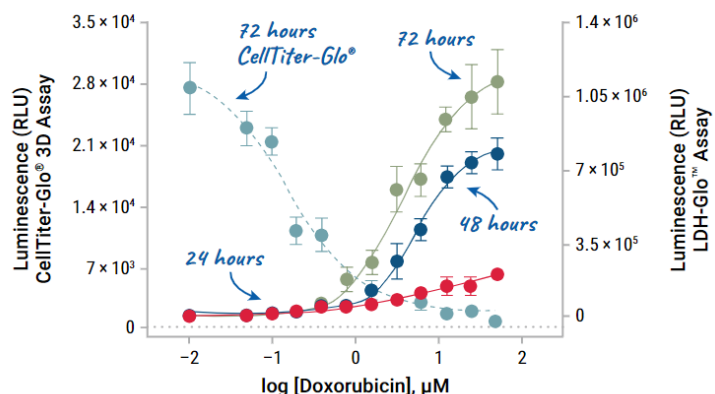
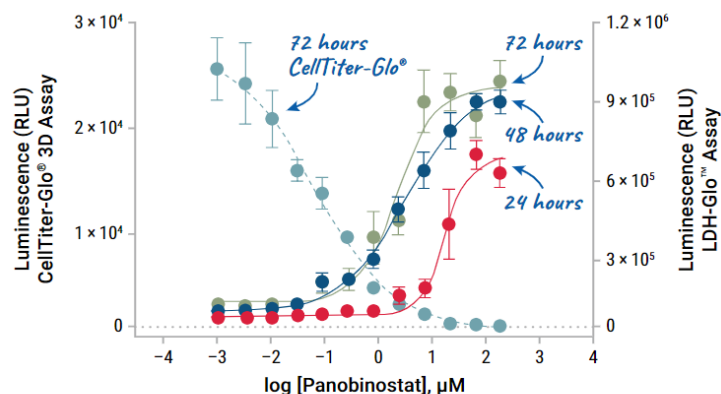
- Additional cellular assays
- RNA isolation
- DNA isolation

No changes from 2D to 3D as the assay is performed on conditioned cell media.

LDH-Glo™ Cytotoxicity Assay

Simple, More Sensitive LDH-based Method to Determine Cytotoxicity

Real-time, Multiplexing and 3D Model Compatible



HCT116 spheroids were formed using 2,500 cells/well in Corning® 384 Well Ultra-Low Attachment plates (400 μm diameter). Spheroids were treated with increasing concentrations of Panobinostat (top) or Doxorubicin (bottom). At 24, 48 and 72 hours following treatment, 2 μl media was removed, diluted 20X in LDH Storage Buffer, and frozen. Following completion of the timecourse experiments, all diluted media samples were assayed using a 1:1 ratio of diluted sample to LDH-Glo™ Cytotoxicity Assay Reagent. CellTiter-Glo® 3D Cell Viability Assay Reagent was added to the spheroid cultures to determine the amount of live cells remaining.

Detect LDH release from <10 cells

The superior sensitivity of the LDH-Glo™ Assay allows use of fewer cells, saving precious samples, culture wells and reagents.

Monitor cytotoxicity in 3D cultures

Assay sensitivity allows use with physiologically relevant cell spheroids and other 3D culture systems.

Multiplex with other assays

Small volumes (2-5 μl) of culture media are removed from culture wells for use in the LDH-Glo™ Assay. The remaining media and cells are available for use in other assays.

Measure real-time, kinetic cytotoxicity

The small sample size allows collection of samples at multiple time points to gain an understanding of cell health in real time, and to monitor cytotoxicity over multiple days

Product	Cat. #	Size
LDH-Glo™ Cytotoxicity Assay	J3280	10ml
	J2381	50ml

Google Scholar hits since 2023 “LDH Glo” + ...



[spheroid](#)



[hydrogel](#)



[organoid](#)



[microfluidic](#)

RealTime-Glo™ Annexin V Apoptosis and Necrosis Assay

A No-Wash, One-Step Method for Real-Time Apoptosis Detection

This simple, non-lytic assay allows real-time monitoring of apoptosis progression, without the need for multiple plates, complicated processing, or specialized detection equipment. A multimode plate reader capable of detecting luminescence and fluorescence is the only instrument required.

The RealTime-Glo™ Apoptosis and Necrosis Assay measures exposure of phosphatidylserine (PS) on the outer leaflet of the cell membrane during the apoptotic process, and loss of membrane integrity during secondary necrosis. Annexin V binding is detected with a simple luminescence signal, and necrosis is detected with a fluorescent DNA binding dye.

Read about the design and use of this assay:

Kupcho, K., et al. (2018) [A real-time, bioluminescent annexin V assay for the assessment of apoptosis](#). *Apoptosis*. **24**(1-2), 184-197.

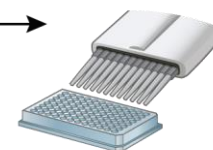
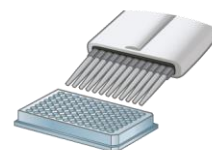


Simple Workflow

Dose cells (50µl) with desired apoptosis inducer at 4x desired final concentration.

Add equal volume (100µl) of 2x Detection Reagent.

Incubate for exposure. Measure RLU and RFU (repeat).



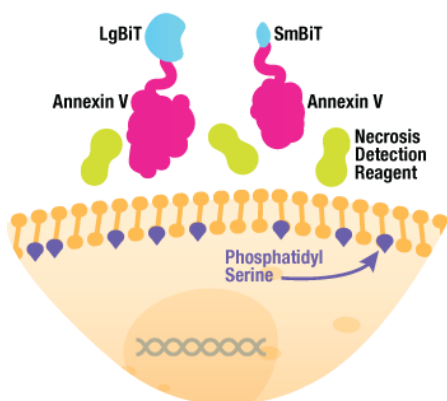
GloMax® System

[How to Get Real-Time Kinetic Data With GloMax® Microplate Readers](#)



Healthy Cell

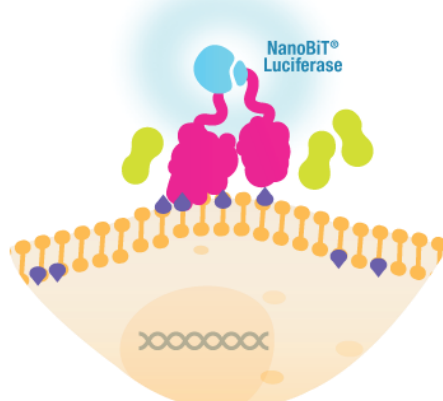
The Detection Reagent contains Annexin V-LgBiT and Annexin V-SmBiT (NanoBiT®) fusion proteins and a profluorescent DNA dye.



PS confined to inner leaflet
Cell membrane intact
Luminescence (RLU) negative
Fluorescence (RFU) negative

Early Apoptosis

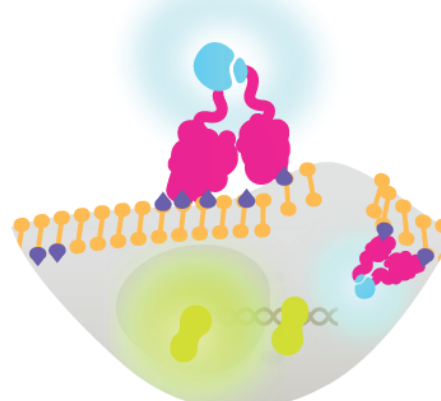
Luminescence remains low until PS exposure brings the annexin fusion proteins close together, forming a functional NanoBiT® enzyme.



PS translocation to outer leaflet
Cell membrane intact
Luminescence (RLU) **POSITIVE**
Fluorescence (RFU) negative

Secondary Necrosis

A fluorescent signal is generated upon loss of membrane integrity during late stage apoptosis when the DNA dye can enter the cell.



PS on inner and outer leaflet
Cell membrane compromised
Luminescence (RLU) **POSITIVE**
Fluorescence (RFU) **POSITIVE**

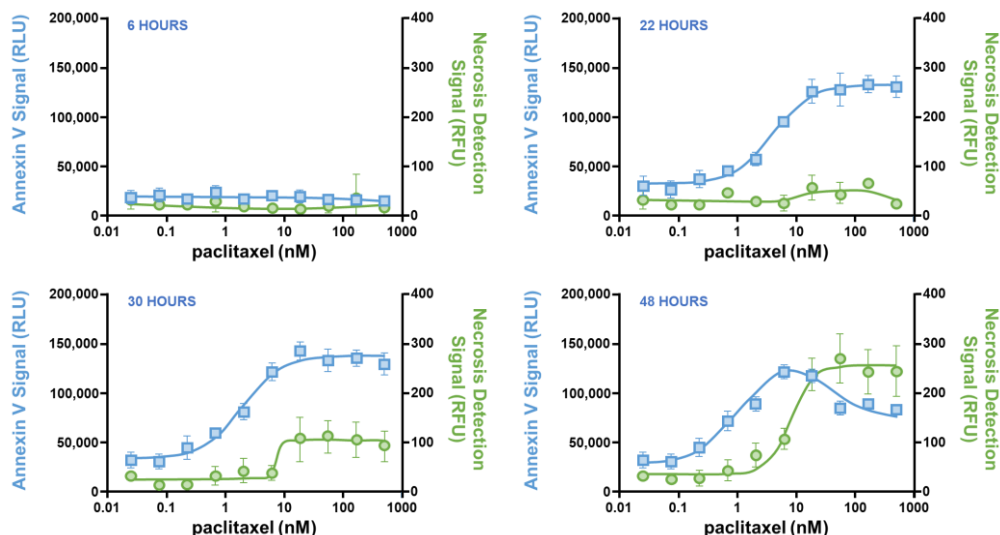
Assay Summary:

- Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation from same well

RealTime-Glo™ Annexin V Apoptosis and Necrosis Assay

Plate-based assay to monitor apoptosis as it happens!

Annexin V Binding Precedes Secondary Necrosis in 3D Model System



HepG2 cell spheroids (~450µm) were grown in ultra-low attachment plates and transferred to white plates prior to challenge with paclitaxel for 48 hours in the presence of the RealTime-Glo™ Annexin V Apoptosis and Necrosis Assay Reagent. Plates were removed from the incubator at various times and measured for luminescence (i.e., Annexin V Signal) and fluorescence (i.e., Necrosis Detection Signal) using a GloMax® Discover instrument. The t=0 measurement (data not shown) was indistinguishable from the t = 6hr time point.

Can RealTime-Glo™ Annexin V Apoptosis and Necrosis Assay be used with cells grown on or within Matrigel® Matrix?

The Matrigel® Matrix is formed by the Engelbreth-Holm-Swarm (EHS) mouse sarcoma. Being a product of cultured cells, the matrix can contain remnants of cell death, like EHS DNA. Exogenous DNA in the well can complicate the use of the Necrosis Detection Reagent to the point that the contaminating DNA can make the reagent unsuitable for use. The more Matrigel Matrix used, the greater the background signal. The matrix should not affect the Annexin V reaction.

- Add and read format with no washing or sample prep
- Real-time analysis reduces consumables, cell culture and operator time.
- Kinetically separates primary necrosis from secondary necrosis resulting from apoptosis
- Bioluminescent imaging on specialized instruments links morphology and PS exposure

Product	Cat. #	Size
RealTime-Glo™ Annexin V Apoptosis and Necrosis Assay	JA1011	100 assays
	JA1012	1,000 assays
RealTime-Glo™ Annexin V Apoptosis Assay	JA1000	100 assays
	JA1001	1,000 assays

Google Scholar hits since 2023 “RealTime Glo Annexin” + ...



[spheroid](#)



[hydrogel](#)



[organoid](#)



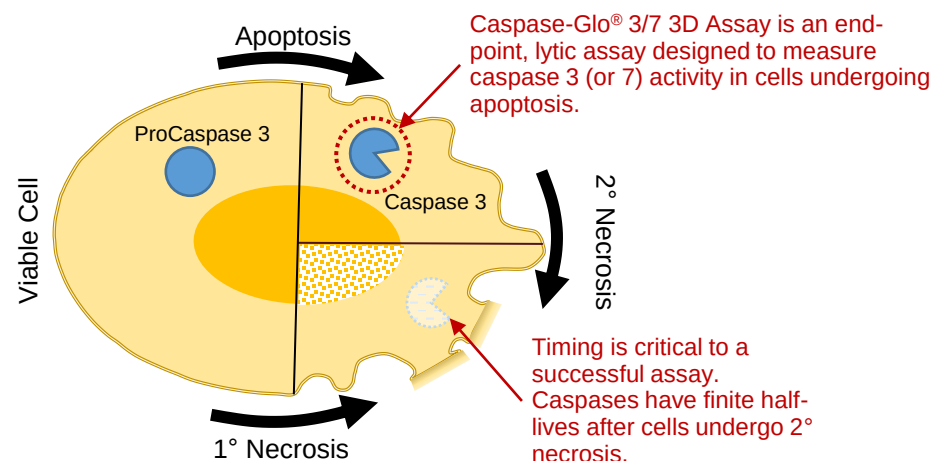
[microfluidic](#)

Caspase-Glo® 3/7 3D Assay

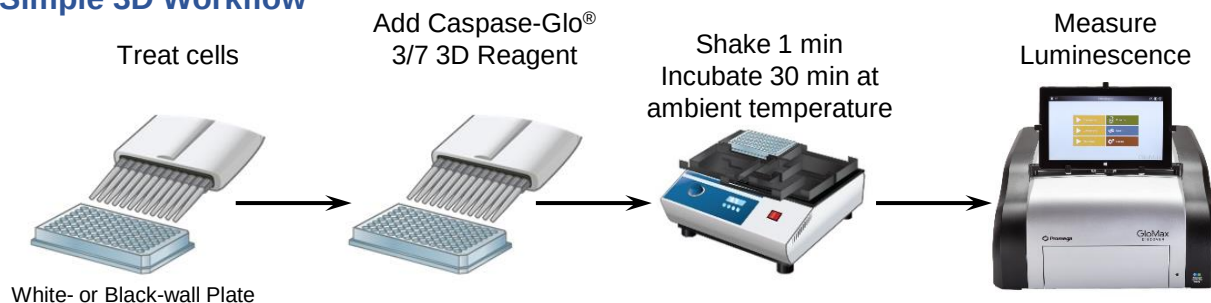
Measure Apoptotic Cells with Protocol Optimized for 3D Structures

The Caspase-Glo® 3/7 3D Assay is a homogeneous, luminescent assay that measures caspase-3 and -7 activities present in apoptotic 3D cultures. The assay reagent contains a proluminescent caspase-3/7 DEVD-aminoluciferin substrate and a proprietary thermostable luciferase in a reagent optimized for caspase-3/7 activity, luciferase activity and cell lysis. Adding the single Caspase-Glo® 3/7 3D Reagent in an "add-mix-measure" format results in cell lysis, followed by caspase cleavage of the substrate. This liberates free aminoluciferin, which is consumed by the luciferase, generating a "glow-type" luminescent signal that is proportional to caspase-3/7 activity.

The assay has been validated for use in a wide range of 3D cell models, including spheroids formed in ultra low attachment (ULA) plate and cells grown in Matrigel®. It can be multiplexed with other cell health assays, so you get more data from a single well. The assay is scalable to 384-well format and delivers excellent Z'-factor values.



Simple 3D Workflow



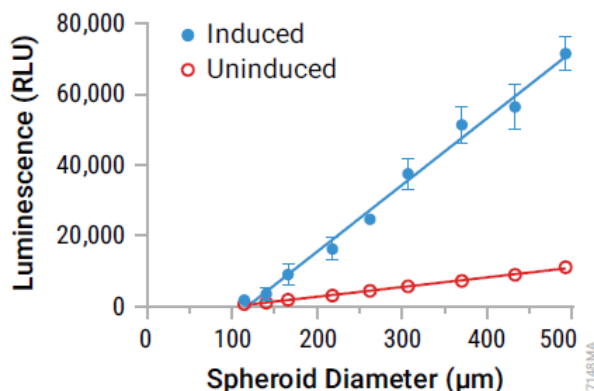
Assay Summary:

-  Lytic Assay
-  No Cellular Engineering Required
-  RNA/DNA Isolation Requires Duplicate Wells

Caspase-Glo® 3/7 3D Assay

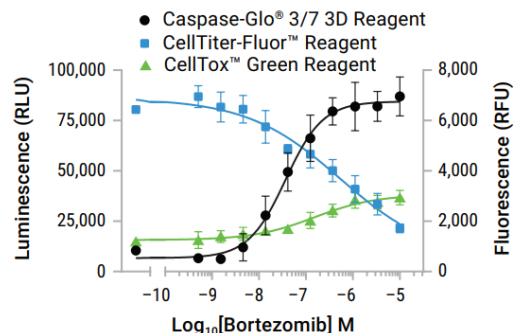
Measure Apoptotic Cells with Protocol Optimized for 3D structures

Luminescence is proportional to spheroid diameter



HCT-116 cells were serially diluted twofold in McCoy's medium supplemented with 10% fetal bovine serum (FBS) and seeded into a 96-well Corning® ultra-low attachment plate. Spheroids formed over 4 days. Average spheroid diameter was determined by brightfield imaging of four replicates per initial seed density. Spent culture medium was removed and replaced with either 10µM bortezomib or vehicle-matched culture medium (induced and uninduced, respectively).

Multiplex to get a more complete cell health characterization



A549 spheroids (~450µm) were dosed with serial dilutions of bortezomib in the presence of CellTox™ Green Cytotoxicity Reagent for 24 hours. CellTiter-Fluor™ Cell Viability Reagent was delivered to each well and the plate incubated at 37°C for 30 minutes. Fluorescence values were collected using a GloMax® Discover Instrument. Caspase-Glo® 3/7 3D Reagent was added, mixed briefly, and luminescence measured after a 30 minute room temperature incubation.

- **Protocol validated with multiple 3D models.** Implement the assay for your model with confidence in assay performance in 3D.
- **Simplify Apoptosis or Caspase Detection:** The "add-mix-measure" protocol makes the assay easy to automate; simply add an equal volume of reagent to sample volume.
- **Scalable to 384-well format:** The low background luminescence results in excellent signal-to-noise ratios and superior sensitivity not achieved by other caspase assay formats.
- **Decrease Assay Time:** No sample preparation or manipulation required, and no extended incubation times are necessary, as with fluorescence-based assays. Maximum sensitivity is achieved in as little as 0.25–1 hour.
- **Multiplex with CellTox™ Green Cytotoxicity Assay** to help identify the assay window for maximal caspase 3/7 activity.

Product	Cat. #	Size
Caspase-Glo® 3/7 3D Assay	G8981	10ml
	G8983	10 x 10ml
	G8982	100ml

Google Scholar hits since 2023 "caspase glo 3/7 3d" + ...



[spheroid](#)



[hydrogel](#)



[organoid](#)



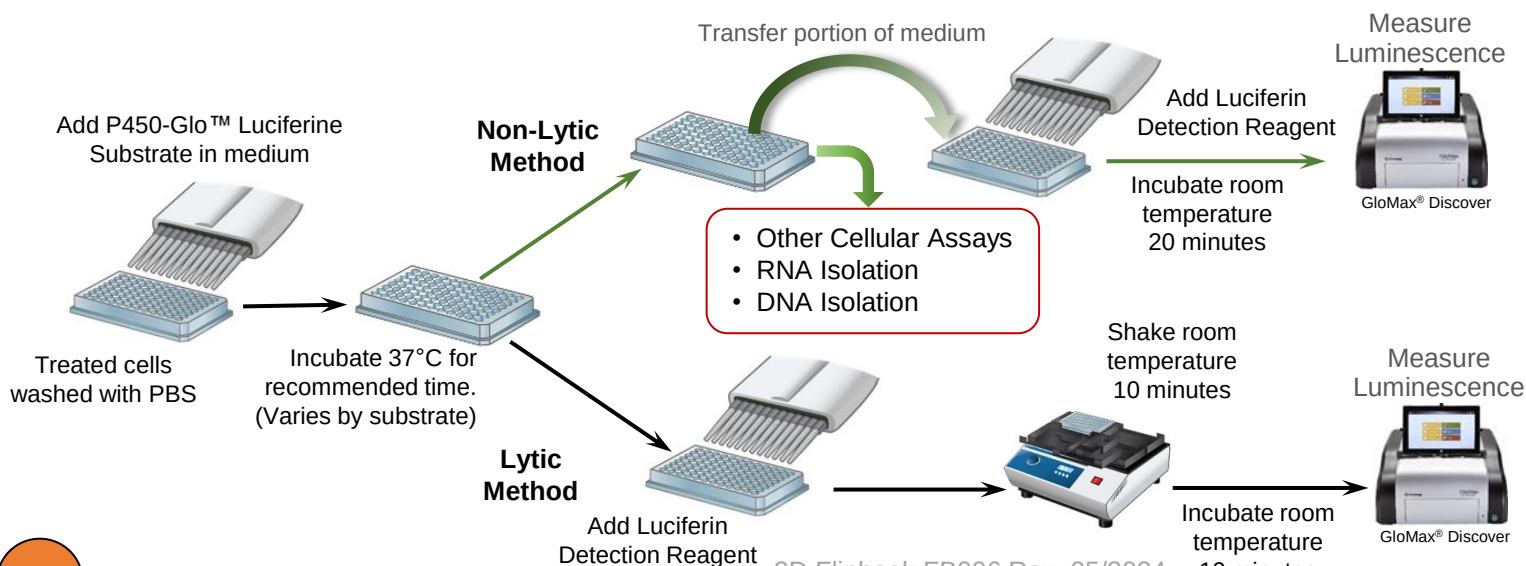
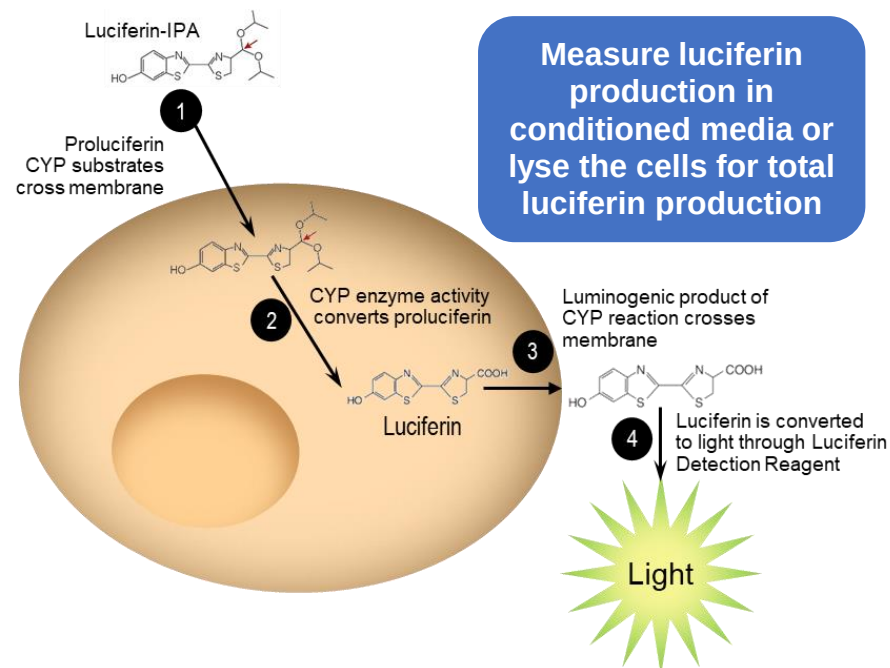
[microfluidic](#)

Cell-Based P450-Glo™ Assays

Rapid quantitation of cytochrome P450 (CYP) activity

The assay employs luminogenic P450 substrates that are derivatives of beetle luciferin, a substrate for luciferase enzymes. The derivatives are not substrates for luciferase but are converted by P450s to luciferin, which in turn reacts with luciferase to produce light that is directly proportional to the activity of the P450.

The P450-Glo™ substrates and reaction products are cell-permeable. This allows development of cell-based assays. In these assays, a luminogenic substrate is incubated with cultured cells for an appropriate period of time. Intracellular CYP enzymes convert the substrate to luciferin product, which passes out of cells and then can be detected with the Luciferin Detection Reagent. The luciferin produced is measured using either a nonlytic assay (perform the P450-Glo™ Assay with an aliquot of intact-cell supernatant) or a lytic assay (perform the P450-Glo™ Assay in a well containing cells). In either type of assay, the light output of the luciferase reaction is proportional to CYP activity. In a nonlytic assay, after an aliquot of the reaction medium is removed, the remaining cells can be used for additional cell-based testing; for example, a cell viability assay may be run to normalize CYP activities to viable cell number.



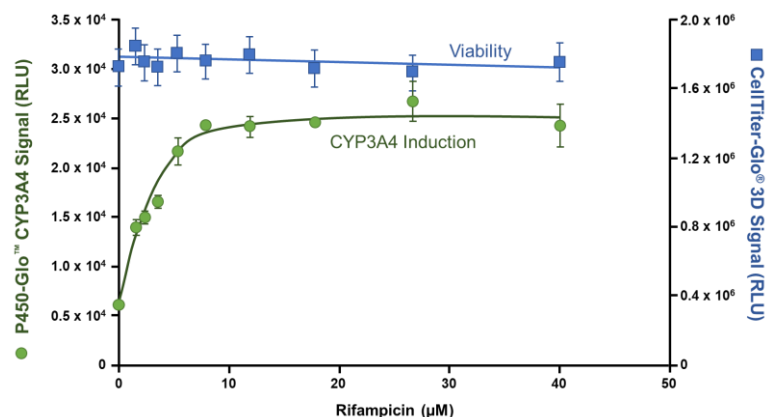
Assay Summary:

- Lytic or Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation Depends on Assay Format

Cell-Based P450-Glo™ Assays

Rapid quantitation of cytochrome P450 (CYP) activity

Rifampicin induction of CYP3A4 activity and cell viability measured from the same culture of human liver microtissues



Human liver microtissues (~225μm; InSphero) in a 3D trap plate were washed with PBS and resuspended in media + rifampicin at various concentrations and incubated for 48 hours at 37°C. Media was removed, cells washed with PBS, media + 1:1000 dilution of Luciferin-IPA substrate added in 50μl and incubated for 1 hour at 37°C.

P450-Glo™ CYP3A4 Assay: Twenty-five μl of conditioned medium was transferred to a white-walled luminescent plate and mixed with 25μl of Luciferin Detection Reagent for 1 minute using a plate shaker. The plate was incubated for 20 minutes at room temperature then luminescence was measured with a GloMax® Discover instrument.

CellTiter-Glo® 3D Assay: 25μl of room temperature CellTiter-Glo® 3D Reagent was added to the cells + media remaining. The plate was shaken for 5 minutes on a plate shaker then incubated for another 25 minutes at room temperature. Fifty μl from each well was transferred to a white-walled luminescent plate and luminescence measured with a GloMax® Discover instrument.

P450-Glo™ Frequently Used With: 3D-Optimized Cell Health Assays

Assay	Size	Cat. #
CellTiter-Glo® 3D Cell Viability Assay	10ml	G9681
LDH-Glo™ Cytotoxicity Assay	10ml	J2380

Product	Cat. #	Size
P450-Glo™ CYP3A4 Assay with Luciferin-IPA	V9001	10ml
	V9002	50ml
P450-Glo™ CYP1A2 Assay with Luciferin-1A2	V8421	10ml
	V8422	50ml
P450-Glo™ CYP2B6 Assay with Luciferin-2B6	V8321	10ml
	V8322	50ml
P450-Glo™ CYP2C9 Assay with Luciferin-H	V8791	10ml
	V8792	50ml

Determine if your 3D liver model is acting like a liver should by monitoring cytochrome P450 Activity

Google Scholar hits since 2023 "P450 Glo" + ...



[spheroid](#)



[hydrogel](#)



[organoid](#)



[microfluidic](#)

Autophagy LC3 HiBiT Reporter Assay Systems

No-wash Luminometer-based Assay to Measure Autophagic Flux

Autophagy is an important intracellular pathway for the degradation of superfluous or harmful subcellular materials, and is critical for maintaining cell health under normal or stress-inducing conditions. Current methods to monitor autophagy primarily rely on cumbersome flow cytometry or imaging workflows and have limited quantitative power. We have developed a novel reporter system to quantitatively measure autophagic flux in a plate-based, add-mix-measure format. The reporter system is sensitive, quantitative, amenable to high-throughput formats and is easy to implement.

LC3 as a Marker of Autophagic Flux

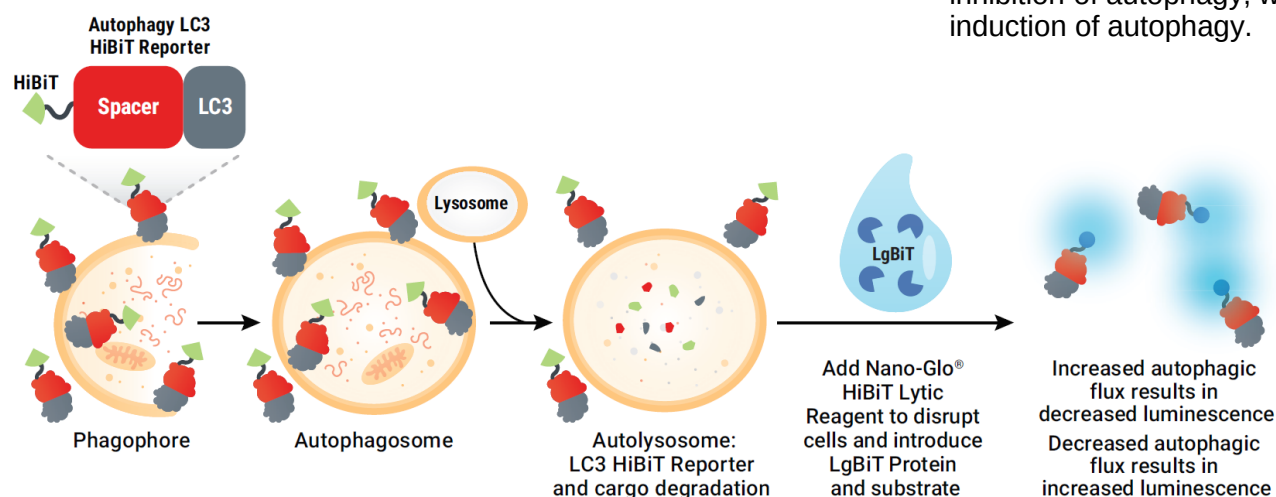
The Autophagy Reporter System uses the incorporation and degradation of LC3, a well-known autophagic marker, to quantitatively measure autophagic flux. Choose from one of two prepared reporter cell lines (HEK293 or U2OS) or express the reporter in the cellular background of your choice.

HiBiT Technology

The LC3 protein is tagged with HiBiT, a small peptide tag that exhibits very high affinity for the complementing polypeptide, LgBiT. Together, they reconstitute the bright, luminescent NanoBiT® Luciferase.

Quantitative, Plate-Based Assay

The luminescent signal is directly proportional to the amount of LC3 reporter in the cells. An increase in signal indicates inhibition of autophagy, while a decrease in signal indicates induction of autophagy.



Assay Summary:

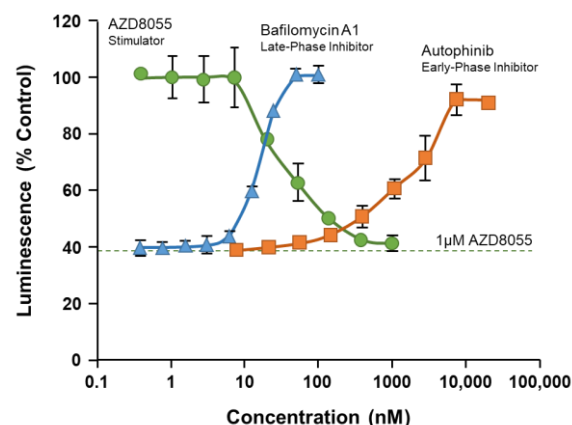
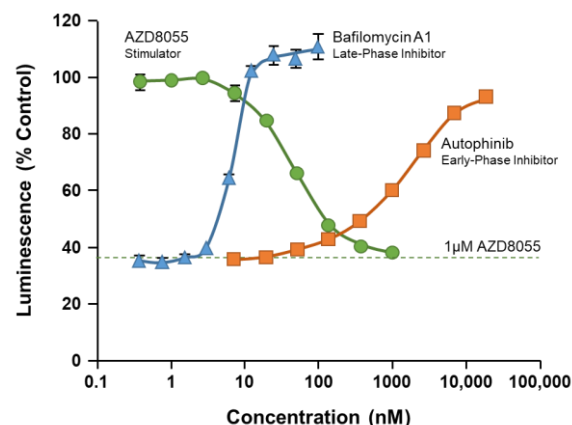
- Lytic Assay
- Cellular Engineering Required
- RNA/DNA Isolation Requires Duplicate Wells

LC3-based autophagy reporter contains an N-terminal small peptide tag, HiBiT, that exhibits very high affinity ($K_d = 0.7\text{nM}$) for LgBiT, the large subunit used in NanoLuc® Binary Technology (NanoBiT®). When HiBiT associates with LgBiT protein, a bright luciferase activity is reconstituted, enabling robust quantitation of the level of autophagy reporter present.

Autophagy LC3 HiBiT Reporter Assay Systems

No-wash Luminometer-based Assay to Measure Autophagic Flux

Assess autophagic activity in both 2D and 3D cell culture models



HEK2193 Autophagy LC3 HiBiT Reporter Cells (Cat.# GA1040) were grown in both 2D and 3D conditions. For 2D cultures, 20,000 cells were plated in standard white-walled 96-well culture plates (Costar #3917) and cultured overnight. For 3D culture, 500 cells were plated into 96-well Ultra-Low Attachment round bottom, black walled plates (Costar #3591) and cultured for 4 days prior to assay. Cells were tested with an autophagic stimulator (AZD8055). For inhibitor studies, cells were dosed first with 1µM AZD8055 to lower the basal autophagy signal then treated with the autophagic inhibitors for 6 hours. To measure the assay, the Nano-Glo® HiBiT Lytic Reagent was added to the plates. For 2D cultures, reagent addition was followed by a 2 min shake then incubated at room temperature for 10 minutes prior to measuring the luminescence. **For the 3D cultures, the plate was shaken for 30 minutes prior to measuring the luminescence.**

Product	Cat. #	Size
Autophagy LC3 HiBiT Reporter Vector Kit Includes vector ¹ (20µg) and 10ml Nano-Glo® HiBiT Lytic Detection System	GA2550	each
HEK293 Autophagy LC3 HiBiT Cell System Includes stably transfected cell line ² (1 vial) and 10ml Nano-Glo® HiBiT Lytic Detection System.	GA1040	each
U2OS Autophagy LC3 HiBiT Cell System Includes stably transfected cell line ² (1 vial) and 10ml Nano-Glo® HiBiT Lytic Detection System.	GA1050	each
Nano-Glo® HiBiT Lytic Detection System	N3030	10ml
	N3040	100ml
	N3050	10 x 100ml

¹ Vector contains Neo^R selectable marker for stable selection. Transient transfection not recommend due to autophagy induction.

² Provided as a propagation model. Cells must be propagated prior to use. Please see Technical Manual 535 for more information on care and preparation of the HEK293 and U2OS Autophagy LC3 HiBiT Reporter Cells.

Learn more about this system:

Lazar, D.F., et al. (2021) [Multimodal assessment of autophagy in mammalian cells with a novel, LC3-based tandem reporter](#). *Methods Cell Biol.* **165**, 39-57.



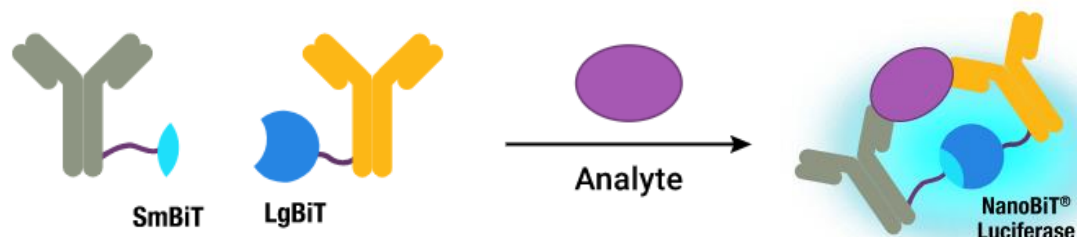
A collaboration between Promega R&D and the Morgridge Institute for Research at the University of Wisconsin

[Explore product citations since 2023](#)



Lumit® Immunoassay Platform

Lumit® technology enables bioluminescence-based detection of specific antigens or antibodies, simplifying immunoassay protocols and speeding time to results. Based on NanoLuc Binary Technology (NanoBiT®), Lumit® powers sensitive and accurate immunoassays for research applications.

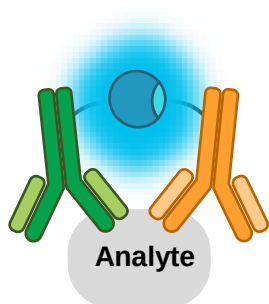


NanoBiT® Technology

NanoBiT® is a protein complementation system based on NanoLuc® luciferase, which consists of two subunits – LgBiT and SmBiT. These subunits have low affinity for each other and only form active luciferase enzyme when they come into close proximity. In Lumit immunoassays, antibodies to an analyte are covalently labeled with LgBiT or SmBiT, and a signal is generated upon addition of substrate in the presence of the analyte.

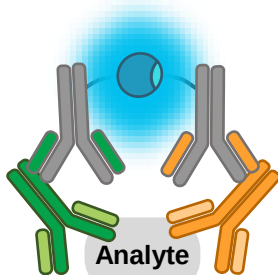
Immunoassay Configurations

Direct



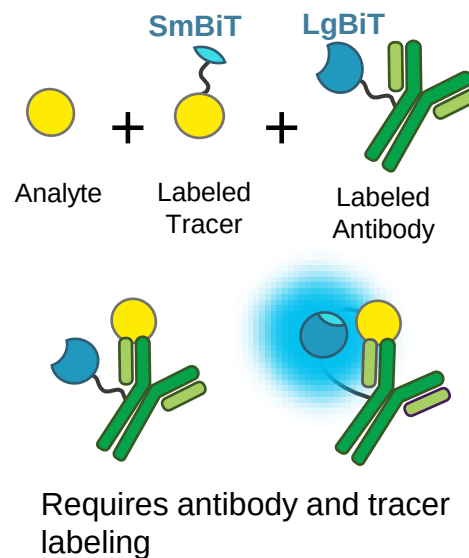
- Primary antibodies labeled with NanoBiTs
- Maximizes number of Ab pairs can test for assay development

Indirect

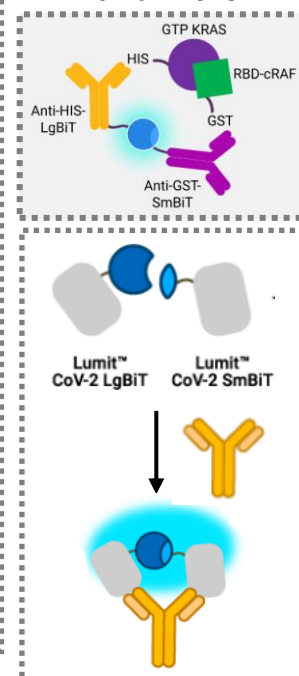


- Secondary antibodies labeled with NanoBiTs
- Universal approach for use with unlabeled primary antibodies

Competitive Binding



...and more!



Lumit® Cytokine Immunoassays

Cytokines are signaling molecules used by cells of the innate and adaptive immune system. Measuring cytokine secretion in cell-based applications is key to understanding T cell activation, expansion, and homeostasis, along with other immune cell types.

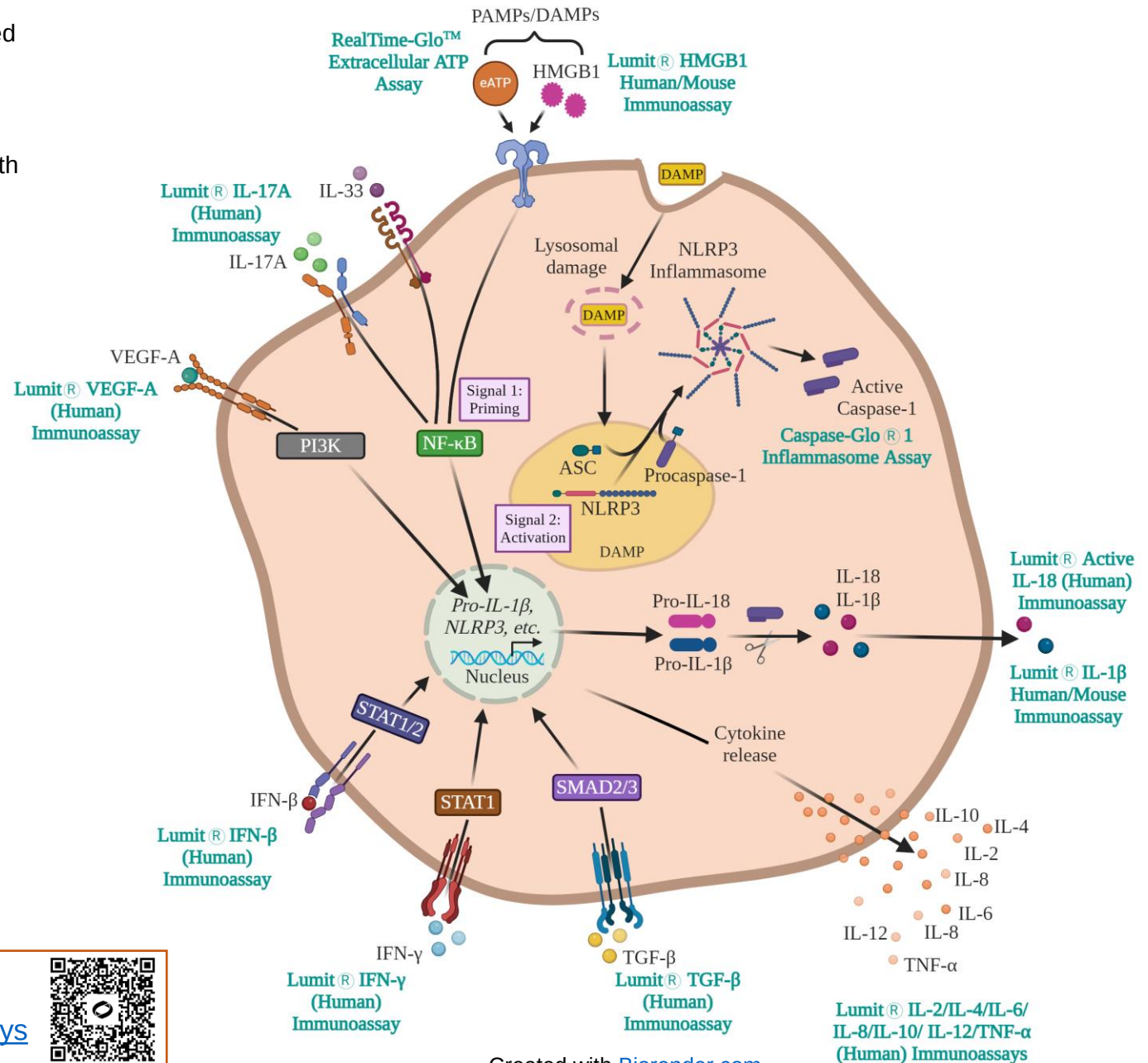
Promega offers assays to detect cytokines released from cell culture samples in ~1 hour with no wash steps, saving time and reagents in the lab.

[Watch the video overview](#)

SCAN ME



View the entire portfolio of [Lumit® Cytokine Immunoassays](#)



Created with [Biorender.com](#)



GloMax[®] Detection Systems

The Readers Designed for Your Assays

GloMax[®] Explorer

- 6- to 384-well reader
- Luminescence
- Fluorescence
- $\pm$ Visible Absorbance



GloMax[®] Navigator

- 96-well reader
- Luminescence

GloMax[®] Discover

- 6- to 384-well reader
- Luminescence
- Filtered Luminescence
- Fluorescence
- Visible Absorbance
- UV Absorbance
- BRET/FRET



Learn more about the
[GloMax[®] Family of
Microplate Readers](#)



Metabolic Changes in 3D

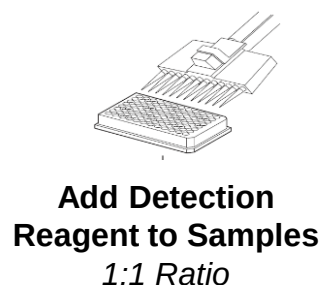
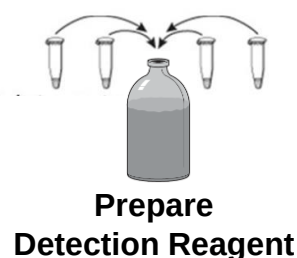
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Energy Metabolism Assays	
<u>Metabolite-Glo™ Detection System</u>	33
<u>Lactate-Glo™, Glucose-Glo™, Glutamate-Glo™ & Glutamine/Glutamate-Glo™ Assays</u>	34
<u>Lipid Metabolism Assays</u>	36
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Oxidative Stress Assays	
<u>ROS-Glo™ H₂O₂ Assay</u>	40
<u>GSH/GSSG-Glo™ Assay</u>	41

Energy Metabolism Assays

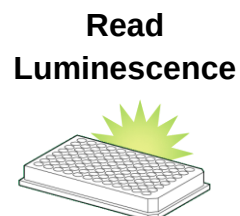
Monitor metabolic pathways with easy-to-use, sensitive assay kits

Promega offers bioluminescent metabolite assays that provide a comprehensive view of cellular metabolism by monitoring metabolic pathways, including glycolysis, gluconeogenesis, lipolysis, and the TCA cycle.

Simple Protocol to Measure Metabolites



**Incubate
1-2 hours**



Luminescent Advantages:

- **Easy sample prep:** Simply requires dilution and/or acid treatment & neutralization. No extraction, sonication or centrifugation steps!
- **Very sensitive:** Low picomole sensitivity (LOD ~ 50nM)
- **Wide Assay Window:** Max S/B >200-fold
- **High Z' values:** Amenable to HTS in 384- or 1536-well plates

Ready to use, 3D model validated assays:

Glucose Metabolism	Amino Acid Metabolism	Lipid Metabolism	Mitochondrial Function	Cofactors	Oxidative Stress
Glucose-Glo™ S	Glutamate-Glo™ S	Triglyceride-Glo™ S	ATP	NAD/ NADH-Glo™	ROS-Glo™
Lactate-Glo™ S	Glutamine/ Glutamate-Glo™ S	Glycerol-Glo™ S	Pyruvate-Glo™ S	NADP/ NADPH-Glo™	GSH/ GSSG-Glo™
Glucose Uptake-Glo™ (2DG6P)	BCAA-Glo™ S	Cholesterol/ Cholesterol Ester- Glo™ S	Malate-Glo™ S	NAD(P)H- Glo™	
Glycogen-Glo™		BHB-Glo™ S			

Sample Compatibility

- ✓ Cells in culture
- ✓ 3D models
- ✓ Culture media
- ✓ Tissue homogenate
- ✓ Serum
- ✓ Other biological fluids

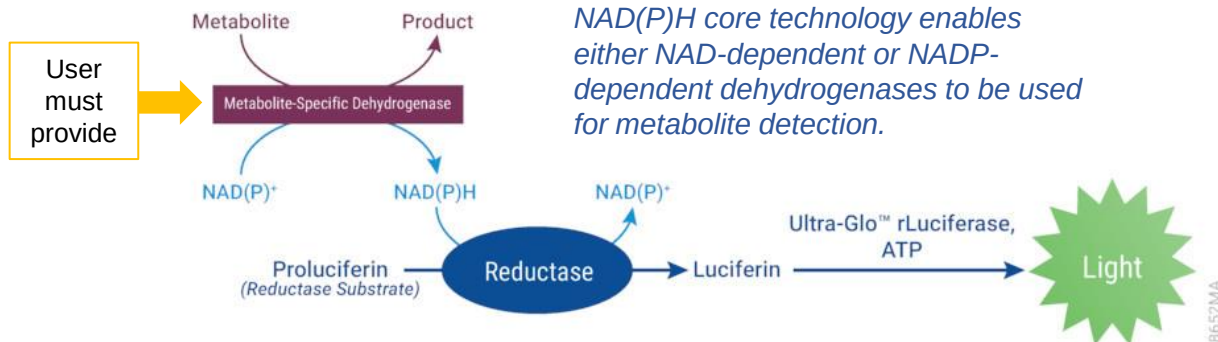
S Metabolites commonly found in cell culture supernatants can be easily measured from media samples, preserving the cells for downstream analyses.

Lytic (purple)
Non-lytic (blue)

Metabolite-Glo™ Detection System (DIY Kit)

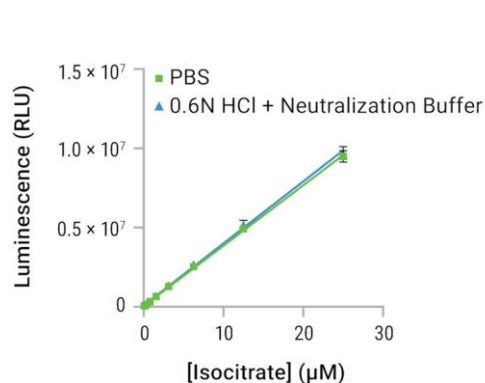
Easy Metabolite Detection Customizable to Your Specific Targets

Core Reaction

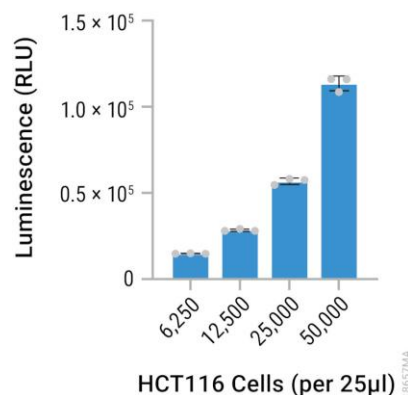


Application Note:

[Metabolite-Glo™ Protocol for Isocitrate Detection](#)



Isocitrate detection using Metabolite-Glo™. Samples treated with 0.6N HCl followed by Neutralization Buffer or with PBS only show overlapping curves, indicating the isocitrate detection assay is compatible with acid treatment. Data represents the average of four replicates and error bars indicate $\pm$ one standard deviation.



Metabolite-Glo™ measures metabolites in biological samples. Isocitrate was measured in HCT116 cell lysates. HCT116 cells were collected, washed with cold PBS and diluted twofold from 50,000 to 6,250 cells in 25μL. Cells (25μL) were transferred into a 96-well assay plate. Wells with no cells (PBS only) were included for assay background control. The average luminescence for three replicates (gray dots) without background (no cells, PBS only) is shown in relative light units (RLU).

- **Greater Sensitivity:** Luminescent assay format avoids inherent fluorescent background signals, providing excellent signal-to-noise readings that allow miniaturizing low volume formats
- **Use Less Cells:** Perform assays directly in sample wells without sample manipulation.
- **Simplified Method:** The direct in-well "add-and-read" protocol requires no upfront sample preparation and makes the assays amenable to automation with less variability.
- **Faster Results:** Maximum sensitivity is reached in as little as 60 minutes after reagent addition.
- **Broad Sample Compatibility:** For use with cultured cells, media samples, tissue homogenates and serum samples

Product	Cat. #	Size
Metabolite-Glo™ Detection System	J9030	5ml
	J9040	50ml

Web Resources:
[Utilizing Energy](#)
[Metabolism Assays for Drug Discovery](#)



Assay Summary:

3D Performance verified

Lytic or Non-Lytic Assay

No Cellular Engineering Required

RNA/DNA Isolation Depends on assay format

Ready-to-Use Metabolite Assays

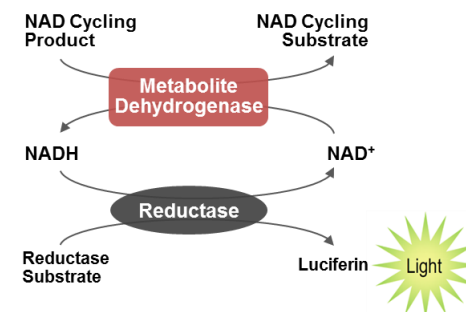
Energy uptake and utilization in cells is a dynamic process regulated by interacting metabolic networks. Monitoring metabolites in cell culture medium can provide information about changes that occur in cellular metabolic pathways. Glucose consumption and lactate secretion can serve as indicators of glycolysis, while glutamine secretion can provide information about glutaminolysis. Changes can be monitored over time or after treatments, such as exposure to hypoxic conditions, by assaying small amounts of diluted medium.

Learn more about the development of this technology:

Leippe, D., *et al.* (2016). *SLAS Discovery* **22**, 366-77 PMID: [27803177](https://pubmed.ncbi.nlm.nih.gov/27803177/)



Core Reaction



Assay Summary:

3D Performance verified



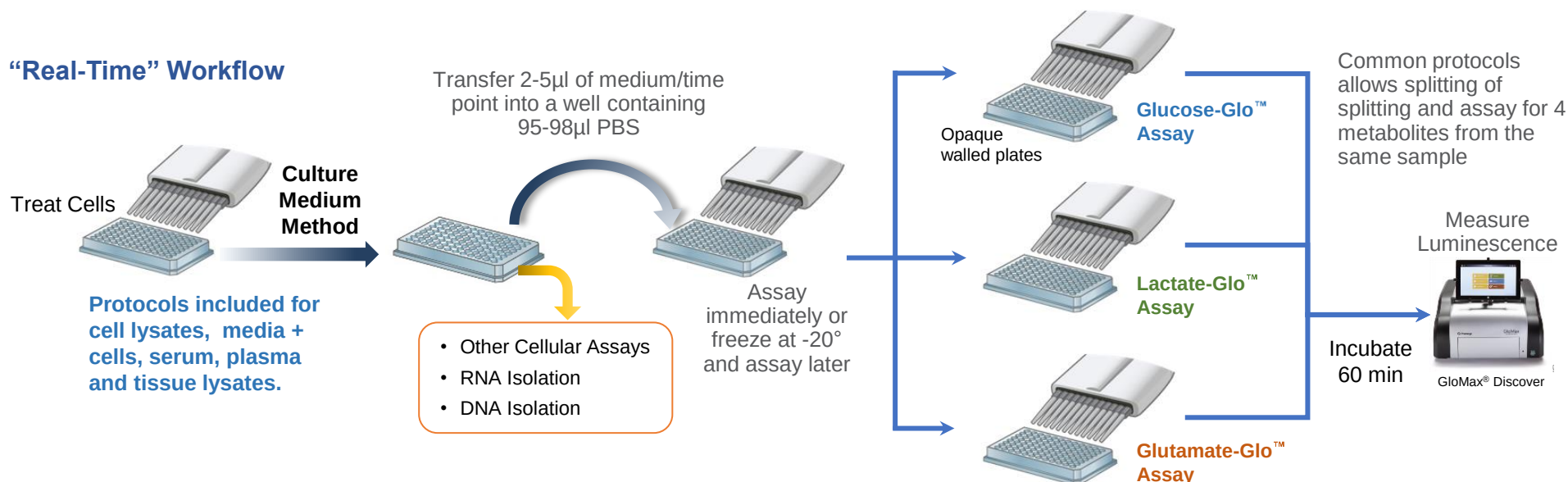
No Cellular Engineering Required

Lytic or Non-Lytic Assay



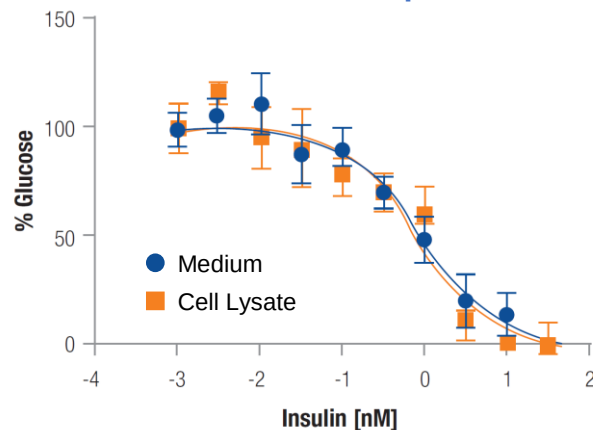
RNA/DNA Isolation Depends on assay format

“Real-Time” Workflow



Glucose, Lactate, Glutamate and Glutamine Assays

Insulin-mediated inhibition of gluconeogenesis in iPSC-derived human liver spheroids

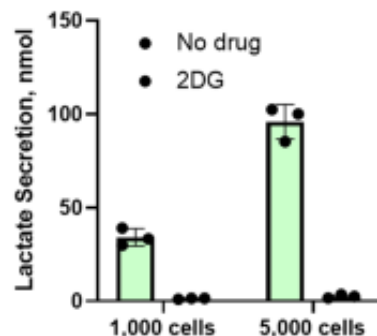


iCell® Hepatocytes 2.0 (Cellular Dynamics, Inc.) were grown as spheroids on GravityTRAP™ Ultra-Low Attachment 96-well spheroid plates (InSphero; ~2,000 cells/well). On the day of assay, cells were cultured for 1.5 hours in a glucose-free gluconeogenesis medium to promote hepatic glucose production. The cells were washed and medium replaced with gluconeogenesis medium containing various concentrations of insulin and incubated for 6 hours. Half of medium was removed from the wells and combined with an equal volume of Glucose Detection Reagent. After 60 minutes, the luminescence was measured with a GloMax® Discover Instrument.

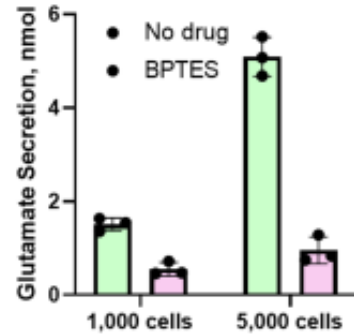
The remaining cells plus media (25µl; cell lysate) were assayed for glucose as well by adding 12.5µl of Inactivation Solution and the plate was shaken for 5 minutes. The sample was neutralized with 12.5µl of Neutralization Solution followed by 50µl of Glucose Detection Reagent and luminescence was measured after a 60 minute room temperature incubation. Further details of this experiment available in the Glucose-Glo™ Technical Manual TM494.

Metabolic activity of HCT116 spheroids

A Lactate-Glo™ Assay



B Glutamate-Glo™ Assay



HCT116 spheroids were cultured, and their cell medium assessed for metabolites. A) Glucose-dependent lactate production was inhibited by 2DG, a known glycolysis inhibitor. B) Glutamine conversion to glutamate was inhibited by BPTES, a known inhibitor of glutamine.

- **Quickly Measure Metabolites in a Variety of Sample Types:** Measure in media, cells, tissue and plasma. The assays require minimal preparation steps with no need for centrifugation and spin columns.
- **Measure Across a Wide Range of Concentrations:** Broad linearity up to 50µM enables simple sample measurement.
- **Detect Small Changes:** Wide assay window with S/Bmax > 1000 allows better discrimination of small changes in metabolite levels compared to colorimetric and fluorometric assays.
- **Gain More Information Per Sample:** The assays are amenable to measuring multiple metabolites from the same sample. Multiplex with cell viability assays for normalization.

Product	Cat. #	Size
Glucose-Glo™ Assay	J6021	5ml
	J6022	50ml
Lactate-Glo™ Assay	J5021	5ml
	J5022	50ml
Glutamate-Glo™ Assay	J7021	5ml
	J7022	50ml
Glutamine/Glutamate-Glo™ Assay	J8021	5ml
	J8022	50ml

Google Scholar hits since 2022 in 3D models with



[Glucose-Glo™ Assay](#)



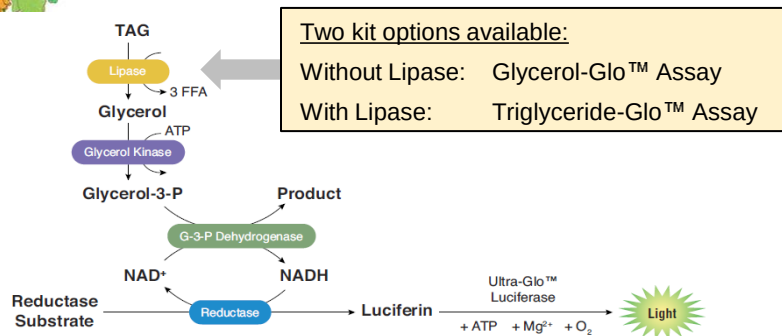
[Glutamate-Glo™ Assay](#)



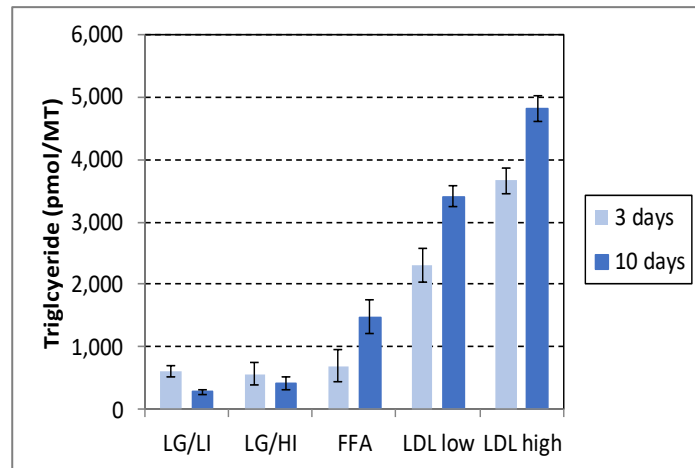
[Lactate-Glo™ Assay](#)

Glycerol-Glo™ and Triglyceride-Glo™ Assays

Simple and sensitive bioluminescent lipid quantitation



Intracellular triglyceride levels in human liver microtissues



3D InSight™ human Liver Microtissues (MT, InSphero) were incubated for 3 and 10 days in serum-free medium containing either physiological (LG/LI) or supraphysiological (LG/HI) levels of glucose and insulin and supplementation with either free fatty acids bound to BSA (FFA) or low density lipoprotein plasma fraction (LDL). After 2x washes with PBS, triglyceride levels were measured using the Triglyceride-Glo™ Assay. Data provided by InSphero

Plate-based assays to measure glycerol and triglyceride levels:

- No Organic Extraction Required:** Detergent extraction efficiently extracts lipids with one-step, no-heat, in-well protocol
- Sensitive with Large Linear Range:** Discriminates small changes across a broader range compared to fluorescent assays and requires fewer sample dilutions
- Compatible with Multiple Sample Types:** Quantitate lipids from cultured cells and 3D models, medium supernatant, serum, plasma or tissue
- Requires Only a Luminometer:** No specialized instrument, consumables or media required
- Can be multiplexed** with other Promega products to assess overall cell health, including RealTime-Glo™ MT Cell Viability or LDH-Glo™ assays.

Product	Cat. #	Size
Glycerol-Glo™ Assay	J3150	5ml
	J3151	50ml
Triglyceride-Glo™ Assay	J3160	5ml
	J3161	50ml

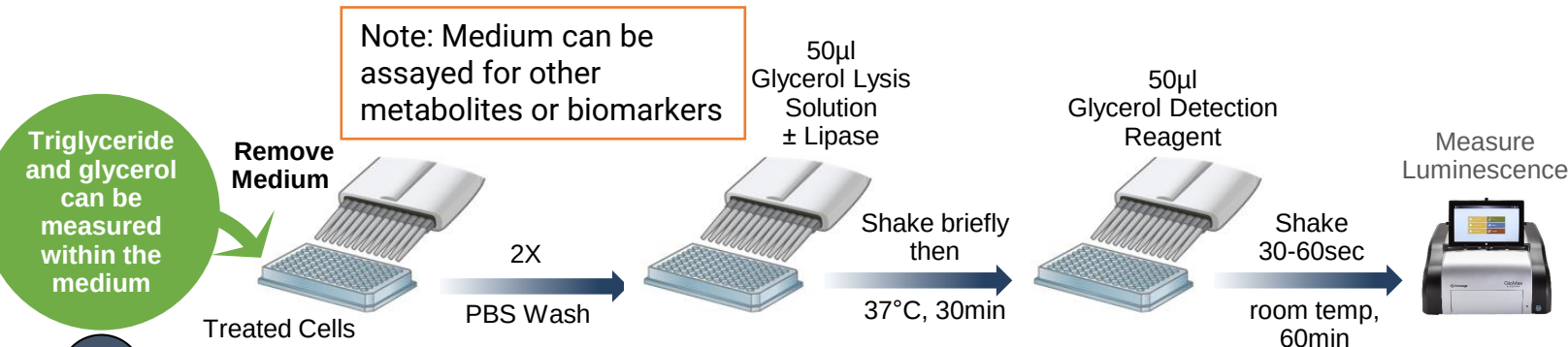
"Triglyceride Glo"
Google Scholar
hits since 2023 in
[3D models](#)



"Glycerol Glo"
Google Scholar
hits since 2023 in
[3D models](#)



Lytic Protocol for Intracellular Measurement of Adherent Cells and 3D Cell Cultures

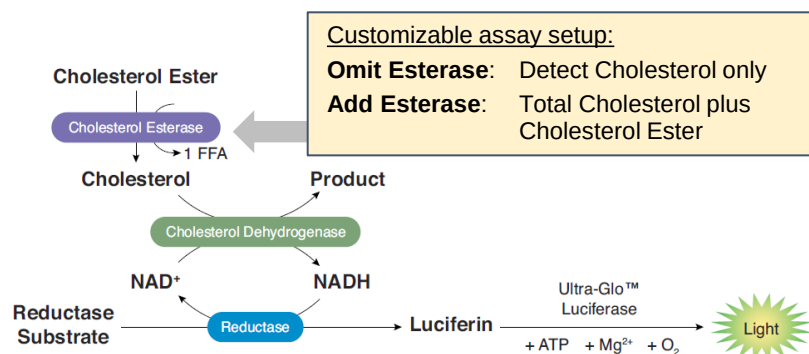


Assay Summary:

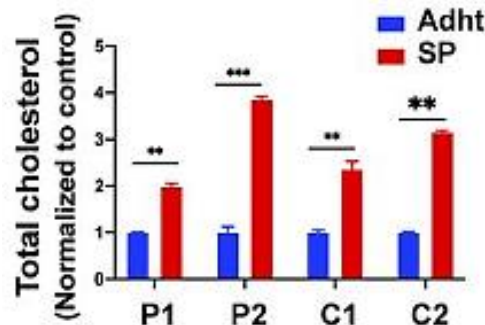
- 3D Performance verified
- Lytic or Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation Depends on assay format

Cholesterol/Cholesterol Ester-Glo™ Assays

Simple and sensitive bioluminescent lipid quantitation



Total cholesterol content of Ewing sarcoma cell lines grown as adherent or spheroid cultures



Total cholesterol content (free and esterified) of Ewing Sarcoma (EWS) primary cells (P1 and P2) and established EWS cell lines, A673 (C1) and TC251 (C2) grown as spheroids (SP; red) or monolayers (Adht; Blue) were measured using the Cholesterol/Cholesterol Ester-Glo™ Assay. The measurements are relative to those in adherent cells. Spheroids were generated through culture on ultra-low attachment plates. Data from Figure 3D of Katakam, S., et al. (2022) Necrotic debris and STING exert therapeutically relevant effects on tumor cholesterol homeostasis. *Life Sci. Alliance* 5, e202101256. PMID: [34983824](https://pubmed.ncbi.nlm.nih.gov/34983824/). Used under [Creative Commons license](https://creativecommons.org/licenses/by/4.0/) with no modifications.

Plate-based assays to measure cholesterol and cholesterol ester levels:

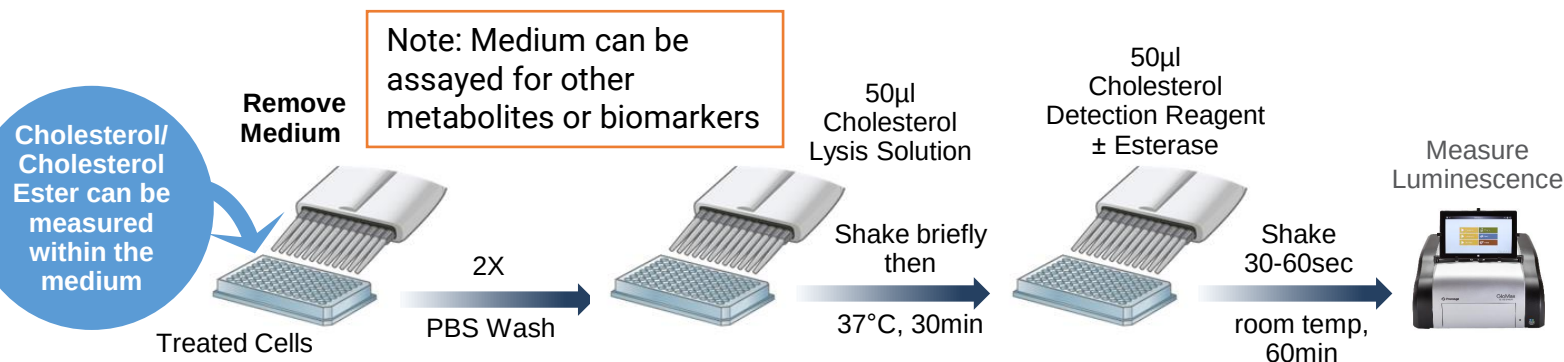
- No Organic Extraction Required:** Detergent extraction efficiently extracts lipids with one-step, no-heat, in-well protocol
- Sensitive with Large Linear Range:** Discriminates small changes across a broader range compared to fluorescent assays and requires fewer sample dilutions
- Compatible with Multiple Sample Types:** Quantitate lipids from cultured cells and 3D models, medium supernatant, serum, plasma or tissue
- Requires Only a Luminometer:** No specialized instrument, consumables or media required
- Can be multiplexed** with other Promega products to assess overall cell health, including RealTime-Glo™ MT Cell Viability or LDH-Glo™ assays.

Product	Cat. #	Size
Cholesterol/Cholesterol Ester-Glo™ Assay	J3190	5ml
	J3191	50ml

Google Scholar hits since 2023 in [3D models](#)



Lytic Protocol for Intracellular Measurement of Adherent Cells and 3D Cell Cultures



Assay Summary:

- 3D Performance verified
- Lytic or Non-Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation Depends on assay format

NAD/NADH-Glo™ and NADP/NADPH-Glo™ Assays

Direct and Sensitive Detection of Nicotinamide Adenine Dinucleotides

The NAD/NADH-Glo™ and NADP/NADPH-Glo™ Assays offer a sensitive, reproducible, and bioluminescent method for detecting NAD⁺, NADH, NADP⁺, and NADPH levels in cells and enzymatic reactions, overcoming the limitations of current methods that lack sensitivity and require extensive sample manipulation. Designed for high-throughput screening with minimal cell numbers, these assays can directly measure nucleotides in multiwell plates, even from low-activity enzymes or those with low K_m values. They achieve specificity through the inclusion of specific cycling enzymes and substrates, allowing for the differentiated measurement of both nonphosphorylated and phosphorylated nucleotides and the calculation of their oxidized and reduced forms' ratios.

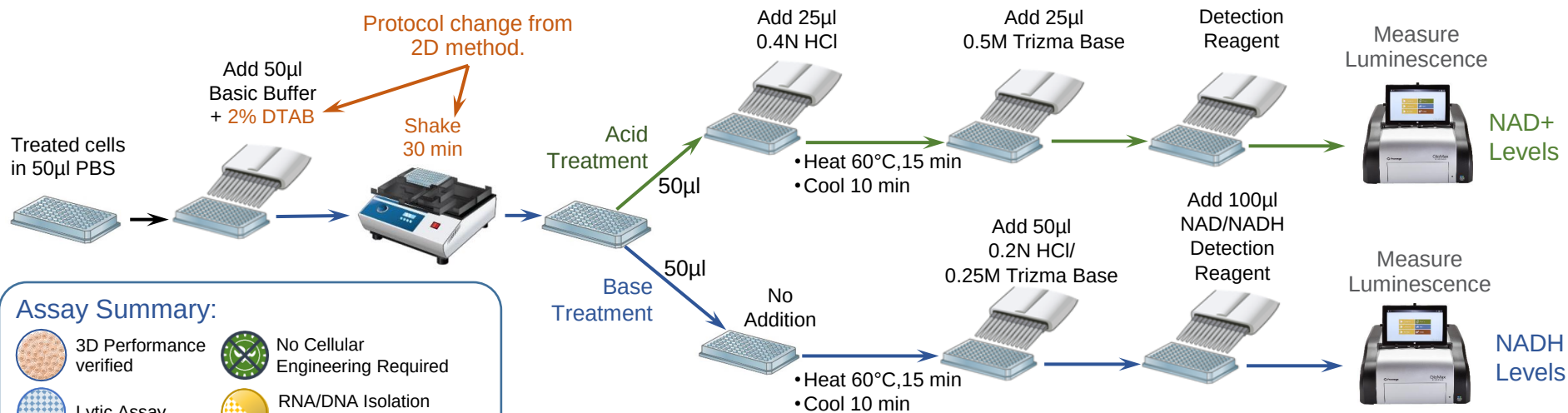
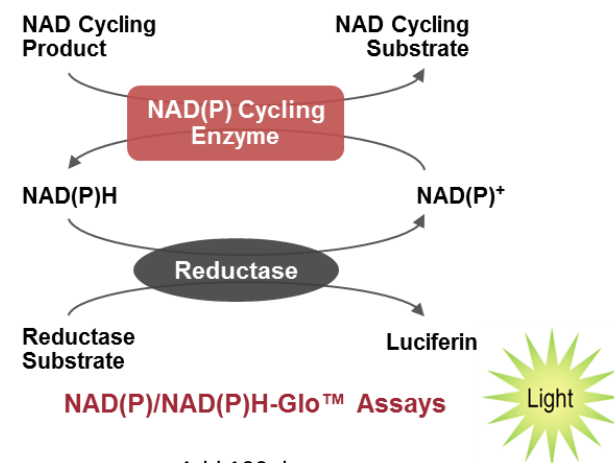
Learn more about the development of this system:

Vidugiriene, J., et al. (2014) [Bioluminescent cell-based NAD\(P\)/NAD\(P\)H assays for rapid dinucleotide measurement and inhibitor screening](#). *Assay Drug Dev Technol.* **12**, 514-26. PMID: [25506801](#)



Superior sensitivity compared to fluorescent methods for detecting total NADH/NADPH

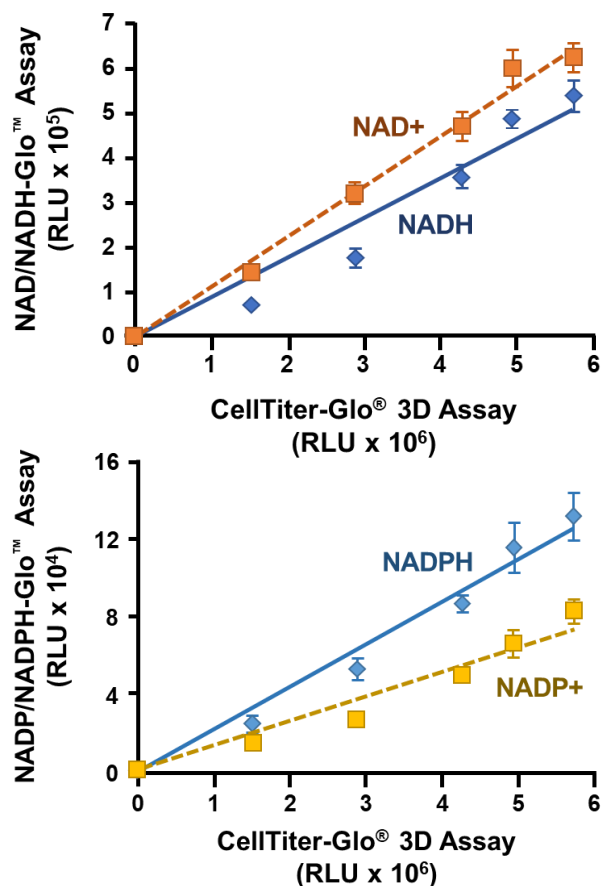
Core Reaction



NAD/NADH-Glo™ and NADP/NADPH-Glo™ Assays

Direct and Sensitive Detection of Nicotinamide Adenine Dinucleotides

NAD/NADH and NADP/NADPH signals correlate with increasing 3D microtissue diameter.



- **Greater Sensitivity:** Luminescent assay format avoids inherent fluorescent background signals, providing excellent signal-to-noise readings that allow miniaturizing to 384- and 1536-well formats.
- **Use Less Cells:** Perform assays directly in sample wells without sample manipulation.
- **Simplified Method:** The direct in-well "add-mix-measure" protocol requires no upfront sample preparation and makes the assays amenable to automation.
- **Faster Results:** Maximum sensitivity is reached in as little as 30 minutes after reagent addition.
- **Selective Dinucleotide Detection:** Simplified and optimized protocols provide selective in-well detection of dinucleotides and ratio determination.

Product	Cat. #	Size
NAD/NADH-Glo™ Assay	G9071	10ml
	G9072	50ml
NADP/NADPH-Glo™ Assay	G9081	10ml
	G9082	50ml

Google Scholar hits since 2023 for :

"NAD/NADH Glo"
+ ...



[spheroid](#)



[hydrogel](#)



[organoid](#)

"NADP/NADPH Glo"
+ ...



[spheroid](#)



[hydrogel](#)

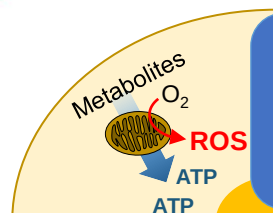


[organoid](#)

Varying numbers of HCT116 cells were seeded into GravityPLUS™ 96-well plates (InSphero) and grown for 4 days. Media was removed and replaced with PBS. Microtissues were lysed by the addition of bicarbonate buffer plus 2% DTAB and shaking for 30 minutes. After lysis, half of the volume was transferred to a white luminescent plate for acid treatment to measure either NAD or NADP. The other half went through base treatment to determine NADH or NADPH. After neutralization, the samples were divided and assayed with either the NAD/NADH-Glo™ Assay or the NADP/NADPH-Glo™ Assay. Parallel wells were assayed with the CellTiter-Glo® 3D Assay as the signal is proportional to microtissue diameter.

ROS-Glo™ H₂O₂ Assay

Monitor H₂O₂ levels to monitor cellular oxidative stress

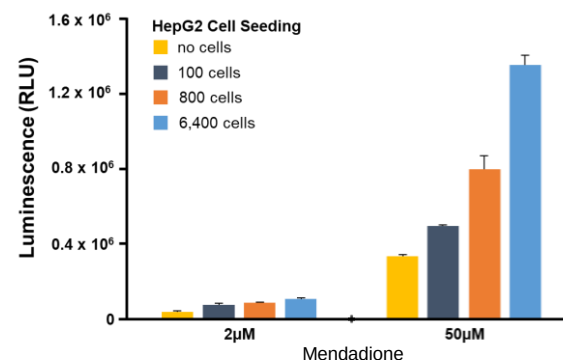


Various ROS species are converted to H₂O₂ in the cell, and H₂O₂ is the longest-lived ROS, an increase in H₂O₂ can reflect a general increase in the ROS level.

Assay Summary:

- 3D Performance verified
- No Cellular Engineering Required
- Lytic or Non-Lytic Assay
- RNA/DNA Isolation Depends on assay format

ROS-Glo™ H₂O₂ Assay signals from 3D microtissues treated with menadione.



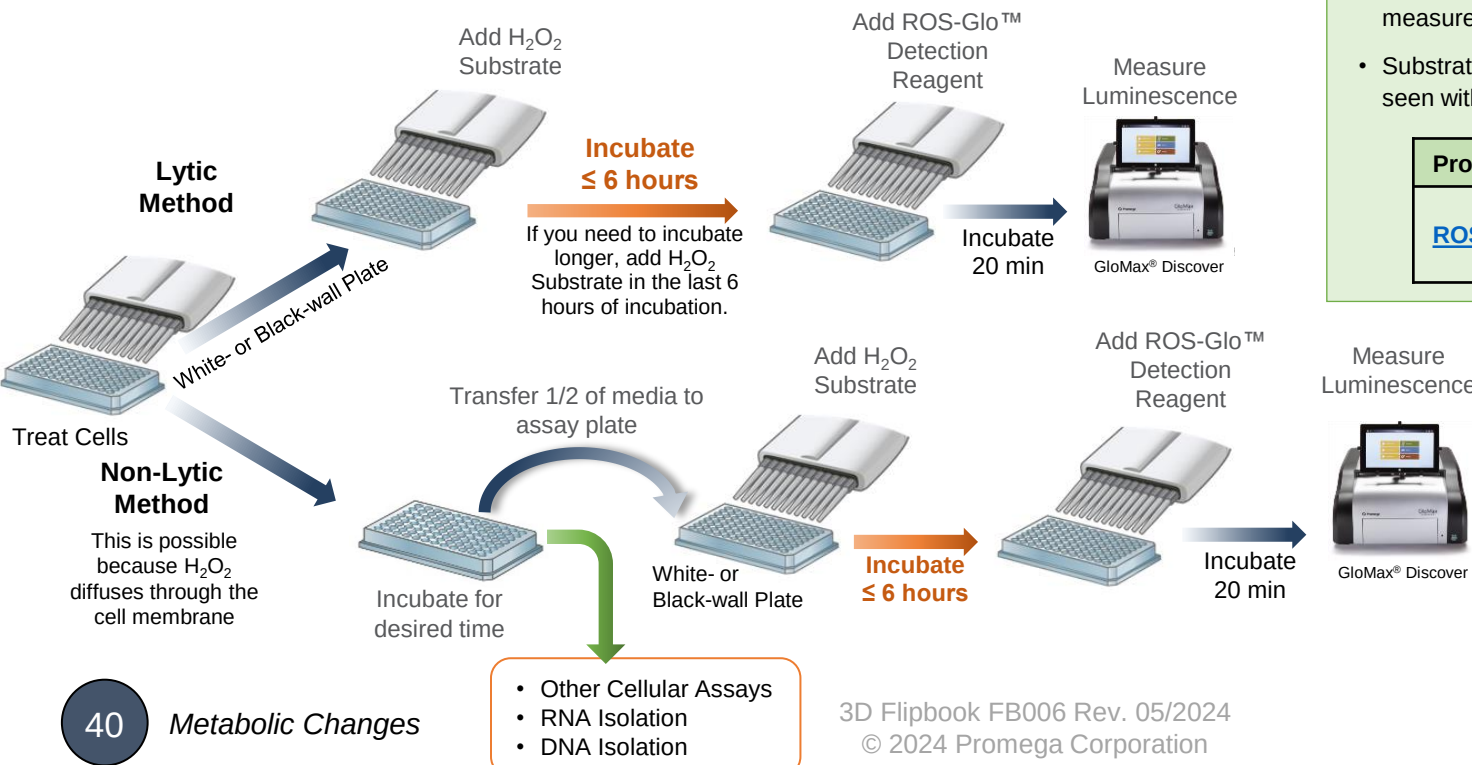
HepG2 cells were seeded in separate ULA (Ultra Low Attachment) plates at 100, 800, and 6,400 cells/well and grown for 4 days at 37°C, 5% CO₂. Microtissues in 25μl of MEM (HepG2) were then transferred to a white-walled assay plate and treated with a final concentration of 2 or 50μM menadione, 25μM H₂O₂ Substrate, and 0.5mM pyruvate in MEM (HepG2) or Hank's balanced salt solution (HCT116). Microtissues were incubated at 37°C, 5% CO₂ for 2 hours before assaying for presence of H₂O₂ by addition of the ROS-Glo™ Detection Reagent (n=3). Luminescence was read using a GloMax® Discover System.

Versatile Workflow allowing in-well lysis or sample transfer.

- Bioluminescent cell-based or in vitro biochemical assay to measure H₂O₂ directly in the well.
- Substrate reacts directly with H₂O₂ minimizing variability seen with enzyme-coupled detection reactions (e.g. HRP)

Product	Cat. #	Size
ROS-Glo™ H ₂ O ₂ Assays	G8820	10ml
	G8821	50ml

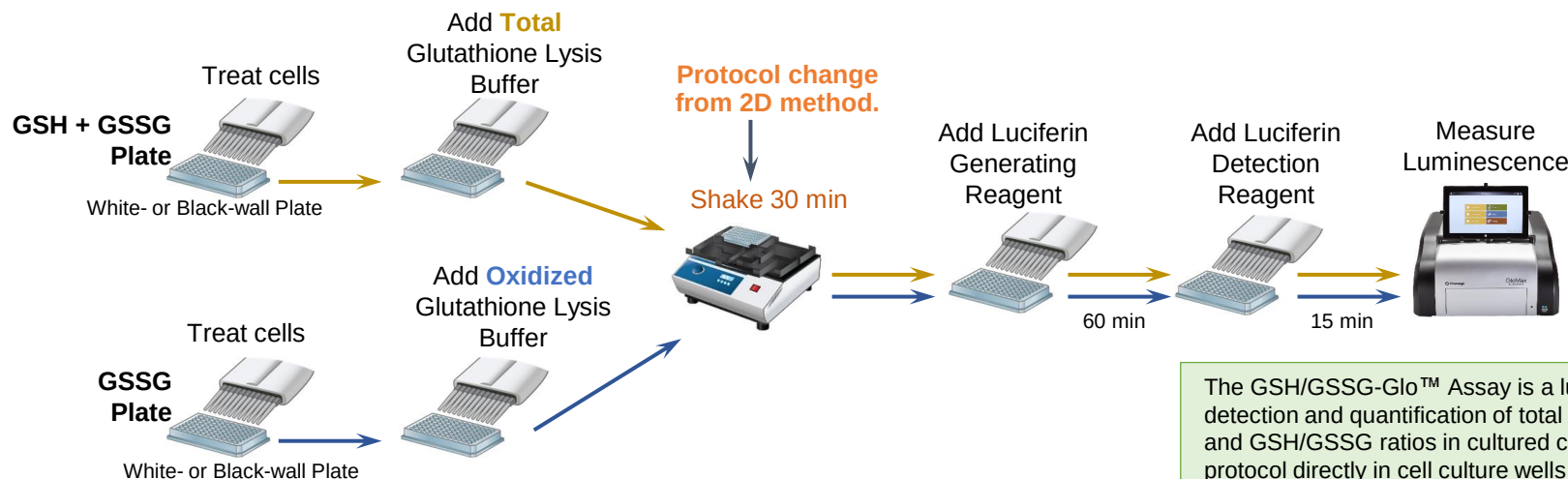
Google Scholar hits since 2023 in [3D models](#)



GSH/GSSG-Glo™ Assay

Measure physiologically relevant GSH/GSSG ratios

Straightforward Workflow



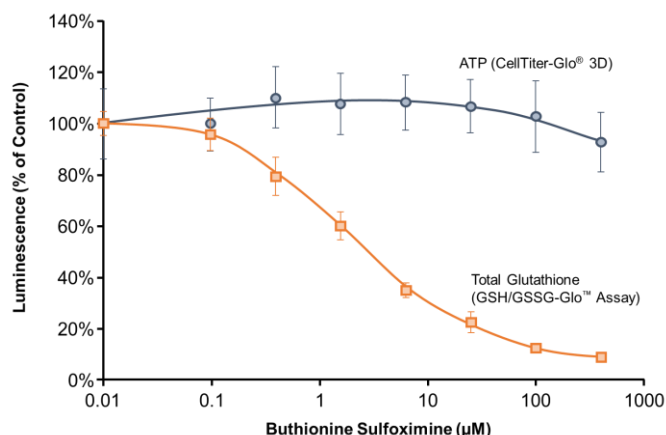
Assay Summary:

- 3D Performance verified
- Lytic Assay
- No Cellular Engineering Required
- RNA/DNA Isolation Requires Duplicate wells

The GSH/GSSG-Glo™ Assay is a luminescence-based system for the detection and quantification of total glutathione (GSH + GSSG), GSSG and GSH/GSSG ratios in cultured cells. Simple add-mix-measure protocol directly in cell culture wells

- Allows direct measure of total and GSSG minimizing variability
- Reduces sample handling
- Shortens time to results
- Amenable to 384-well format
- Sensitive luminescent multiwell-plate assay minimizes the number of cells required

Monitoring total glutathione and viability in parallel wells of HCT116 spheroids.



For the total glutathione assay, the medium was removed from 4-day ~350 mm HCT116 spheroids treated for 48 hr with buthionine sulfoximine. 50µl of Total Glutathione Lysis Reagent was added and the plates shaken for 30 minutes. 50µl of Luciferin Generation Reagent was then added, and after a 30 minute incubation, 100µl of Luciferin Detection Reagent was added. After a final 15 minute incubation, luminescence was recorded. ATP was assayed from parallel samples using the CellTiter-Glo® 3D Assay.

Product	Cat. #	Size
GSH/GSSG-Glo™ Assay	V6611	10ml
	V6612	50ml
GSH-Glo™ Glutathione Assay	V6911	10ml
	V6912	50ml

Google Scholar hits in 3D models since 2023 with:



[GSSG Glo](#)



[GSH Glo](#)



GloMax[®] Detection Systems

The Readers Designed for Your Assays

GloMax[®] Explorer

- 6- to 384-well reader
- Luminescence
- Fluorescence
- $\pm$ Visible Absorbance



GloMax[®] Navigator

- 96-well reader
- Luminescence

GloMax[®] Discover

- 6- to 384-well reader
- Luminescence
- Filtered Luminescence
- Fluorescence
- Visible Absorbance
- UV Absorbance
- BRET/FRET



Learn more about the
[GloMax[®] Family of
Microplate Readers](#)



Expression Changes in 3D

Page

RNA Purification

[ReliaPrep™ RNA Minipreps](#) 44

[Maxwell® RSC RNA Purification Kits](#) 46

Expression Analysis

[QuantiFluor® RNA System](#) 48

[GoScript™ RT Family for RT-qPCR](#) 49

[GoTaq® Dye-Based qPCR & RT-qPCR](#) 50

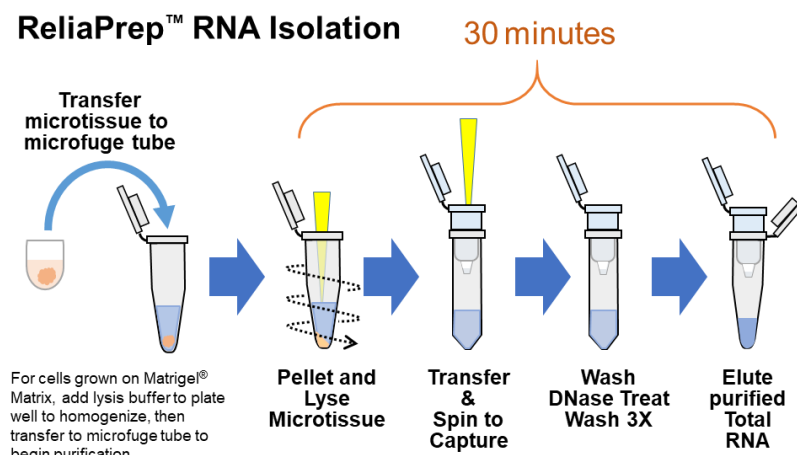
[GoTaq® Probe-Based qPCR & RT-qPCR](#) 51

[Reporter Gene Assays](#) 52

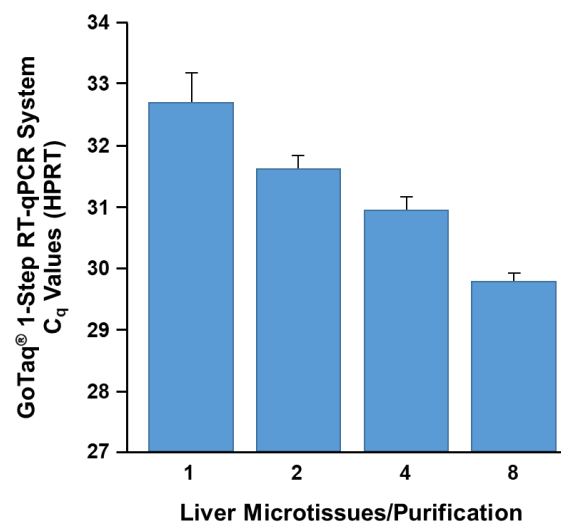
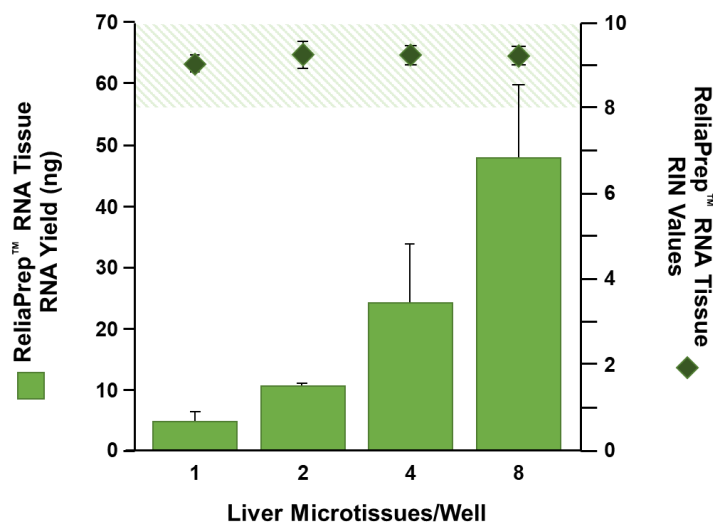
Manual RNA Isolation from 3D Cultured Cells

Isolate application-ready total RNA or miRNA

The purity and integrity of RNA isolated from cultured cells are critical for its effective use in applications such as reverse transcription PCR (RT-PCR), reverse transcription quantitative PCR (RT-qPCR), RNase protection assays, Northern blot analysis, oligo(dT) selection of poly(A)+ RNA, in vitro translation, microarray analysis and sequencing. In recent years, RT-PCR and RT-qPCR have emerged as powerful methods to identify and quantitate specific mRNAs from small amounts of total RNA and mRNA. As the use of amplification as a research tool has grown, the need for methods to rapidly isolate high-quality RNA, substantially free of genomic DNA contamination, from small amounts of starting material (i.e., cultured cells) has also increased. The ReliaPrep™ RNA Cell Miniprep System has been designed to address these needs.



Liver Microtissues ReliaPrep Tissue RNA Purification with RT-qPCR data



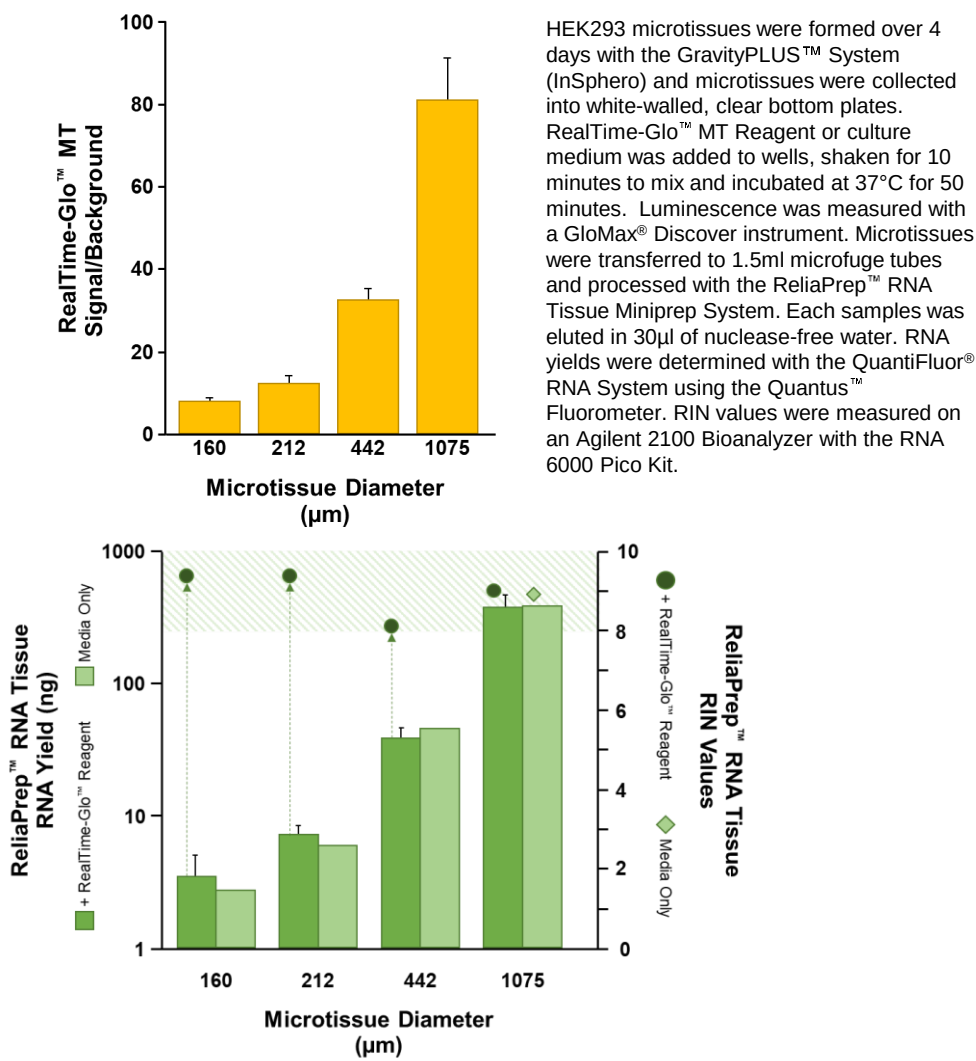
Total RNA was isolated from 1, 2, 4 or 8 3D InSight™ Human Liver Microtissues (InSphero, ~200µm each) with the ReliaPrep™ RNA Tissue Miniprep System. Yields were determined with the QuantiFluor® RNA System and the Quantus™ Fluorometer. RNA integrity numbers (RIN) were determined using an Agilent Bioanalyzer and RNA 6000 Pico Kit. The isolated RNA was reverse transcribed and amplified with the BRYT Green™ dye-based GoTaq® 1-Step RT-qPCR System using primers to hypoxanthine guanine phosphoribosyl transferase (HPRT).



Manual RNA Isolation from 3D Cultured Cells

Isolate application-ready total RNA or miRNA

Measurement of HEK293 microtissues with RealTime-Glo™ MT Assay followed by RNA purification with the ReliaPrep™ RNA Tissue Miniprep System



Product	Cat. #	Size
ReliaPrep™ RNA Cell Miniprep System	Z6010	10 prep
	Z6011	50 prep
	Z6012	250 prep
ReliaPrep™ RNA Tissue Miniprep System	Z6110	10 prep
	Z6111	50 prep
	Z6112	250 prep
ReliaPrep™ miRNA Cell and Tissue Miniprep System	Z6210	10 prep
	Z6211	50 prep
	Z6212	250 prep

Google Scholar hits since 2023, “reliaprep rna” +



[spheroid](#)



[hydrogel](#)



[organoid](#)

Benchtop automated RNA from 3D Cultured Cells

Isolate application-ready total RNA or miRNA

Benchtop RNA Purification from Tissue Samples

The **Maxwell® RSC simplyRNA Tissue Kit**, used with the Maxwell® RSC Instruments, provides a simple method for automated RNA purification from up to 20mg of tissue. The low elution volume is used to generate concentrated high-quality RNA suitable for use in downstream applications such as quantitative RT-PCR. The kit provides the necessary reagents for processing the samples and uses prefilled cartridges for purification, maximizing simplicity and convenience.



Learn more about the
[Maxwell® RSC
simplyRNA Tissue Kit](#)

**Self-contained, cartridge-based
purification systems**



Benchtop RNA Purification from Fresh or Frozen Cells

The **Maxwell® RSC simplyRNA Cells Kit**, used with the Maxwell® RSC Instruments, provides a simple method for automated RNA purification from fresh or frozen cells. The low elution volume is used to generate concentrated high-quality RNA suitable for use in downstream applications such as quantitative RT-PCR. The kit provides the necessary reagents for processing the samples and uses prefilled cartridges for purification, maximizing simplicity and convenience.



Learn more about the
[Maxwell® RSC
simplyRNA Cells Kit](#)

**Designed for use on
Maxwell® RSC or
RSC 48 Instruments**



Benchtop Purification of High-Quality miRNA from Tissue

The **Maxwell® RSC miRNA Tissue Kit** is used with the Maxwell® RSC Instruments to purify total RNA, including microRNA (miRNA), from 1–48 tissue samples in about 90 minutes. The kit provides all the reagents required for sample processing and uses prefilled cartridges for purification, simplifying extraction and freeing up your time for analysis.

The extracted RNA is highly concentrated and ready for use in RT-qPCR, RNA sequencing and other downstream applications used in biomarker detection, gene expression, and other studies.

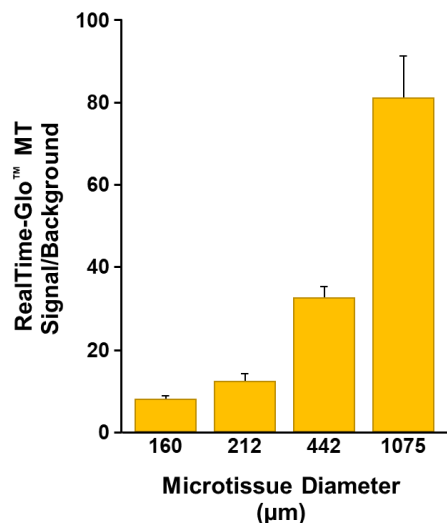


Learn more about the
[Maxwell® RSC
miRNA Tissue Kit](#)

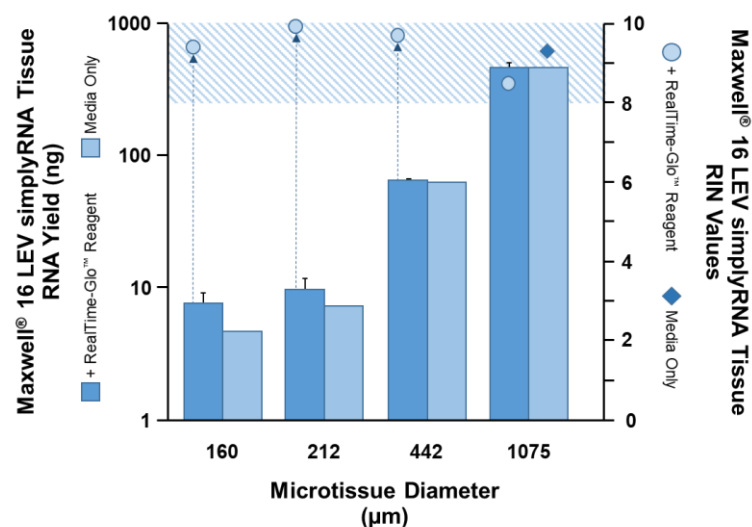
Benchtop automated RNA from 3D Cultured Cells

Isolate application-ready total RNA or miRNA

Measurement of HEK293 microtissues with RealTime-Glo™ MT Assay followed by RNA purification with a Maxwell® simplyRNA Tissue System.



HEK293 microtissues were formed over 4 days with the GravityPLUS™ System (InSphero) and microtissues were collected into white-walled, clear bottom plates. RealTime-Glo™ MT Reagent or culture medium was added to wells, shaken for 10 minutes to mix and incubated at 37°C for 50 minutes. Luminescence was measured with a GloMax® Discover instrument. Microtissues were transferred to 1.5ml microfuge tubes for initial lysis then processed with the Maxwell® 16 LEV simplyRNA Tissue Kit on a Maxwell® 16 Instrument. (*The Maxwell® 16 Systems were the predecessors to the Maxwell® RSC Systems*). RNA yields were determined with the QuantiFluor® RNA System using the Quantus™ Fluorometer. RIN values were measured on an Agilent 2100 Bioanalyzer with the RNA 6000 Pico Kit.



Product	Cat. #	Size
Maxwell® RSC simplyRNA Tissue Kit	AS1340	48 prep
Maxwell® RSC simplyRNA Cells Kit	AS1390	48 prep
Maxwell® RSC miRNA Tissue Kit	AS1460	48 prep

Google Scholar hits since 2023, “simplyRNA” +



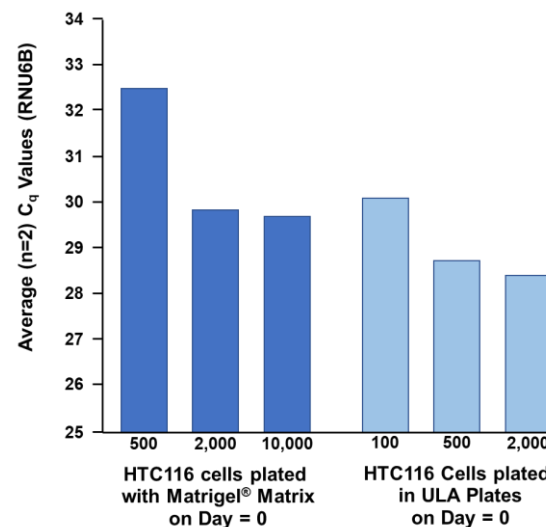
[spheroid](#)



[hydrogel](#)



[organoid](#)



Cq values from TaqMan® RT-qPCR with RNA (10ng) isolated from 3D microtissues with the Maxwell® RSC miRNA Tissue Kit. Target was the miRNA control gene RNU6B. The indicated number of cells were either plated in Matrigel® Matrix or directly into an ultra-low attachment (ULA) plate (Corning) and cultured for 4 days. RNA was isolated with the Maxwell® RSC miRNA Tissue Kit and quantified with the QuantiFluor™ RNA System.

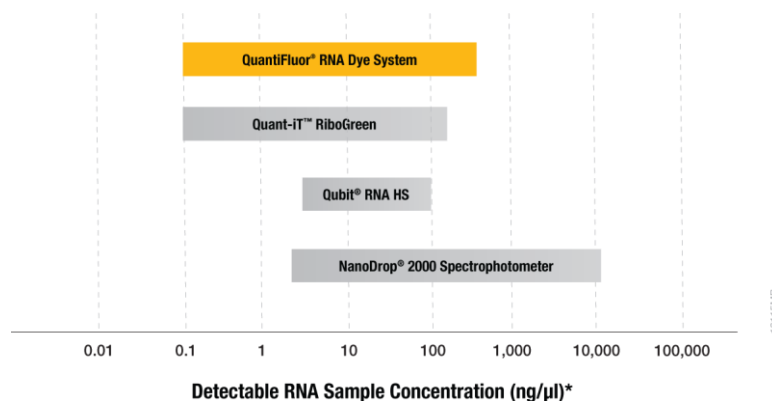
QuantiFluor® RNA System

Accurately quantitate RNA prior to downstream applications

The QuantiFluor® RNA System contains a fluorescent RNA-binding dye that enables sensitive quantitation of small amounts of RNA in solution. Detecting and quantitating small amounts of RNA is important for many biological applications, including determining yield of in vitro transcribed RNA, and measuring RNA concentration before Northern blot analysis, S1 nuclease assays, RNase protection assays, cDNA library preparation, RT-PCR, and differential display PCR.

The QuantiFluor® System requires less RNA (100pg) than other RNA quantitation methods (~1 µg), so you save more of your sample for downstream assays.

Improved Sensitivity vs. Absorbance and Other RNA Fluorescent Quantitation Systems



*Based on 1µl sample input per assay. Quantitation of more dilute samples is possible using more input RNA per assay

Product	Cat. #	Size
QuantiFluor® RNA System	E3310	1ml
Quantus™ Fluorometer	E6150	each

Quick and easy
pre-programmed
single-tube
quantitation with the
Quantus® Fluorometer



Quantify multiple
samples at once with
the GloMax® Discover
or Explorer Instruments
using pre-programmed
methods



cDNA Synthesis Systems for RT-qPCR

GoScript™ Reverse Transcriptase Family

Sensitive Reverse Transcriptase Ideal for Challenging Templates

GoScript™ Reverse Transcriptase utilizes M-MLV reverse transcriptase enzyme and state-of-the-art buffer to drive robust, reliable cDNA synthesis of a full range of rare and abundant transcripts, even with difficult templates and in the presence of PCR inhibitors.

Resilient

Synthesizes cDNA in the presence of strong PCR inhibitors

Sensitive

Transcribes both high copy and low copy messages

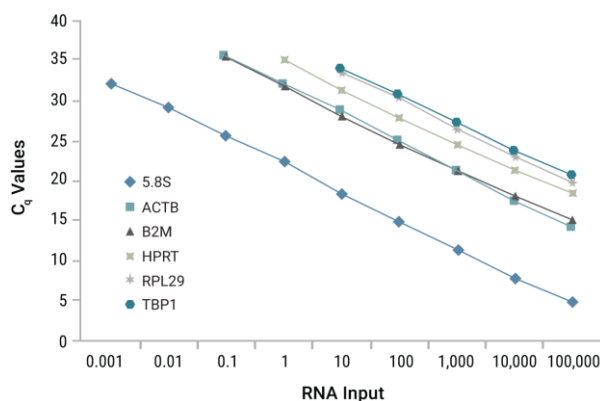
Reliable

Processes through secondary structure

Processive

Transcribes short and long transcripts

Efficient cDNA Synthesis Over a Wide Range of Input RNA



Direct quantification of six different targets in human total RNA using GoTaq® 2-Step RT-qPCR System. Nine parallel large-scale GoScript™ RT reactions were performed, containing log-fold variations of input human reference total RNA (10ng/μl to 0.1fg/μl). 10μl fractions of each reverse transcription reaction product, representing 100ng to 1fg of input RNA, were sampled directly into triplicate GoTaq® qPCR reactions, without dilution, for six separate monoplex assays. Each assay was designed to be specific for a different RNA target with an anticipated, proportionally different expression level: extremely high (5.8S rRNA), high (ACTB and B2M), moderate (HPRT) or low (RPL29 and TBP1). In each different model, the results demonstrate the desired ≈ 3.3 cycle change per $\Delta \log$ input, but with different Cq's reflecting relative proportion within the total RNA sample.

Product	Cat. #	Size
<u>GoScript™ Reverse Transcriptase</u> Enzyme, buffer, 25mM MgCl ₂	A5003	100 rxn
	A5004	500 rxn
<u>GoScript™ Reverse Transcriptase Kit</u> Enzyme, buffer, dNTPs, rRNasin® Ribonuclease Inhibitor, Oligo (dT) and Random Hexamer primers, 25mM MgCl ₂ and Nuclease-Free Water	A5000	50 rxn
	A5001	100 rxn
<u>GoScript™ Reverse Transcription Mix, Oligo(dT)</u> GoScript™ Enzyme Mix; Reaction Buffer, Oligo(dT); and Nuclease-Free Water.	A2790	50 rxn
	A2791	100 rxn
<u>GoScript™ Reverse Transcription Mix, Random Hexamers</u> GoScript™ Enzyme Mix; Reaction Buffer, Random Hexamers; and Nuclease-Free Water.	A2800	50 rxn
	A2801	100 rxn

Google Scholar hits since 2023, "GoScript" +



[spheroid](#)



[hydrogel](#)



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Simple, Sensitive Dye-Based qPCR and RT-qPCR

The GoTaq® qPCR Family with BRYT Green® Dye

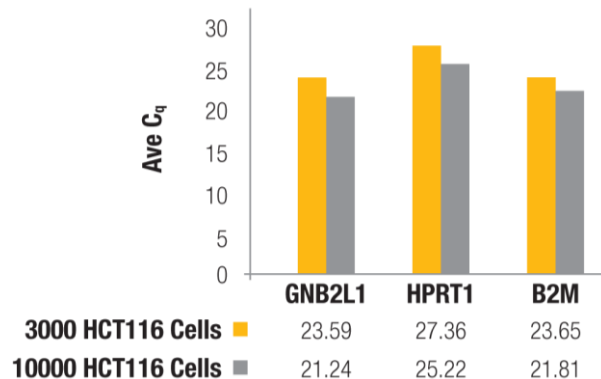
The **GoTaq® qPCR and RT-qPCR Systems** are ready-to-use, 2X master mixes containing BRYT Green® Dye, a fluorescent DNA binding dye with minimal PCR inhibition, providing maximum amplification efficiency and greater fluorescence enhancement than SYBR® Green I.

Rapid hot-start activation and processive enzymes make the GoTaq® Systems compatible with most real-time PCR instruments using standard or fast cycling. The 1-Step and 2-Step RT-qPCR Systems also include GoScript™ Reverse Transcriptase, to enable efficient synthesis of first-strand cDNA in preparation for PCR.

Convenient Master Mixes for Quantitative Real-Time PCR and RT-qPCR

- Ready-to-use mix of optimized components for dye-based qPCR or RT-qPCR
- Compatible with both fast and standard cycling methods
- Resistant to a wide range of PCR inhibitors

GoTaq® 1-Step RT-qPCR from 3D Microtissues.



HCT116 cells were seeded at two different densities on GravityPLUS™ hanging drop 96-well plates (InSphero) to form microtissues. Purified RNA was evaluated by looking at the gene expression levels of three genes (GNB2L1, HPRT1, and B2M) using the GoTaq® 1-Step RT-qPCR System. The GoTaq® System was able to detect all three genes from RNA purified from two different microtissue densities using the ReliaPrep™ RNA Cell MiniPrep System.

Product	Cat. #	Size
GoTaq® qPCR Master Mix	A6001	5ml
	A6002	25ml
GoTaq® 1-Step RT-qPCR System	A6020	5ml
GoTaq® 2-Step RT-qPCR System	A6010	5ml

Google Scholar hits since 2022,
"GoTaq qPCR Master" GoScript +



[spheroid](#)



[hydrogel](#)



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Simple, Sensitive Probe-Based qPCR and RT-qPCR

The GoTaq® Probe Family

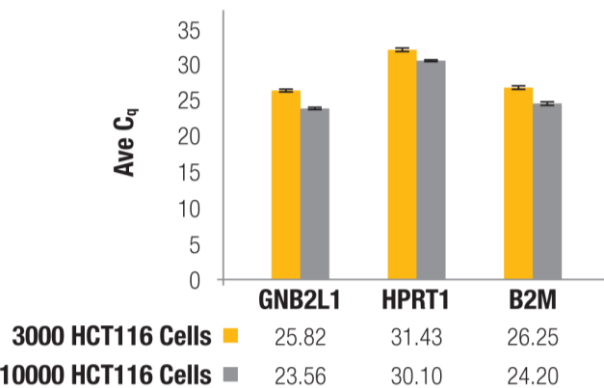
The **GoTaq® Probe qPCR and RT-qPCR Systems** are ready-to-use 2X master mixes that simplify reaction assembly for qPCR using hydrolysis probe detection. These systems are designed for sensitive detection and quantification of a broad range of DNA or RNA targets in the presence of a wide range of PCR inhibitors.

Rapid hot-start activation and processive enzymes make the GoTaq® Probe Systems compatible with most real-time PCR instruments using standard or fast cycling. Convenient, room-temperature setup makes it easy to scale up to automated and high-throughput detection formats.

Convenient Master Mixes for Quantitative Real-Time PCR and RT-qPCR

- Ready-to-use mix of optimized components for robust qPCR and RT-qPCR using hydrolysis probes
- Compatible with both fast and standard cycling methods on most real-time PCR instruments using TaqMan® and other probe assays such as molecular beacons
- Resistant to most PCR inhibitors

GoTaq® Probe 1-Step RT-qPCR from 3D Microtissues.



HCT116 cells were seeded at two different densities on GravityPLUS™ hanging drop 96-well plates (InSphero) to form microtissues. Purified RNA was evaluated by looking at the gene expression levels of three genes (GNB2L1, HPRT1, and B2M) using the GoTaq® Probe 1-Step RT-qPCR System. The GoTaq® System was able to detect expression levels all three genes from RNA purified from two different microtissue densities using the ReliaPrep™ RNA Cell MiniPrep System..

Product	Cat. #	Size
GoTaq® Probe qPCR Master Mix	A6101	2ml
	A6102	10ml
GoTaq® Probe 1-Step RT-qPCR System	A6120	2ml
GoTaq® Probe 2-Step RT-qPCR System	A6110	2ml

Google Scholar hits since 2023, “GoTaq probe” +



[*spheroid*](#)



[*hydrogel*](#)



[*organoid*](#)

Reporter Gene Assays in 3D

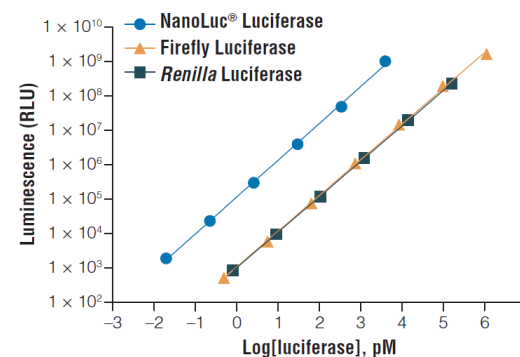
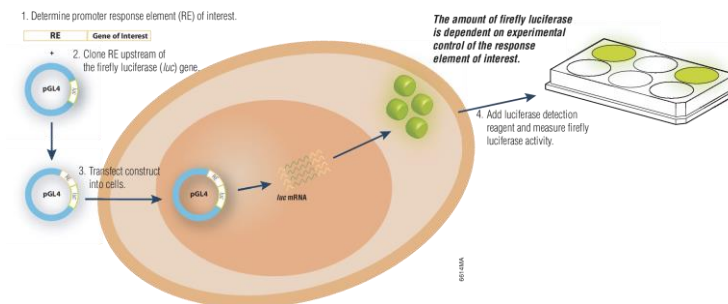
Genetic reporter systems have contributed greatly to the study of eukaryotic gene expression and regulation. Although reporter genes have played a significant role in numerous applications, both in vitro and in vivo, they are most frequently used as indicators of transcriptional activity in cells.

Promega revolutionized the reporter assay process in the early 1990's by introducing the Luciferase Reporter Assay System and pGL2 Vector Family dependent upon Firefly luciferase. Continued innovation led to the Dual-Luciferase® Reporter Assay System utilized the Firefly luciferase as the primary reporter and *Renilla* luciferase as a secondary, control reporter.

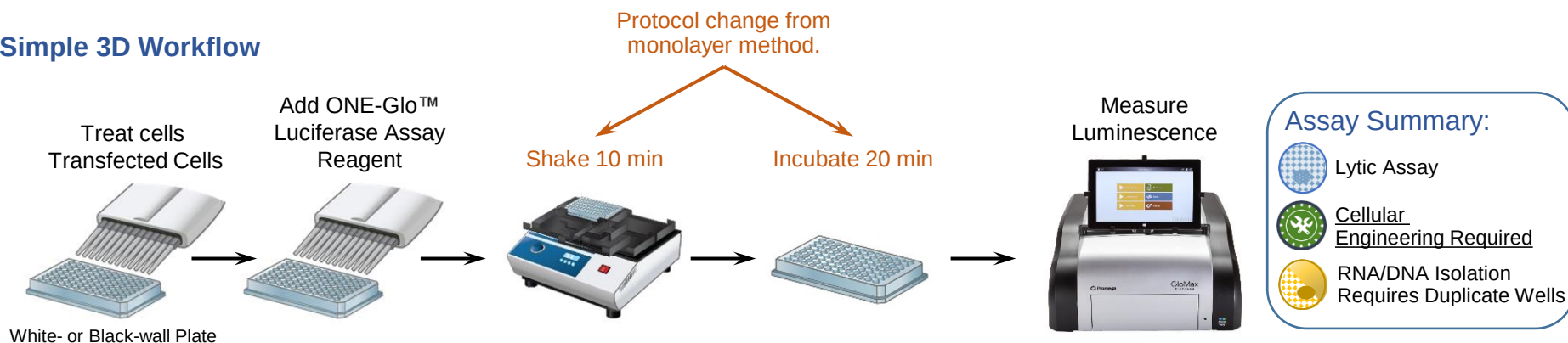
As reporter assays became more and more prevalent and moving from single tubes to 96-well plates and beyond to even 1,536-well plates, we introduced "Glo" assays with longer luminescent half-lives to fit assays to the workflow.

In 2012, Promega introduced the compact, extremely bright reporter called NanoLuc® Luciferase. This 19kDa enzyme is >100-fold brighter than either Firefly or *Renilla* luciferases. This brightness means you can detect a signal from 100-fold less NanoLuc® Luciferase than other reporters allowing you to work closer to the real biology.

As biology investigation progress to 3D applications, Promega Reporter Assays are ready to assist you. Standard reporter assays are easily adapted to 3D application with a simple protocol change:

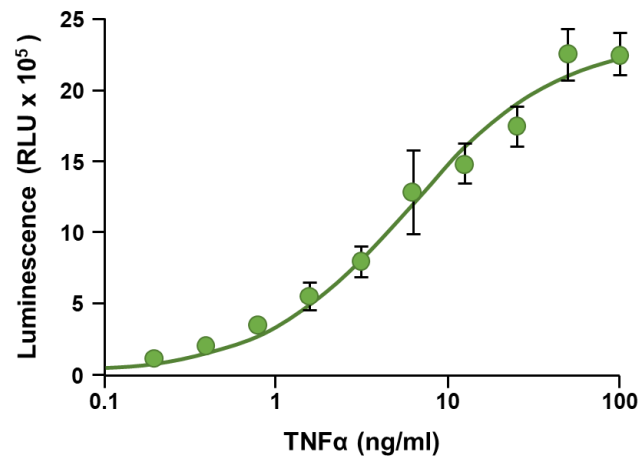


Simple 3D Workflow



Reporter Gene Assay in 3D

Assay of NF-κB response in HEK293 microtissues to TNFα treatment



The GloResponse™ NF-κB-RE-*luc2P* HEK293 cells were seeded in GravityPLUS™ 96-well plates (InSphero) and grown for 4 days then transferred to white-walled, 96-well plate. The ~340µm microtissues were challenged with various concentrations of TNFα for 7 hours. ONE-Glo™ Luciferase Assay Reagent was added to wells, shaken for 10 minutes then allowed to sit at room temperature for 20 minutes prior to reading the luminescence on a GloMax® Instrument.

Product	Cat. #	Size
Nano-Glo® Luciferase Assay System Assay NanoLuc® Luciferase, 2hr signal half-life	N1110	10ml
	N1120	100ml
ONE-Glo™ Luciferase Assay System Assay Firefly luciferase, >45 minute signal half-life	E6110	10ml
	E6120	100ml
Bright-Glo™ Luciferase Assay System Assay Firefly luciferase, >25 minute signal half-life	E2610	10ml
	E2620	100ml
Steady-Glo® Luciferase Assay System Assay Firefly luciferase, >5 hour signal half-life	E2510	10ml
	E2520	10ml
Nano-Glo® Dual-Luciferase® Reporter Assay System Same well assay of Firefly luciferase followed by NanoLuc® Luciferase. >2 hour signal half-life each.	N1610	10ml
	N1620	100ml

Larger sizes available

Learn more about
[Reporter Assays](#)



Learn more about
[Reporter Vectors & Cell Lines](#)



Learn more about
[Transfection Reagents](#)



Learn more about
[Transfection-Quality Plasmid Preps](#)







Genome Analysis in 3D

Page

DNA Purification

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Genome Analysis

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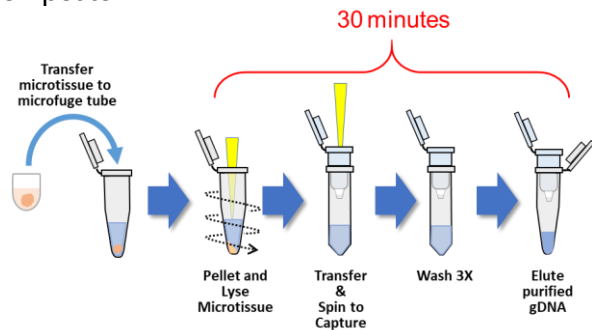
Manual Genomic DNA Isolation from 3D Cultures

Options based on downstream applications

Pure, Intact DNA from Tissues in Under 30 Minutes

The **ReliaPrep™ gDNA Tissue Miniprep System** provides a complete, ready-to-use method for purification of gDNA from up to 25mg of tissue, a buccal (cheek) swab, or a 1cm mouse tail snip, obtaining intact gDNA without the use of ethanol washes or precipitations. DNA purification is complete in 30 minutes or less (hands-on time).

- **Easy to Use:** Reagents are supplied "ready-to-use"—no additions required.
- **Pure gDNA:** Improved A_{260}/A_{230} ratios vs. the leading competitor.



Google Scholar hits since 2022, "Reliaprep gDNA" +



spheroid



hydrogel

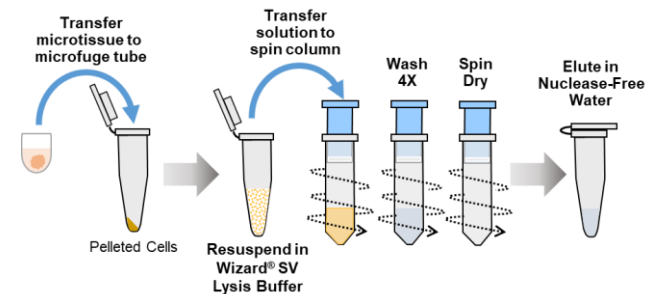


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Simple DNA Purification Method for Cells and Tissues

The **Wizard® SV Genomic DNA Purification System** provides a fast, simple, membrane-based technique for preparing genomic DNA from cultured cells and tissue, including mouse tails. Genomic DNA can be purified from cultured cells in about 20 minutes. Isolation from tissue or mouse tails requires an overnight digestion with Proteinase K (Cat.# V3021). Amplifiable genomic DNA can be isolated from up to 5×10^6 cells, 20mg of tissue or up to 1.2cm of a mouse tail tip without a centrifugation clearing step.

Spin or Vacuum method for amplifiable gDNA



Google Scholar hits since 2022, "Wizard SV genomic" +



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Manual Genomic DNA Isolation from 3D Cultures

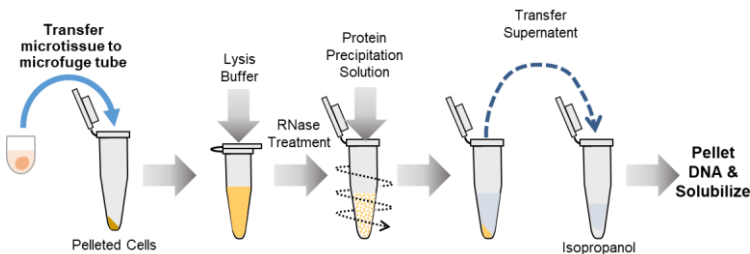
Options based on downstream applications

Simple Method to Isolate Genomic DNA from Many Sample Types

The **Wizard® Genomic DNA Purification Kit** provides a simple, solution-based method for isolation of DNA from white blood cells, tissue culture cells, animal tissue, plant tissue, yeast and Gram-positive and Gram-negative bacteria. DNA purified with this system is suitable for a variety of applications, including amplification, digestion with restriction endonucleases and membrane hybridizations (e.g., Southern and dot/slot blots).

Product	Cat. #	Size
ReliaPrep™ gDNA Tissue Miniprep System	A2051	100 prep
	A2052	250 prep
Wizard® SV Genomic DNA Purification System	A2360	50 prep
	A2361	250 prep
Wizard® Genomic DNA Purification Kit (Note: Isolations based on purification from 300µl blood.)	A1120	100 isolations
	A1125	500 isolations

Gentle, solution-based method for high MW gDNA



Google Scholar hits since 2023, “Wizard Genomic” +



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Benchtop automated DNA from 3D Cultured Cells

Isolate application-ready DNA

Automated Benchtop DNA Extraction from Mammalian Tissues

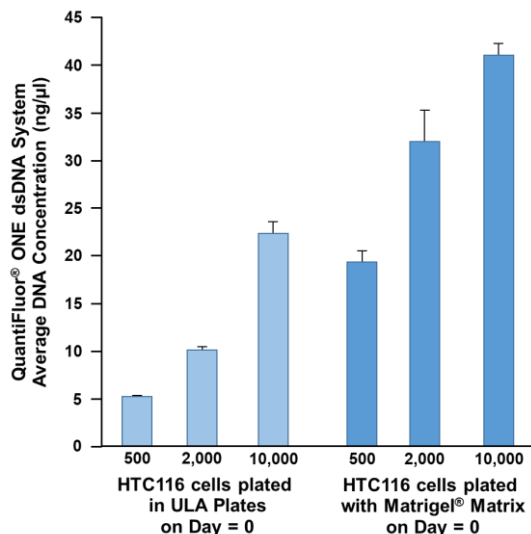
The **Maxwell® RSC Tissue DNA Kit** is a simple, automated method for extraction of DNA from up to 50mg of mammalian tissue using the Maxwell® RSC Instrument. The kit contains all the necessary reagents for DNA extraction from tissue and is used with the Maxwell® RSC Instrument in a convenient prefilled cartridge format. Homogenized tissue is added directly into well #1 of the cartridges, and purified DNA is ready for analysis in about 45 minutes. Purified DNA is free of PCR inhibitors and can be used directly in a variety of downstream applications including sensitive amplification-bases assays and agarose gel electrophoresis.

Product	Cat. #	Size
Maxwell® RSC Tissue DNA Kit	AS1610	48 prep



Learn more about the
[Maxwell® RSC
Tissue DNA Kit](#)

Purify DNA from Spheroids or Matrigel®-grown Cells



DNA was isolated from HTC116 cells grown in Ultra-Low Attachment (ULA) plates (Corning) or Matrigel® Matrix using the Maxwell® RSC Tissue DNA Kit. The microtissue spheroid (ULA plate) or the entire Matrigel® Matrix culture were transferred to well 1 of the RSC cartridge with lysis buffer using a wide-bore pipet tip. The cells were pipetted up and down 10 times prior to initiating the purification on the Maxwell® RSC Instrument. The DNA was eluted in 60μl of nuclease-free water. DNA was quantified with the Quantifluor® ONE dsDNA System using the Quantus™ Fluorometer.

Self-contained, cartridge-based purification system



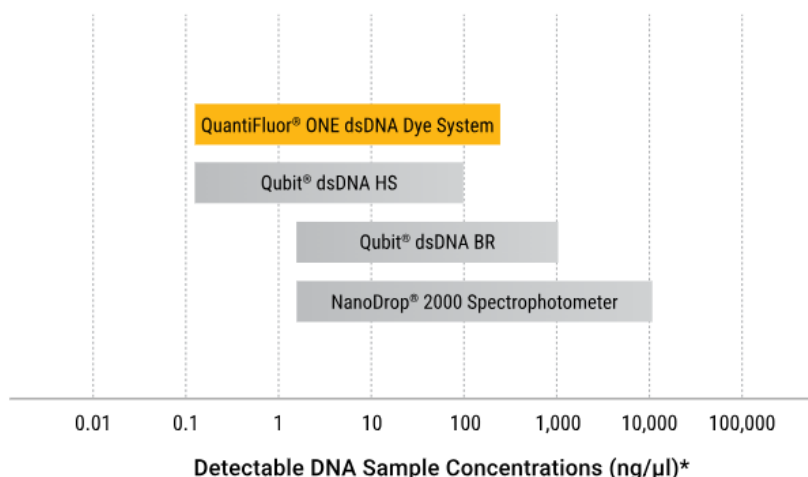
Designed for use on
**Maxwell® RSC or
RSC 48 Instruments**



QuantiFluor® dsDNA Systems

Accurate quantitation of DNA prior to analysis

The **QuantiFluor® ONE dsDNA System** provides a fluorescent double-stranded DNA-binding dye (504nm_{Ex}/531nm_{Em}) in an automation-friendly, "Add-and-Read" format for both dye and standard, simplifying DNA quantitation and speeding up your workflow. It's as easy to use as NanoDrop® absorbance-based methods, but much more sensitive for low-concentration samples.



*Based on 1μl sample input per assay. Quantitation of more dilute samples is possible using more input dsDNA per assay.

Product	Cat. #	Size
QuantiFluor® ONE dsDNA System	E4871	100 rxn
QuantiFluor® dsDNA System	E2670	1ml
Quantus™ Fluorometer	E6150	each

Quick and easy
pre-programmed
single-tube
quantitation with the
Quantus® Fluorometer



Quantify multiple
samples at once with
the **GloMax® Discover**
or **Explorer Instruments**
using pre-programmed
methods



Simple, Sensitive Probe-Based qPCR

Ready-to-use 2X Master Mix

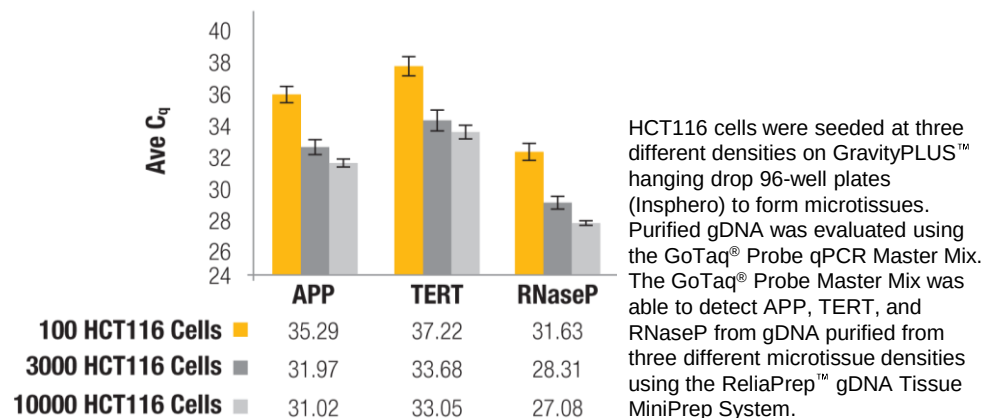
The **GoTaq® Probe qPCR Systems** are ready-to-use 2X master mixes that simplify reaction assembly for qPCR using hydrolysis probe detection. These systems are designed for sensitive detection and quantification of a broad range of DNA targets in the presence of a wide range of PCR inhibitors.

Rapid hot-start activation and processive enzymes make the GoTaq® Probe Systems compatible with most real-time PCR instruments using standard or fast cycling. Convenient, room-temperature setup makes it easy to scale up to automated and high-throughput detection formats.

Convenient Master Mixes for Quantitative Real-Time PCR

- Ready-to-use mix of optimized components for robust qPCR using hydrolysis probes
- Compatible with both fast and standard cycling methods on most real-time PCR instruments using TaqMan® and other probe assays such as molecular beacons
- Resistant to most PCR inhibitors

GoTaq® Probe qPCR from 3D Microtissues.



Product	Cat. #	Size
GoTaq® Probe qPCR Master Mix	A6101	2ml
	A6102	10ml

Google Scholar hits since 2022, “GoTaq probe” +



[spheroid](#)



[hydrogel](#)



[organoid](#)

Compatible with these Instruments

For further details on instrument compatibility, please reference the appropriate Technical Manual. Instruments not listed may also be compatible—please enquire with Promega technical support for additional compatibility.

- Applied Biosystems ABI PRISM® 7000 and 7700 Sequence Detection System
- Applied Biosystems 7300 and 7900HT Real-Time PCR System
- Applied Biosystems GeneAmp® 5700 Thermal Cycler
- Applied Biosystems StepOne™ and StepOnePlus™ Real-Time PCR Systems
- Applied Biosystems 7500 and 7500 FAST Real-Time PCR System
- Bio-Rad CFX96 Real-Time PCR Detection System
- Bio-Rad DNA Engine Opticon® and Opticon® 2 Real Time PCR Detection Systems
- Bio-Rad iCycler® iQ™ and iQ™ 5 Real-Time PCR Detection System
- Bio-Rad/MJ Research Chromo4™ Real-Time Detector
- Bio-Rad MyiQ™ Real-Time PCR Detection System
- Cepheid SmartCycler® System
- Corbett Rotor-Gene™ 3000 and 6000 Real-Time Rotary Analyzer
- Eppendorf Mastercycler® ep realplex Real-Time PCR System
- Roche LightCycler® 480 Real-Time PCR System
- Stratagene Mx3000P® and Mx3005P® Real-Time PCR Systems
- Stratagene Mx4000® Multiplex Quantitative PCR System

Simple, Sensitive Dye-Based qPCR with BRYT Green® Dye

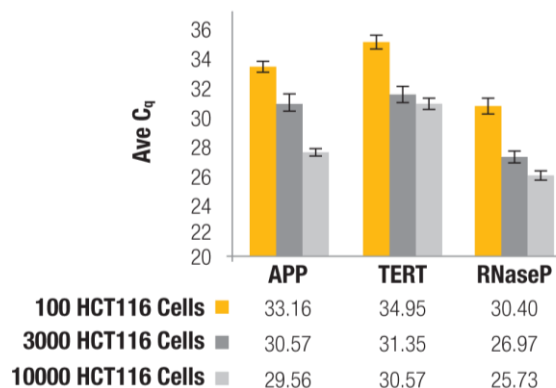
The **GoTaq® qPCR Systems** are ready-to-use, 2X master mixes containing BRYT Green® Dye, a fluorescent DNA binding dye with minimal PCR inhibition, providing maximum amplification efficiency and greater fluorescence enhancement than SYBR® Green I.

Rapid hot-start activation and processive enzymes make the GoTaq® Systems compatible with most real-time PCR instruments using standard or fast cycling..

Convenient Master Mixes for Quantitative Real-Time

- Ready-to-use mix of optimized components for dye-based qPCR
- Compatible with both fast and standard cycling methods
- Resistant to a wide range of PCR inhibitors

GoTaq® Dye qPCR from 3D Microtissues.



HCT116 cells were seeded at three different densities on GravityPLUS™ hanging drop 96-well plates (Insphero) to form microtissues. Purified gDNA was evaluated using the GoTaq® qPCR Master Mix (Cat. # A6001). The GoTaq® qPCR Master Mix was able to detect APP, TERT, and RNaseP from gDNA purified from three different microtissue densities using the ReliaPrep™ gDNA Tissue MiniPrep System.

Product	Cat. #	Size
GoTaq® qPCR Master Mix	A6001	5ml
	A6002	25ml

Google Scholar hits since 2023, “GoTaq qPCR” +



[spheroid](#)



[hydrogel](#)



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Compatible with these Instruments

For further details on instrument compatibility, please reference the appropriate Technical Manual. Instruments not listed may also be compatible—please enquire with Promega technical support for additional compatibility.

- Applied Biosystems ABI PRISM® 7000 and 7700 Sequence Detection System
- Applied Biosystems 7300 and 7900HT Real-Time PCR System
- Applied Biosystems GeneAmp® 5700 Thermal Cycler
- Applied Biosystems StepOne™ and StepOnePlus™ Real-Time PCR Systems
- Applied Biosystems 7500 and 7500 FAST Real-Time PCR System
- Bio-Rad CFX96 Real-Time PCR Detection System
- Bio-Rad DNA Engine Opticon® and Opticon® 2 Real Time PCR Detection Systems
- Bio-Rad iCycler® iQ™ and iQ™ 5 Real-Time PCR Detection System
- Bio-Rad/MJ Research Chromo4™ Real-Time Detector
- Bio-Rad MyiQ™ Real-Time PCR Detection System
- Cepheid SmartCycler® System
- Corbett Rotor-Gene™ 3000 and 6000 Real-Time Rotary Analyzer
- Eppendorf Mastercycler® ep realplex Real-Time PCR System
- Roche LightCycler® 480 Real-Time PCR System
- Stratagene Mx3000P® and Mx3005P® Real-Time PCR Systems
- Stratagene Mx4000® Multiplex Quantitative PCR System



ProNex® Size-Selective Purification System

Efficient, Accurate Size Selection

ProNex® Size-Selective Purification System

Efficient, Accurate Size Selection

The ProNex® Size-Selective Purification System enables the rapid and efficient magnetic resin-based purification of double-stranded DNA (dsDNA) for next-generation sequencing (NGS), polymerase chain reaction (PCR) and general molecular biology applications. The ProNex® System allows users to select the desired size of purified dsDNA fragments, from 100bp to 750bp. The novel reagent formulation provides significantly improved selectivity, reproducibility and yield relative to traditional dsDNA purification methods. In addition, the ProNex® System can be used in both manual and automated high-throughput workflows.

Product	Cat. #	Size
ProNex® Size-Selective Purification System	NG2001	10ml
	NG2002	125ml
	NG2003	500ml

Google Scholar hits since 2022, "ProNex" "size selection" +



[spheroid](#)

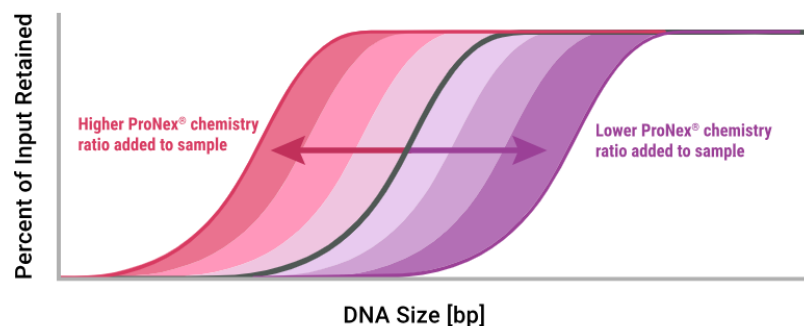


[hydrogel](#)



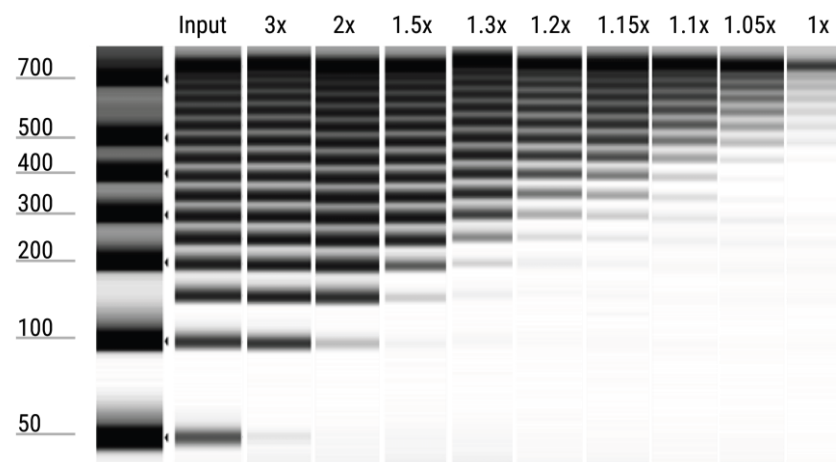
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Control the size the size of your DNA



By adding varying ratios of ProNex® Size Selection Chemistry to your sample, you can control what size DNA is retained or eliminated. This enables NGS library and PCR fragment cleanup, as well as dual size selection of libraries.

Sensitive, Accurate Single-Size Cleanup



ProNex[®] NGS Library Quant Kit

The most consistent NGS library quantitation kit

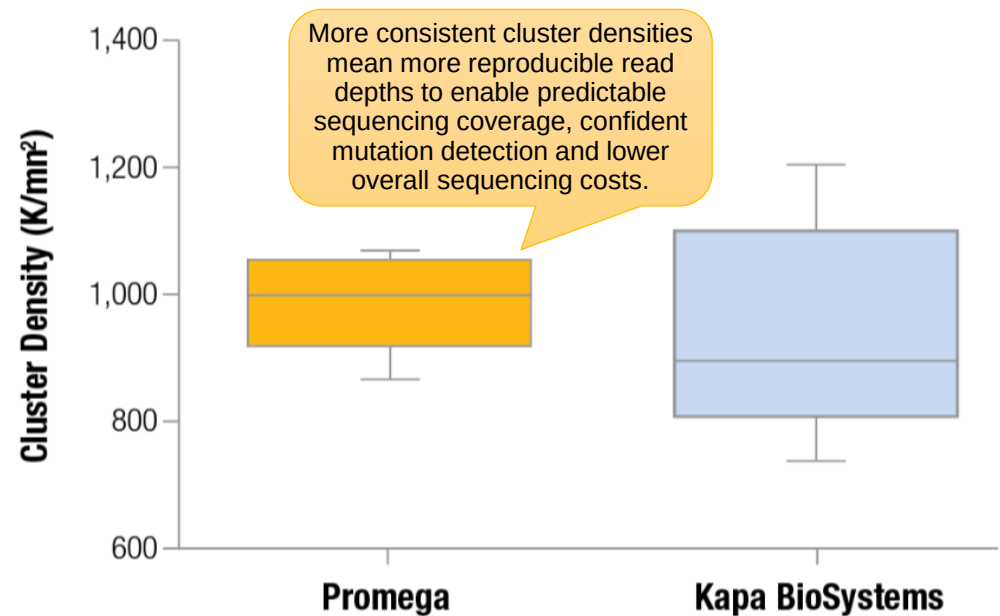
The **ProNex[®] NGS Library Quant Kit** contains reagents to determine the concentration of next generation sequencing libraries compatible with Illumina platforms using qPCR. Data generated using the ProNex[®] NGS Library Quant Kit can be used to normalize the DNA concentration for sequencing libraries to the desired concentration prior to multiplex pooling of samples. This is the most consistent NGS library quantitation kit you can get.

Product	Cat. #	Size
ProNex[®] NGS Library Quant Kit	NG1201	500 rxn



Learn more about the [ProNex[®] NGS Library Quant Kit](#)

Superior Precision and Reproducibility

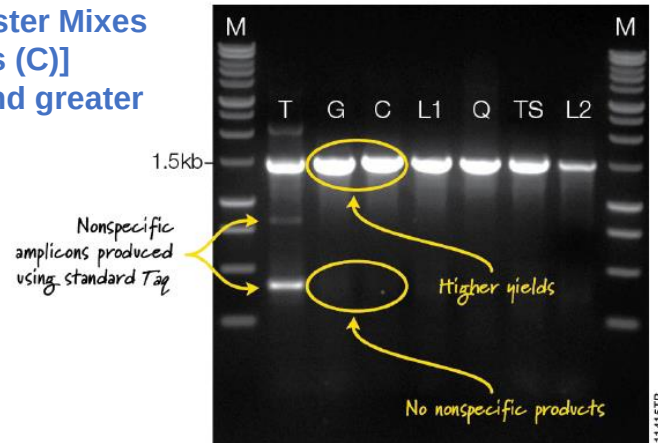


Illumina NGS libraries were quantified using either the ProNex[®] NGS Library Quant Kit or the KAPA Library Quantification Kit for Illumina (Kapa BioSystems). The determined concentrations were used to normalize and pool libraries (n=10 pools) prior to sequencing on an Illumina MiSeq instrument. Targeted cluster density was 1000K/mm². Cluster density was measured for all sequencing runs, showing significantly improved reproducibility when samples were quantified with the ProNex[®] system

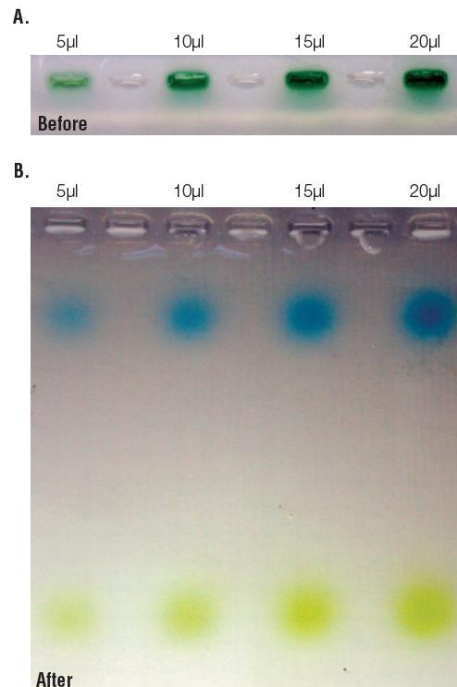
Standard, Endpoint PCR

The GoTaq® Family

GoTaq® G2 Hot Start Master Mixes [Green (G) and Colorless (C)] produce higher yields and greater specificity.



Green Reaction Buffers and Green Master Mixes offer direct gel loading convenience.



Product	Cat. #	Size
Hot Start PCR		
GoTaq® G2 Green Hot Start Master Mix	M7422	100 rxn*
GoTaq® G2 Colorless Hot Start Master Mix	M7432	100 rxn*
GoTaq® G2 Hot Start Polymerase	M7405	500u*
GoTaq® Long PCR Master Mix	M4021	100 rxn
Standard PCR		
GoTaq® G2 Green Master Mix	M7822	100 rxn*
GoTaq® G2 Colorless Master Mix	M7832	100 rxn*
GoTaq® G2 Flexi DNA Polymerase	M7805	500u*
Pfu DNA Polymerase	M7745	500u*

* other sizes available

Learn more about these and other [amplification products](#):



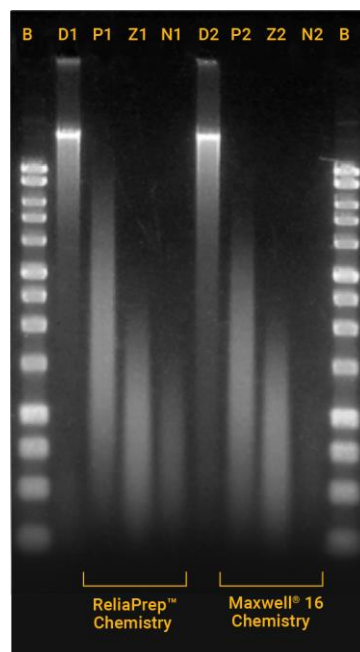
MethylEdge® Bisulfite Conversion System

Bisulfite Conversion for DNA Methylation Workflows

The **MethylEdge® Bisulfite Conversion System** provides a rapid, efficient method to perform bisulfite conversion with minimal DNA fragmentation in less than two hours. The rapid protocol and complete conversion mean that you can produce completely converted DNA ready for your choice downstream assays with minimal preparation and hands-on time. Coupled with purification chemistries and flexible, robust amplification technologies for detection, the MethylEdge® Bisulfite Conversion System delivers high-quality, intact converted DNA for your experiments.

- High-efficiency DNA conversion
- Robust conversion of DNA with reduced DNA fragmentation
- Rapid Protocol
- Room-Temperature, Ready-to-Use Reagents

This system can be used for the bisulfite conversion and cleanup of DNA. Applications for converted DNA include bisulfite-specific PCR (BSP), bisulfite sequencing (bis-seq), bisulfite-specific high-resolution melt and COBRA analysis.



MethylEdge® Bisulfite Conversion produces less fragmentation than competitor systems.

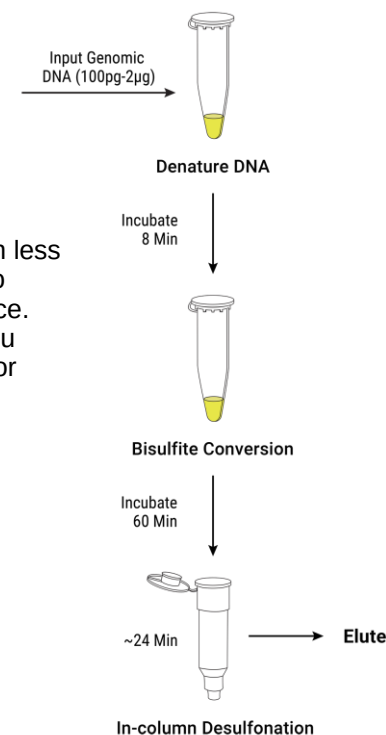
DNA was purified from whole blood using the ReliaPrep™ Blood gDNA Miniprep System (1) or Maxwell® 16 LEV Blood Kit (2) and was converted using the MethylEdge® Bisulfite Conversion System (P) or a competing bisulfite conversion kit (Z or N). B = BenchTop 1kb DNA Ladder, D = nonconverted, purified DNA.

Product	Cat. #	Size
MethylEdge® Bisulfite Conversion System	N1301	50 rxn

Learn more about the [MethylEdge® Bisulfite Conversion System](#):



Completely convert your DNA in less than 2 hours and go directly into your downstream assay of choice. This all-inclusive kit provides you with more intact, usable, DNA for any application including qPCR, arrays, and sequencing.



Human Cell Line Authentication

Authentication of human cell lines is now required or strongly encouraged by many journals and funding agencies.

examples



Misidentified or contaminated cell lines lead to invalidation of data as well as lost time, money and effort.



ICLAC

iclac.org

INTERNATIONAL CELL LINE AUTHENTICATION COMMITTEE

Highlights from the Register of Misidentified Cell Lines:

- The Register currently lists 582 cell lines.
- 76 cell lines do not correspond to the original donor...70 cell lines come from a different species.
- 146 different contaminants are listed. The commonest is HeLa (140 entries), followed by T-24 (21 entries) and M14 (18 entries).

How can I confirm the identity of my HUMAN cell lines?



ansi.org

ANSI Standard ASN-0002-2011 recommends the use of Short Tandem Repeats (STRs) for human cell line authentication.

- STRs are repetitive sequence elements 3–7 base pairs in length scattered throughout the human genome. By amplifying and analyzing these polymorphic loci, then comparing the resulting STR profile to that of a reference sample, the origin of biological samples such as cells or tissues can be identified and verified.
- STR testing is recommended when receiving a cell line from an unreliable source, after ten passages, when preparing a cell bank, and when in doubt of its origin or identity.

Learn more:

[Cell Line Authentication Guide](#)



[Authentication of Human Cell Lines by STR DNA Profiling Analysis](#)



GenePrint® 10 & 24 System and Spectrum Compact CE System

STR Profiling Workflow

Human Cells



DNA Extraction



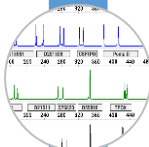
Multiplex PCR



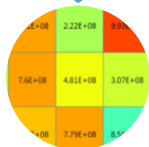
STR Allele Separation and Sizing



Data Analysis



Database Comparison



All or part of this workflow offered by CLA service providers which could include Genetic Core facilities.

[Learn More](#)



Product	Cat. #	Size
GenePrint® 10 System	B9510	50 rxns
GenePrint® 24 System	B1870	100 rxns

Both Systems are compatible with the Spectrum Compact CE System and with the Applied Biosystems® Genetic Analyzers.

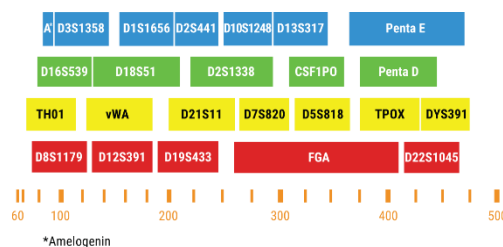
Panels and bins text files are required for automatic assignment of genotypes using the GeneMapper® and GeneMarker® software and are available for download. Please contact Promega Technical Services if you need assistance.



Bring *GenePrint® 10 or 24 System* analysis to your own lab with the [Spectrum Compact CE Instrument](#)

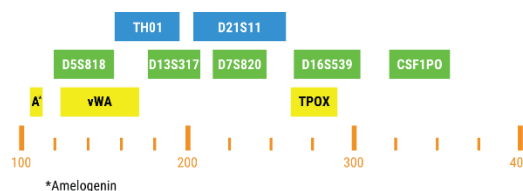
Recommended for patient-derived cell lines and meets the ASN-0002-2011 Guidelines

The *GenePrint® 24* System allows co-amplification and five-color detection of 24 loci



Generally sufficient for established cell lines

GenePrint® 10 provides co-amplification and four-color detection of 10 loci



Google Scholar hits since 2023, "GenePrint" +



[spheroid](#)



[hydrogel](#)



[organoid](#)





Detection Instruments

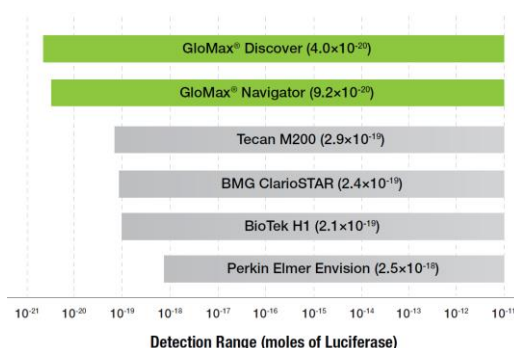
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GloMax® Detection Systems

The Readers Designed for Your Assays

Easy-to-Use, Luminescence Plate Reader

The **GloMax® Navigator** is an easy-to-use microplate luminometer integrated with Promega chemistries for superior luminescence assay performance. The GloMax® Navigator comes ready to use—simply unpack it, plug it in and begin your experiments. You can also interpret results using integrated data analysis software.



**GloMax® Instruments
are Designed
for Sensitivity**

Multimode Plate Reader with Maximum Flexibility

The **GloMax® Explorer** is a high-performance multimode detection instrument that allows you to get up and running quickly, generating the data you need from your experiments. Simply unpack it, plug it in, and begin your experiments. You can also interpret your results using integrated data analysis software. Developed with Promega reagents to provide a simple means of detecting advanced chemistries, the GloMax® Explorer measures luminescence, fluorescence intensity and visible absorbance. The GloMax® Explorer can be used as a standalone instrument or integrated into your high-throughput automated workflow.

Easy-to-Use Microplate Reader with Advanced Detection Capabilities

GloMax® Discover is a ready-to-use multimode plate reader developed with Promega reagent chemistries to provide a simple means of detecting luminescence, fluorescence and absorbance. This advanced plate reader provides flexible use of filters and includes **high-performance luminescence, fluorescence, UV-Visible absorbance, BRET and FRET, two-color filtered luminescence and kinetic measurement capabilities**. GloMax® Discover can be used as a standalone plate reading instrument or integrated into high-throughput automated workflows. Results are easy to interpret using integrated data analysis software.



Learn more about the
[GloMax® Family of
Microplate Readers](#)

GloMax® Detection Systems

The Readers Designed for Your Assays

Instrument	Luminescence	Fluorescence	Vis Absorbance	UV Absorbance	BRET/FRET
GloMax® Discover Model GM3000	✓	✓	✓	✓	✓
GloMax® Explorer Model GM3500	✓	✓	✓	230nm, 260nm, 280nm & 320nm	Optimized for NanoBRET™ Assays
GloMax® Explorer Model GM3510	✓	✓	Will read all Promega Colorimetric Assays		
GloMax® Navigator Model GM2000	✓	Will read all			

Will read all
Promega
Bioluminescent
Assays

Ask for a [GloMax® Demo](#) in your Lab!



96-well
Dual-Injector
options for each
instrument



Cat. # GM3030 shown for
GloMax® Discover or Explorer
Models and can be added
after purchase. Navigator
must be ordered with or
without dual-injectors

PC Tablet
interface on all
plate readers



GloMax® Navigator is a
workhorse 96-well luminometer



GloMax® Discover & Explorer
read 6- through 384-well plates



GloMax® Discover & Explorer
are Automation Ready

Maxwell® RSC Instruments

Isolate nucleic acids from 1-to-16 or 1-to-48 samples at once!

Maxwell® RSC Instrument

The **Maxwell® RSC Instrument** is a compact, automated nucleic acid purification platform that processes up to 16 samples simultaneously. Using prefilled cartridges and preprogrammed methods, the Maxwell® RSC offers consistent, reliable purification in 25–60 minutes, depending upon sample type. The intuitive graphical interface makes the instrument easy to use, and the integrated **Quantus™ Fluorometer** lets you collect purification and quantification data in one report.

Maxwell® RSC 48 Instrument

The **Maxwell® RSC 48 Instrument** is a compact, automated nucleic acid purification platform that processes up to 48 samples simultaneously. Using Maxwell® RSC prefilled cartridges, the Maxwell® RSC 48 Instrument brings the same consistent, reliable purification of DNA or RNA from a variety of sample types and a higher throughput. The intuitive graphical interface makes the instrument easy to use. The integrated vision system with its large LED indicator reduces the potential for user error by detecting proper cartridge placement and lets you know before a run starts if there is an issue. An integrated **Bar Code reader** makes it easy to track samples.

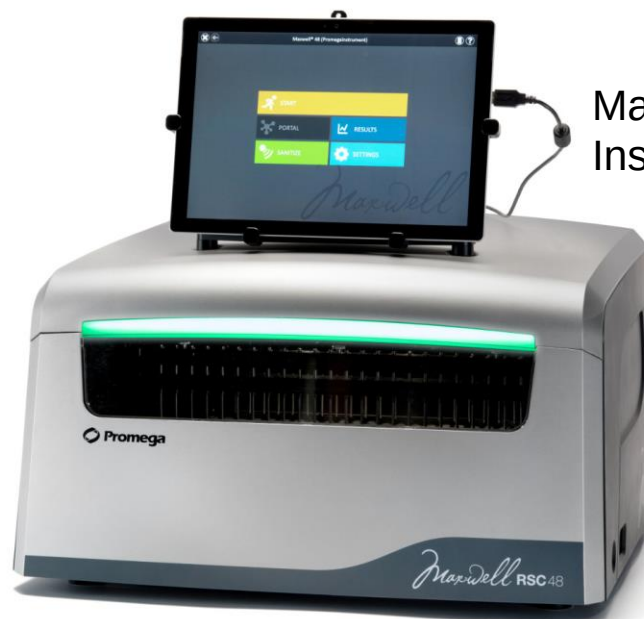
High-quality nucleic acids with less hands-on time

Maxwell® RSC
Instrument

Quantus™
Fluorometer



Maxwell® RSC 48
Instrument

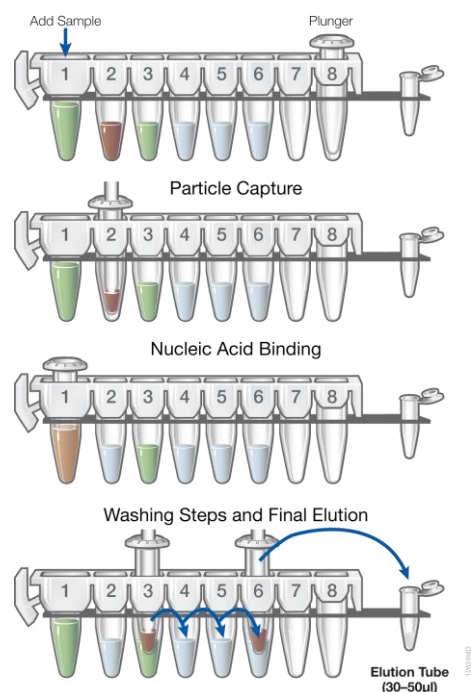


Bar Code
Reader

Maxwell® RSC Instruments

Isolate nucleic acids from 1-to-16 or 1-to-48 samples at once!

General Scheme for any Maxwell® RSC Purification



Request a [Demo](#) in your Lab!



No clogging worries with a paramagnetic particle mover

The Maxwell® RSC System starts with cartridges prefilled with reagents and paramagnetic particles, ready for your samples. After sample addition, the Maxwell® RSC moves the paramagnetic particles and associated nucleic acids through multiple steps ultimately yielding highly pure RNA or DNA in 30–100µl.

Because the Maxwell® RSC is a magnetic particle mover, not a liquid handler, it offers advantages over other automated systems. There is minimal risk of cross-contamination because no liquid handling or splashing happens during sample processing. With no clogs and fewer breakdowns, there are fewer disruptions to your workflow.



Quantus™ Fluorometer

Highly sensitive, affordable, single-tube fluorometer

The **Quantus™ Fluorometer** is a compact, dual-channel fluorometer designed to provide highly sensitive fluorescent detection when quantifying nucleic acids. The Quantus™ Fluorometer is optimized with preprogrammed settings for Promega QuantiFluor® Dye Systems (QuantiFluor® dsDNA, RNA and ssDNA Systems) to quantitate nucleic acids and offers the flexibility to create customized methods and quantitation settings for other fluorescent dyes.



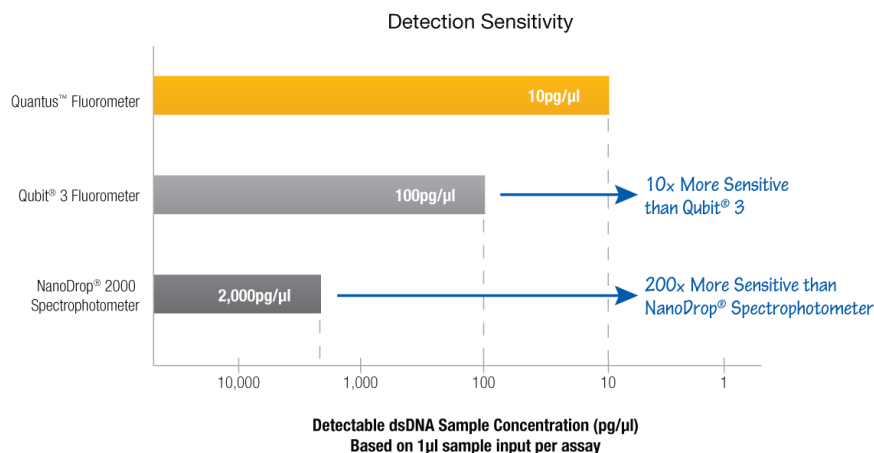
Features

- Easy, intuitive controls
- Calculate concentration automatically
- Store the last 50 readings and transfer data in real time
- Recommended for NGS and compatible with Illumina (HiSeq/miSeq), Roche (454) and Life Tech (ion Torrent and ion Proton) Systems

- 1 Two fluorescent channels**
 - **Red:** Ex: 640nm shortpass (wavelengths up to 640nm); Em: 660-720nm
 - **Blue:** Ex: 495nm shortpass (wavelengths up to 495nm); Em: 510-580nm
- 2 Easily customize sample names, view concentration results, raw values, sample volumes and a quality check.**
- 3 Compact size at only 22.7 x 11.5 x 4.5cm**
- 4 Large 3-inch liquid crystal display**
- 5 Intuitive navigation**

Quantus™ Fluorometer

Highly sensitive, affordable, single-tube fluorometer



Fluorescence-based nucleic acid quantification methods are more sensitive than absorbance-based methods, allowing you to quantitate low-level DNA samples accurately.

Learn about the
[Quantus™ Fluorometer](#)



Product	Cat. #	Size
Quantus™ Fluorometer	E6150	each
Quantus™ NGS Starter Package	E5150	each
- Quantus™ Fluorometer - QuantiFluor® ONE dsDNA System (500 rxn) 0.5ml PCR Tubes (10 x 50)		

Quantus™ NGS Starter Package



Learn about the [Quantus™ NGS Starter Bundle](#)



Spectrum Compact CE System

Benchtop, Personal CE System

The **Spectrum Compact CE System** is an integrated and efficient instrument that brings you the independence to perform Sanger sequencing and fragment analysis in your laboratory, under your control, and at your convenience.

It is designed for use with existing sequencing chemistries using fluorescently labeled dideoxynucleotide triphosphate and 4-, 5- and 6-dye commercially available STR kits. It also supports the next generation of 8-color STR kits.

- Personal, bench top CE instrument
- Both Sanger sequencing and fragment analysis
- 4 capillary (36cm)
- 32 samples (4 X 8-Well Strip tubes)
- 4, 5, 6, and 8-color detection
- Compatible with existing fluorescently labeled ddNTP sequencing chemistries
- Easy, wizard-like operation and snap-in independently packed consumables, for more efficient management
- Compatible with most existing chemistry and analysis software (.fsa and .ab1)

Take a [Virtual Tour](#) of the Spectrum Compact



Optimized For a Broad Range of Sequencing and Fragment Analysis Applications

Sanger Sequencing

- De novo sequencing
- NGS confirmation
- Resequencing
- Mutation detection
- Mitochondrial sequencing

Fragment Analysis

- DNA Profiling
- Microsatellites
- PCR sizing
- and many more..

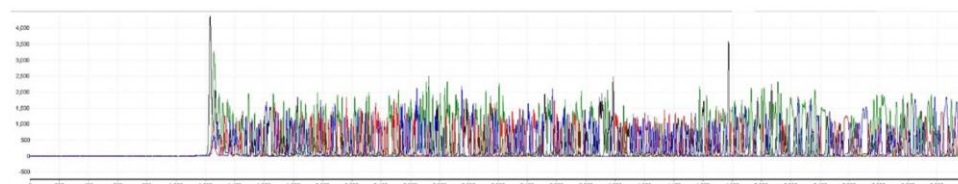


Spectrum Compact CE System

Benchtop, Personal CE System

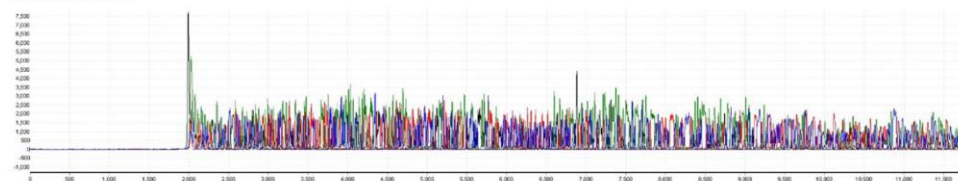
More Bases in Less Time

Fast Mode



At least 600 bases with a run time of around 30 minutes

Standard Mode



At least 800 bases with a run time of around 60 minutes

Raw view of entire electropherogram using the ProDye™ Terminator Sequencing System.

- Free access to **GeneMarker® HID Software** for Spectrum CE Systems which supports data analysis with all commercially available human identity kits.
- Free access to **ProView™ Sequencing Software**, a customizable viewer of Sanger sequencing data.

[Learn More...](#)



An Affordable Benchtop Instrument for Sanger Sequencing and Fragment Analysis

- 8-dye-compatible CE analysis
- Single-base resolution
- Integrated touch screen operation
- Plug-and-Play prefilled consumables

Product	Cat. #	Size
Spectrum Compact CE System, 4 capillary	CE1304	each
Spectrum Compact Starter Pack All the reagents necessary to start using the Spectrum Compact CE System. All available separately.	CE1307	each

Sanger Sequencing Chemistry for Capillary Electrophoresis Platforms

- Easily implemented with the same protocol, workflows and calibration
- Designed for a wide range of sequencing applications
- Provides enhanced productivity while reducing costs

Product	Cat. #	Size
ProDye™ Terminator Sequencing System	CR4324	24 rxns
	CR4302	200 rxns
	CR4310	1,000 rxns

GloMax[®] Galaxy Bioluminescence Imager

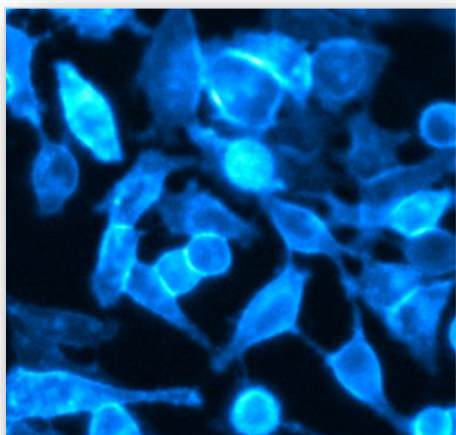
Affordable Functional Imaging of NanoLuc[®] Technologies

Easy-to-Use Bioluminescent Microscope to Study Dynamic, Functional Biology

Collect publication-quality images with the **GloMax[®] Galaxy**, a high-performance bioluminescent imager enabling you to study dynamic biology using live-cell microscopy with bioluminescence, fluorescence and brightfield capabilities. The GloMax[®] Galaxy is an affordable imaging option that allows you to get the most out of Promega's NanoLuc[®] technologies.

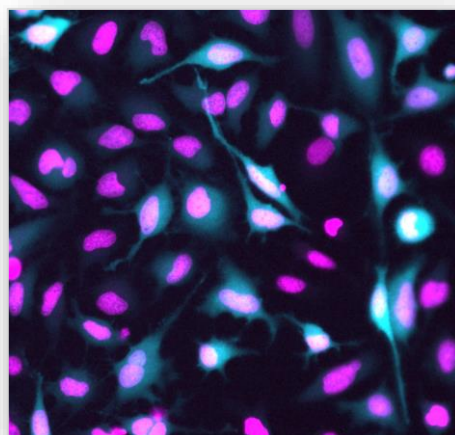


Image Low Abundance Endogenous Proteins



HeLa cells expressing endogenous EGFR-HiBiT (blue, detected with bioluminescence). The GloMax[®] Galaxy enables imaging of physiologically relevant cellular biology.

Overlay Fluorescence with Luminescence Images



HeLa cells expressing endogenous Cofilin-HiBiT (cyan, detected with bioluminescence) were counterstained with Hoechst 33342 (magenta, detected with fluorescence). The GloMax[®] Galaxy enables characterization of assay biology alongside common cellular reference markers.

Coming Soon 2024!

TARGET SPECIFICATIONS

TARGET SPECIFICATIONS	
Sample Vessels	Slide, microchamber, 35mm dish, 6, 12, 24, 48, and 96-well plates
Capture Modes	Luminescence, BRET, Fluorescence, and Brightfield
Excitation Source	LED, transillumination
Objective	Nikon 20X Plan APO Lambda D, 0.75 NA, 1mm WD
System Magnification	10.3X
Sensor and Pixel Size	CMOS, 7mega pixel, cooled to -25°C, low noise, >70% quantum efficiency, 4.5µm x 4.5µm pixel size, up to 60minute exposure
Pixel Size	3200x2200 pixels, 4.5µm x 4.5µm pixel size
Maximum Field of View	1.4mm x 0.95mm
Resolution Limit	1.3 to 2.0µm
Maximum Exposure	60 minutes
Digital Zoom	Up to 100X
Focus Mechanism	Motorized, with manual focus to sub-micron resolution (0.3125µm)
Environment Control	Optional: Stage-top chamber and Controller with built-in gas mixer

Study Dynamic, Functional Biology:

- Protein localization & translocation
- Protein degradation & stability
- Protein:protein interactions
- Target engagement
- Live cell kinetics
- Rare cellular events
- Mixed cell populations



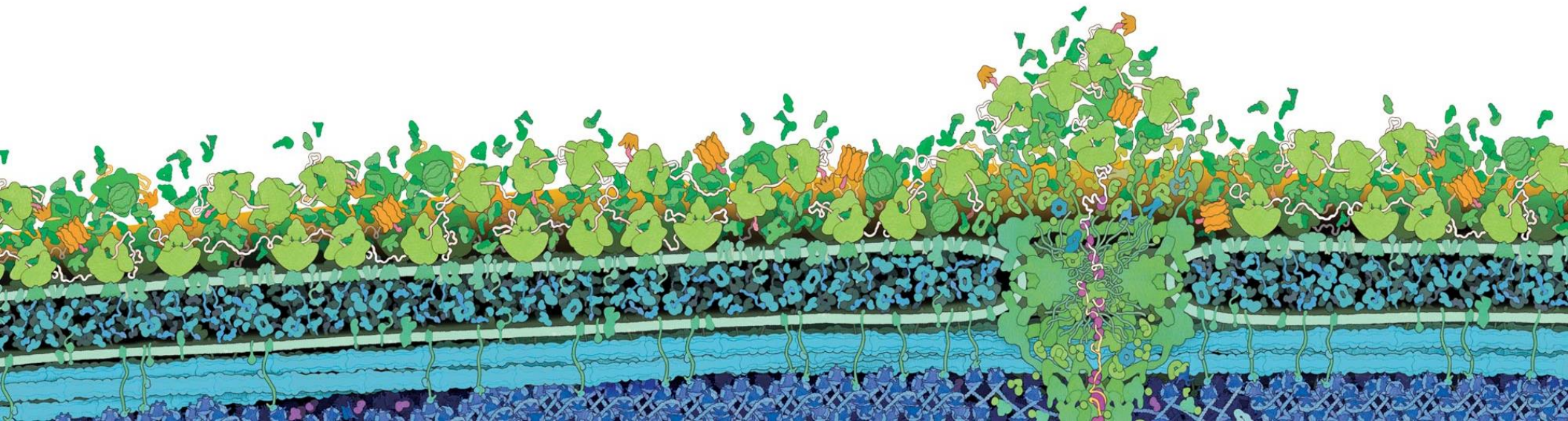
Additional Resources

Custom & Bulk Ordering

Custom Assay Services

Integration Support

Questions Answered





Additional Resources

Need it Customized?



We can help!

- Custom products
- Custom dispensing
- Bulk quantities.
- OEM solutions, too.

Custom and Bulk Ordering Available!

Ask your Promega Representative

or visit

www.promega.com/custom

Need a Special Assay?



Cell Engineering

Target expression in both normal & disease states

Assay Development & Qualification

Target class expertise & multiple assay formats

Assay Ready Cells in-scale

Pharmacological validation & unparalleled client support

Tailored R&D Solutions

General Inquiries:

TailoredSolutions@promega.com

On the Web:

www.promega.com/custom-solutions/tailored-solutions/



Additional Resources

**You are not alone!
Integration Support**

**Contact
FSS@promega.com**

**Automate Promega
technologies on robotic
platforms such as Tecan,
Beckman, Hamilton,
Eppendorf, etc.**

Need it Automated?



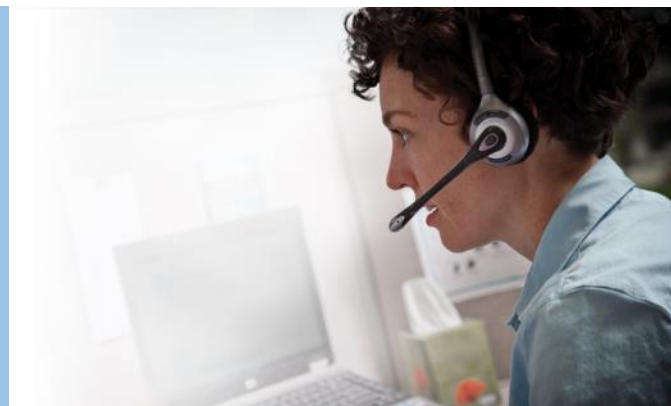
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online chat away...**

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- **Customer Services**
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