Agilent
Trusted Answers

Agilent xCELLigence Real Time Cell Analyzer

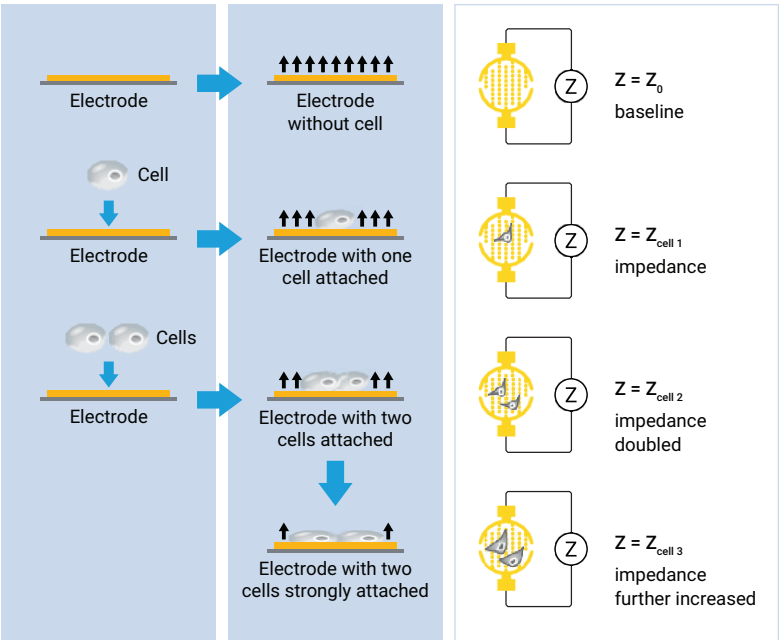
RTCA S16 - a pilot scale instrument for label-free cell monitoring

The xCELLigence RTCA S16 system uses biosensors to continuously monitor live cell proliferation, morphological changes, and attachment quality in a label-free and real-time manner. The instrument operates in a standard CO_2 cell-culture incubator while the control unit is housed outside the incubator. User-friendly software enables real-time control and monitoring with real-time data analysis functions.

Impedance-based biosensor technology

The functional unit of a cellular impedance assay is a set of gold electrodes fused to the bottom surface of a microtiter plate well. The presence of adherent cells affects the local ionic environment at the electrode-solution interface, leading to an increase in cellular impedance. The magnitude of this impedance is dependent on the number of cells, their size and shape, cell barrier function formation, and the cell-substrate attachment quality.

Thus, electrode impedance, displayed as Cell Index (CI) values, can be used to monitor cell viability, number, morphology, and adhesion in several cell-based assays. In addition, the electronic signal (22 mV) used is noninvasive to the living cells and has no effect on cell health or behavior.



Simple, compact, convenient

The xCELLigence RTCA S16 system consists of two components: the control unit and RTCA S16 instrument. The RTCA S16 includes one integrated plate cradle to measure cell responses.

Agilent xCELLigence Control Unit with state-of-the-art software

- Simple assay setup
- Streamlined real-time data acquisition and analysis
- Powerful immunotherapy analysis tools
- Support for 21 CFR Part 11 compliance

Agilent RTCA E-Plate

- Biocompatible biosensor
- Glass or PET substrate
- Compatible with co-culture devices

Agilent xCELLigence RTCA S16 instrument

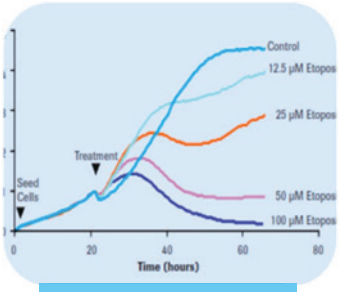
- High sensitivity
- High temporal resolution (3.2 seconds)
- Validated performance
- Designed for culture incubators

Experience the advantages of real-time cell monitoring using the RTCA S16

Simply add cells to the E-Plates and start monitoring cell number, proliferation rate, cell size, shape, and cell-substrate attachment in real time.

Seed cells (label-free)

Real-time monitoring at physiological conditions

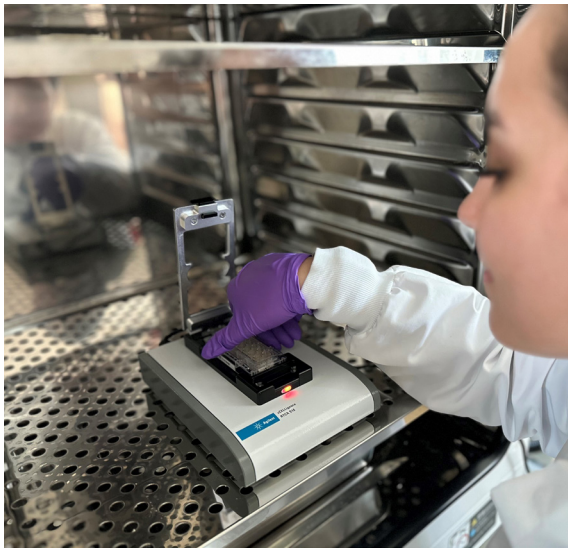


Automated recording of kinetic response curves

The RTCA S16 instrument offers high flexibility for cell science researchers carrying out parallel short-term (hours) and long-term (days) assays using label-free, noninvasive real-time impedance monitoring. Dynamic, continuous cell analysis goes far beyond end-point analysis, enabling significantly better insight into the functioning and behavior of your cells. Multiple 16-well plate formats and predefined assay templates provide options without the time-consuming hassle of traditional assays.

Features

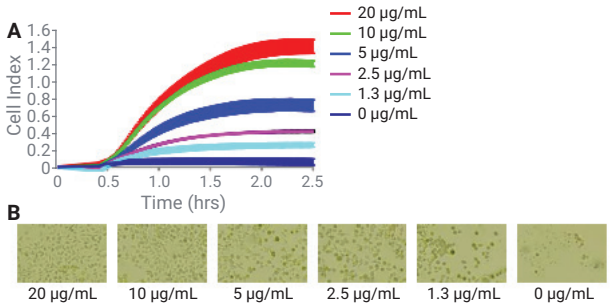
- 16-well format suited for assay development and optimization
- Simply seed cells and start monitoring
- Operates in a standard CO_2 incubator for consistent physiological conditions
- User-friendly software, including EC_{50}/IC_{50} and % cytolysis plotting
- Highly sensitive, reproducible, and direct assays for immune cell killing, viral CPE, cytotoxicity, adhesion, cell signaling, barrier function, and more



Application highlights

Cell adhesion and spreading

- Real-time monitoring of cell adhesion and spreading.
- Label-free assay requires no fixation, staining, or sample processing.
- Easy quantification of adhesion and spreading kinetics.
- Rapid optimization of cell density and extracellular matrix coating conditions.



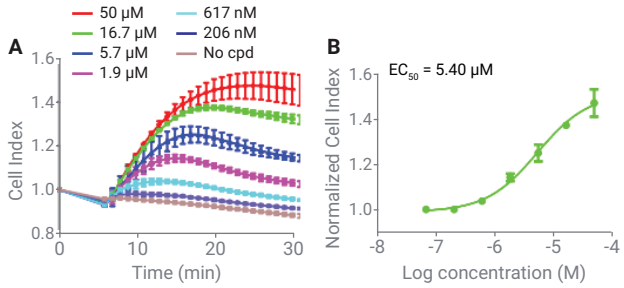
C

Col IV Conc. (µg/mL)	Max. CI	TR (CI, 50%)	SR CI
20	1.41	0.98	1.17
10	1.22	0.92	1.20
5	0.73	0.90	0.84
2.5	0.42	0.85	0.45
1.3	0.26	0.74	0.31
0	0.07	0.48	0.20

Dynamic monitoring of cell attachment and spreading.

Functional monitoring of GPCR signaling

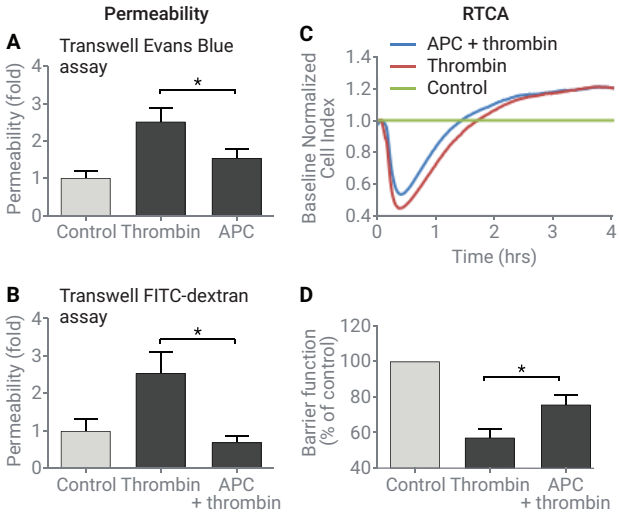
- Assay endogenous GPCRs with primary cells, stem cells, and other disease relevant cell lines.
- Simultaneous screening of GPCR function across all coupling classes.
- Detection of traditionally difficult classes.
- Detection of functional selectivity and de-orphaning GPCRs.



Pharmacological study of endogenous histamine GPCR function.

Cell barrier function

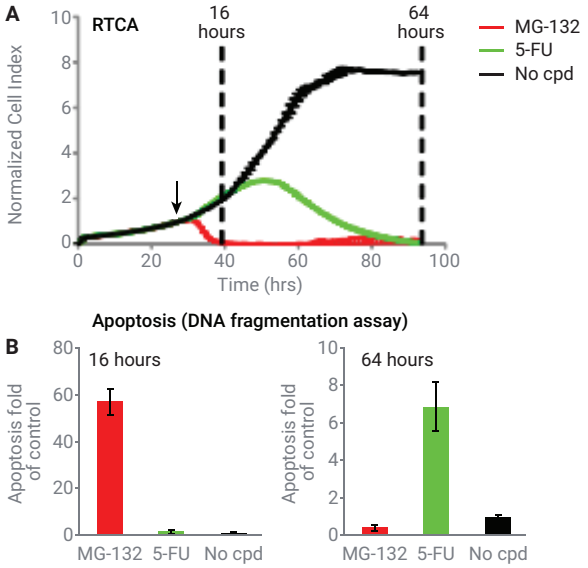
- A label-free alternative to solute permeability and transendothelial electrical resistance (TEER) assays.
- Real-time assay is conducted under normal tissue culture conditions, enabling monitoring of barrier function disruption and recovery.
- Noninvasive nature of the readout allows for orthogonal assays conducted on the same device, including visual monitoring of cell density by microscopy.



The protective effect of Activated Protein C on endothelial barrier function assessed by solute permeability assays and RTCA platform.

Compound-mediated cytotoxicity

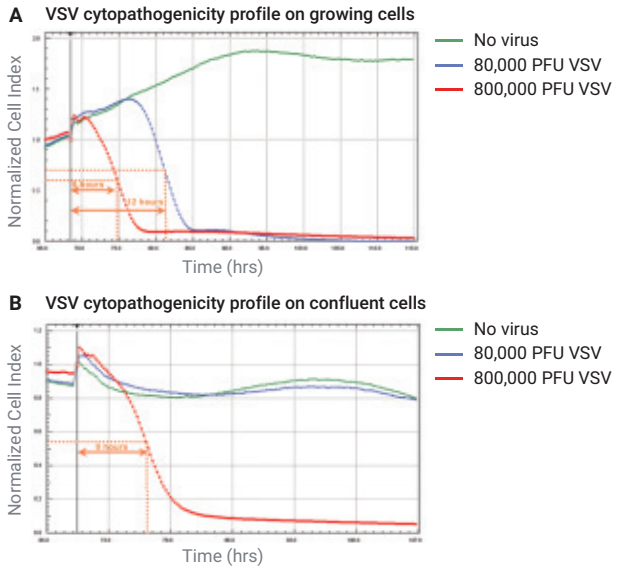
- Real-time data allow identification of optimal times for compound treatment and data collection.
- The noninvasive assay is performed in a tissue culture incubator, enabling analysis by standard viability assays.



Dynamic monitoring of compound mediated cytotoxicity and apoptosis.

Virus-mediated cytopathogenicity

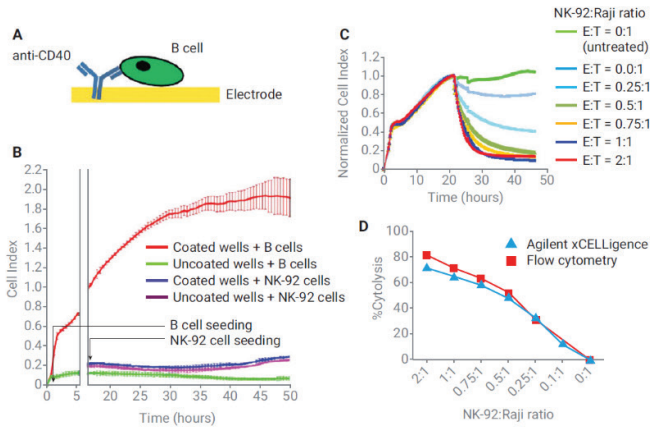
- A simple alternative method to the plaque assay to measure virus lytic activity.
- Provides quantitative information about viral-mediated cytopathic effects (CPE) onset and kinetics.
- Rapidly identify the optimal viral titer and assay timepoint for screening of inhibitory compounds, neutralizing antibodies, and neutralizing serums.



Dynamic monitoring of HEK 293 cells during viral infection.

Cell-mediated and antibody-dependent cell-mediated cytotoxicity (ADCC)

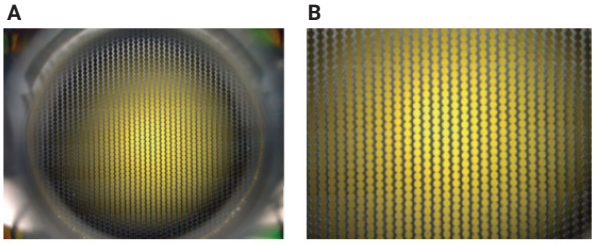
- Real-time monitoring of cell-mediated cytotoxicity and ADCC.
- Optimized for both adherent and liquid tumors.
- Direct, sensitive, and specific measurement of target cell changes.
- Homogenous assay for easy quantification of cytotoxic response kinetics, both short and long-term.
- Rapid cell density and effector/target ratios optimization.



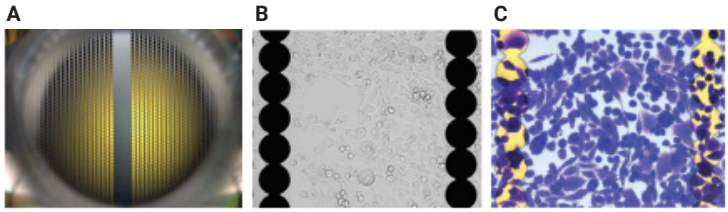
Multiple 16-well plate formats are available to accommodate different needs

E-Plate 16/E-Plate 16 VIEW/E-Plate PET

Gold biosensors enable dynamic monitoring in a label-free manner. E-Plates are single-use, disposable devices used to perform cell-based assays on xCELLigence instruments. Plate dimensions and well spacing are similar to industry standards. Gold biosensors cover approximately 80% of the well bottom. This design enables large populations of cells to be monitored simultaneously, providing a sensitive read-out of dynamic changes in cells' physical properties. The view plate provides a sensor-free window for imaging-based orthogonal assay. As an alternative to glass, polyethylene terephthalate (PET) plates are also available.



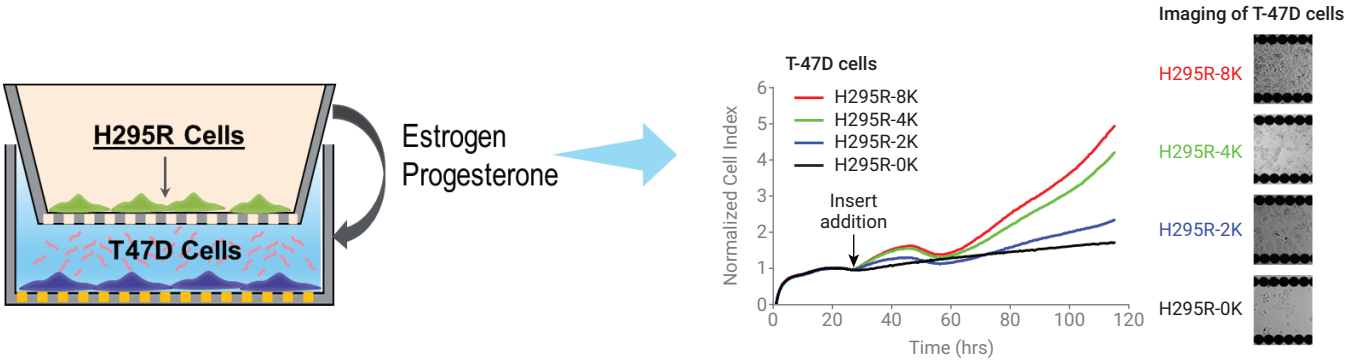
(A) View looking down into an E-plate well. (B) Zoomed in view of E-Plate biosensors.



(A) View looking down into an Agilent E-Plate VIEW well. (B,C) Views of cells within the biosensor-free region.

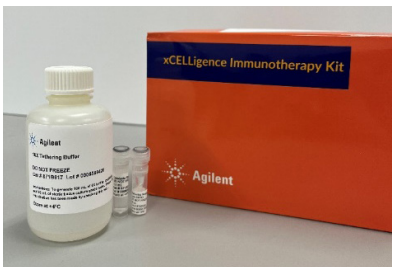
E-Plate insert 16 (co-culture device)

The E-Plate Insert enables investigation of specific cell-cell interactions in real time, while maintaining the cells in separate compartments. The 16-well insert is compatible with all E-Plate formats.



xCELLigence Immunotherapy kits

Use xCELLigence Immunotherapy kits with your real-time cell analysis system for a noninvasive solution to a broad range of liquid cancer immunotherapies and suspension tumor cell killing applications. Determine the potency of immune cells against liquid tumors *in vitro*.



Liquid Tumor Tethering Specificity	Effector Cells	Target Cells
anti-CD40	NK-92, CAR-T, primary CD8+ T cells	Daudi, Raji, Ramos, MEC2
anti-CD29	NK-92	K562, HEL 92.1.7
anti-CD19	NK-92, primary CD8+ T cells	Raji
anti-CD9	NK-92	NALM6, RS4;11, RPMI 8226
anti-CD71	NK-92	K562

Product specifications

RTCA S16 Instrument	
	+5 VDC, 1 W maximum
Electronic switch resistance	2 to 5 Ω
Electronic interface	Handling one E-Plate 16 device
Communication	USB 2.0
Environment	Temperature: 20 to 40 °C Relative humidity: 98% maximum noncondensing
Output test signal	22 mV rms ±(2% +5 mVrms) at 10, 25, and 50 kHz
Impedance measure accuracy	±(1% + 1.5 Ω)
Impedance measurement repeatability	0.8%
Impedance dynamic range	10 to 5,000 Ω
Status indicators	Instrument status

E-Plate 16	
Dimensions	4.0 cm × 8.7 cm × 1.96 cm (W × D × H, with cover)
Well spacing	9 mm center-to-center as per ANSI/SBS 4-2004 standard
Well volume	270 ±10 µL
Well bottom diameter	5.0 ±0.075 mm
Electrical interface	Compatible with RTCA S16 and DP Instrument
Sensor impedance	17 ±5 Ω at 10 kHz, when measured with a 1x PBS solution
Materials	Polystyrene well plate, glass sensor substrate, UV irradiated
Environment	Temperature: 15 to 40 °C, relative humidity: 98% maximum noncondensing

E-Plate VIEW 16	
All E-Plate 16 specifications apply	
Viewing window	Four center electrodes removed to aid in microscopy (~400 µm width)

E-Plate 16 PET	
All E-Plate VIEW 16 specifications apply, except:	
Materials	Polystyrene well plate, PET sensor substrate, UV irradiated

E-Plate Insert 16	
Dimensions	7.02 cm × 1.7 cm × 1.11 cm (W × D × H)
Well format	16-well (8 × 2) format as per ANSI/SBS 4-2004 standard for 96-well microplates
Well volume	95 µL ±10%
Membrane material	PET
Membrane area	5.4 mm^2 ±12%
Pore size	0.4 ±0.1 µm
Pore density	8×10^7 to 1.5×10^8 pores/cm^2, UV irradiated
Environment	Temperature: 15 to 40 °C Relative humidity: 98% maximum noncondensing

Ordering information

Description	Pack Size	Part No.
Agilent xCELLigence RTCA S16 Bundle	1 RTCA S16 instrument, 1 control unit, 3 RTCA Software Pro basic single license keys, and E-Plate 16 PET (1 x 6 plates)	380601310
E-Plate 16 PET	1 × 6 plates	300600890
E-Plate 16 PET	6 × 6 plates	300600880
E-Plate VIEW 16	1 × 6 plates	300601140
E-Plate VIEW 16	6 × 6 plates	300601150
E-Plate 16	1 × 6 plates	5469830001
E-Plate 16	6 × 6 plates	5469813001
E-Plate Insert 16	1 × 6 units	6465382001
IMT assay (anti-CD40) sample kit	Tethering reagent (90 µL), buffer and cytolysis reagent (for up to 12 × 16 well E-Plate)	8100006
IMT assay (anti-CD29) sample kit	Tethering reagent (45 µL), buffer and cytolysis reagent (for up to 12 × 16 well E-Plate)	8100009
IMT assay (anti-CD19) sample kit	Tethering reagent (90 µL), buffer and cytolysis reagent (for up to 12 × 16 well E-Plate)	8100012
IMT assay (anti-CD9) sample kit	Tethering reagent (90 µL), buffer and cytolysis reagent (for up to 12 × 16 well E-Plate)	8100015
IMT assay (anti-CD71) sample kit	Tethering reagent (90 µL), buffer and cytolysis reagent (for up to 12 × 16 well E-Plate)	8100018
RTCA Software Pro, basic single license key S16	1 license	310100210
RTCA Software Pro, IMT single license key S16	1 license	S2807-90033
RTCA Software Pro, compliance single license key	1 license	S2807-90004
RTCA software virology single license	1 license	S2807-90089

Agilent Value Promise

We guarantee at least 10 years of instrument life with 7 years of guaranteed support. If you have aging equipment, our CrossLab Extended Services plan provides diagnostics, repairs, maintenance, and education services with consistent quality. Our engineers use the latest tools and procedures and, of course, genuine Agilent parts.

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