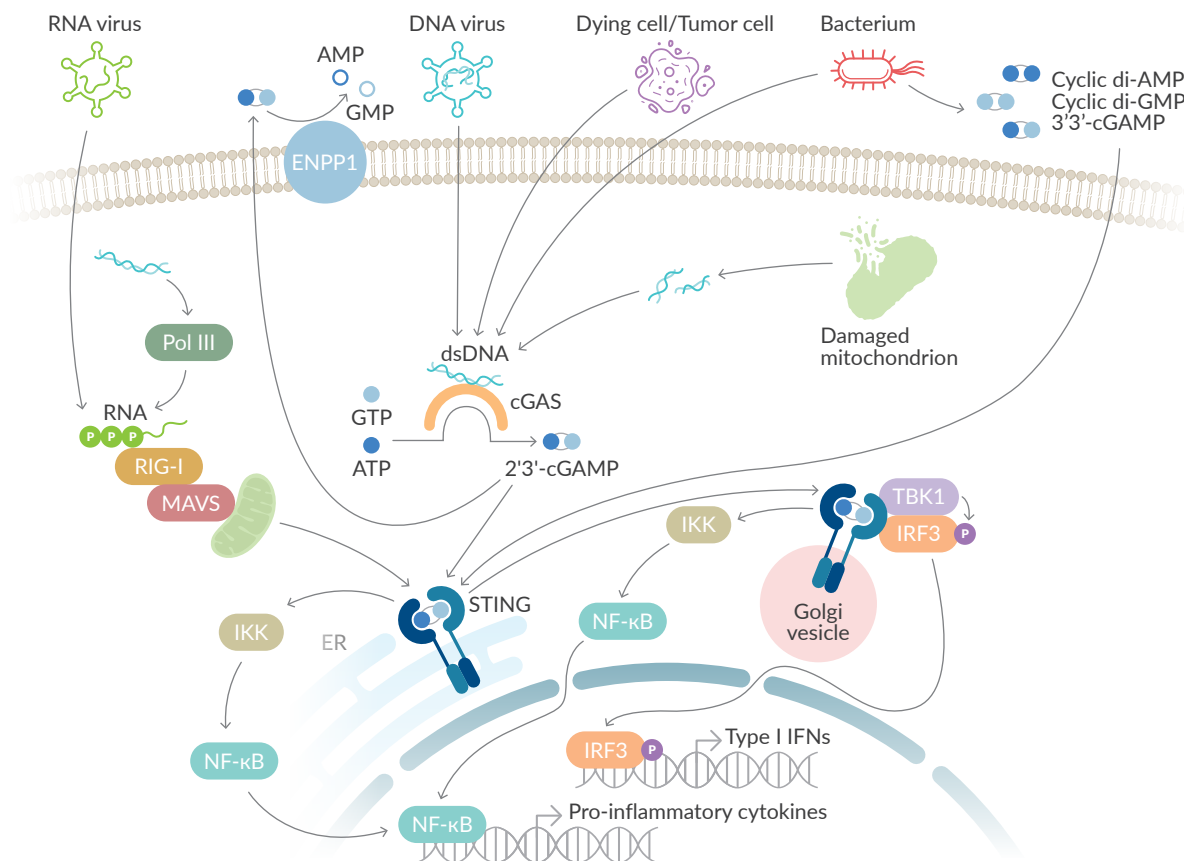


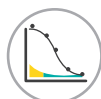
# STING Signaling Pathway

Cayman offers a dedicated tool set to study stimulator of interferon genes (STING), a central mediator of the innate immune response that induces the expression of various interferons (IFNs), cytokines, and T cell recruitment factors and has the potential to enhance the initial anticancer response. Products include cyclic dinucleotides (CDNs), recombinant STING variants, ELISA kits, agonists, inhibitors, and additional key pattern recognition receptor proteins and antibodies to study this area of therapeutic interest.



Detection of nucleic acids by the cytosolic pattern recognition receptors cGAS and RIG-I leads to STING activation and the induction of innate immune responses, including the production of type I IFNs and pro-inflammatory cytokines. Upon recognition of cytosolic DNA, cGAS produces the CDN 2'3'-cGAMP which, along with several bacterial CDNs, can directly activate STING. Hydrolysis of extracellular 2'3'-cGAMP by ENPP1 attenuates cGAS-STING signaling. RIG-I is an RNA sensor that signals through the adaptor protein MAVS to trigger STING signaling.

## Discover Cayman's STING Research Tools Inside!



### High-sensitivity Assays

Cyclic Dinucleotide ELISA Kits



### Well-characterized Proteins

cGAS, STING Variants, & More



### Wide Range of Biochemicals

Small Molecule Agonists & Antagonists



### High-quality & Specific Antibodies

cGAS, STING, TBK1, RIG-I, MAVS, & More

# Cytosolic Nucleic Acid Sensing

Specific cytosolic pattern recognition receptors detect DNA or RNA from invading microbes or host cells and generate innate immune responses. Cayman has developed tools to study this process that leads to activation of the type I IFN and NF- $\kappa$ B pathways.

## Cytosolic DNA Sensor

Item No.	Product Name
22810	cGAS (human, recombinant)
23853	cGAS Monoclonal Antibody (Clone 5G10)

## Cystolic RNA Sensor & Adaptor Protein

Item No.	Product Name
25620	RIG-I helicase domain (human, recombinant)
25300	RIG-I Monoclonal Antibody (Clone 1E3)
26355	MAVS Monoclonal Antibody (Clone 7B9)

## CDNs & Negative Controls

Item No.	Product Name
17753	Cyclic di-AMP (sodium salt)
17144	Cyclic di-GMP (sodium salt)
22485	Cyclic di-IMP (sodium salt)
33890	Cyclic di-UMP (sodium salt)
22419	2'2'-cGAMP (sodium salt)
19887	2'3'-cGAMP (sodium salt)
39608	2'3'-cGAMP-d <sub>8</sub> (ammonium salt)
17966	3'3'-cGAMP (sodium salt)
33886	5'-pApA (sodium salt)
33889	5'-pGpG (sodium salt)

## Tools to Study cGAS Activity

Cayman offers robust, easy-to-use assays to screen modulators of human cGAS. Active cGAS enzyme, substrates, and positive control inhibitor are provided to screen for inhibitors.

### cGAS Inhibitor Screening Assay Kit

Item No. 701930

- Uses a competitive ELISA platform to directly measure 2'3'-cGAMP as an indicator of cGAS activity

### cGAS TR-FRET Inhibitor Screening Assay Kit

Item No. 702120

- Uses a homogenous TR-FRET platform compatible with high-throughput screening applications



Learn more about our assays to study cGAS activity and screen for inhibitors at [www.caymanchem.com/cgasassays](http://www.caymanchem.com/cgasassays)

## cGAS Inhibitors

Item No.	Product Name
31029	CU-32
31030	CU-76
28318	G150
32515	PF-06928215
31765	RU-521

## Sensitive, Accurate Quantification of Cyclic Dinucleotides

Cayman, in collaboration with Biolog Life Science Institute, has developed highly sensitive competitive immunoassays for specific and reliable detection of 2'3'-cGAMP, 3'3'-cGAMP, 3'2'-cGAMP, cyclic di-GMP, and cyclic di-AMP. By monitoring CDN levels in biological samples, these assays can be used to identify compounds that modulate CDN synthesis, degradation, & signaling.

Item No.	Product Name	Summary
501700	2'3'-cGAMP ELISA Kit	Measure 2'3'-cGAMP in cell lysates, plasma, serum, and tissue
502340	3'2'-cGAMP ELISA Kit	Measure 3'2'-cGAMP in fruit fly homogenates and bacterial lysates
502130	3'3'-cGAMP ELISA Kit	Measure 3'3'-cGAMP in bacterial and mammalian cell lysates and cell supernatants
501960	Cyclic di-AMP ELISA Kit	Measure cyclic di-AMP in bacterial cell lysates
501780	Cyclic di-GMP ELISA Kit	Measure cyclic di-GMP in bacterial cell lysates

# STING Regulation

STING binds to CDNs, activating signals that stimulate IFN genes. Cayman offers variants of the STING proteins that occur as natural haplotypes or introduce point mutations within the CDN binding domain as well as antibodies and synthetic agonists and antagonists to help understand the events that lead to IFN induction.

## STING Variants & Antibodies

Item No.	Product Name
25306	STING A162 variant (human, recombinant)
23592	STING AQ variant (human, recombinant)
22815	STING H232 variant (human, recombinant)
15139	STING H232 variant; SUMO-tagged (human, recombinant)
23594	STING M284 variant (human, recombinant)
23593	STING R224 variant (human, recombinant)
22816	STING R232 variant (human, recombinant)
40241	STING R232 variant (N242A mutant; human, recombinant)
40240	STING R232 variant (Y240A mutant; human, recombinant)
17856	STING Monoclonal Antibody (Clone 2C8)
17857	STING Polyclonal Antibody

Read more about genetic variations in human STING that affect CDN binding and STING activation at [www.caymanchem.com/STINGvariants](http://www.caymanchem.com/STINGvariants)

## STING Agonists

Item No.	Product Name
37354	C53
30022	CAY10748
28054	diABZI STING Agonist 1 (hydrochloride)
34088	diABZI STING Agonist 2
34082	diABZI STING Agonist 3
14617	DMXAA
24106	ML RR-S2 CDA (ammonium salt)
30140	MSA-2
31759	SR 717 (lithium salt)

See all STING agonists at [www.caymanchem.com](http://www.caymanchem.com)



Learn how our experts used computer-aided drug design and SPR to screen and characterize novel hSTING agonists at [www.caymanchem.com/hstingagonists](http://www.caymanchem.com/hstingagonists)

## STING Antagonists

Item No.	Product Name
30157	C-170
30159	C-171
25859	C-176
25860	C-178
25857	H-151
34890	SN-011

See all STING antagonists at [www.caymanchem.com](http://www.caymanchem.com)

## Tools to Study ENPP1 Activity

Ectonucleotide pyrophosphatase/phosphodiesterase 1 (ENPP1) degrades extracellular 2'3'-cGAMP to prevent STING activation in nearby cells and is upregulated in several types of cancer.

### ENPP1 Fluorescent Inhibitor Screening Assay Kit

Item No. 702090

- A convenient fluorometric method of screening human ENPP1 modulators
- Active ENPP1 enzyme, substrate, and positive control inhibitor are provided to screen or inhibitors

### ENPP1/ENPP3 Cell-Based Activity Assay Kit

Item No. 702080

- A convenient fluorometric method of detecting ENPP1 and/or ENPP3 activity in cells

## ENPP1 Protein & Inhibitors

Item No.	Product Name
33397	ENPP1 (human, recombinant)
29864	3,3'-((2-Chlorophenyl)methylene)bis(4-hydroxy-2H-chromen-2-one)
31764	ENPP1-IN-1
37687	ENPP1 Inhibitor 4e
36836	ENPP1 Inhibitor 43
29809	ENPP1 Inhibitor C

See all ENPP1 inhibitors at [www.caymanchem.com](http://www.caymanchem.com)



Read our News article to learn more about how ENPP1 suppresses immune responses in the tumor microenvironment. [www.caymanchem.com/ENPP1](http://www.caymanchem.com/ENPP1)

# Host Immune Response

Phosphorylation of the transcription factor IRF3 by the IKK-related kinase TBK1 leads to production of type I IFNs. Cayman has developed key proteins, antibodies, and chemical modulators to study the important players in this process as well as the activation of NF- $\kappa$ B triggered by IKK, which controls the expression of cytokines.

## Interferon Activation Proteins & Antibody

Item No.	Product Name
22811	IRF3 (human, recombinant)
23590	IRF3 (S386A, S396A mutant; human, recombinant)
22817	TBK1 (human, recombinant)
25924	TBK1 Monoclonal Antibody (Clone 4E6)

## Interferon Pathway Modulators

Item No.	Product Name
17869	Dimethyl biphenyl-4,4'-dicarboxylate
30960	IFN- $\alpha$ -IFNAR-IN-1 (hydrochloride)
20449	RO8191
22402	StA-IFN-1

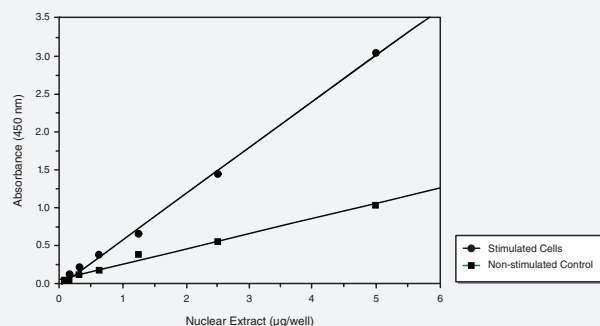
## IKK Antibody & Inhibitors

Item No.	Product Name
13931	IKK $\gamma$ Monoclonal Antibody (Clone 72C627)
14181	Amlexanox
19184	BI-605906
16667	BMS 345541 (hydrochloride)
10011249	CAY10576
13313	IKK-16 (hydrochloride)
17276	IKK2 Inhibitor VI
17290	IMD 0354
18774	LY2409881
14862	PS-1145
10010267	SC-514
15115	TPCA-1
11796	Wedelolactone

See all IKK and TBK1 inhibitors at [www.caymanchem.com](http://www.caymanchem.com)

## NF- $\kappa$ B Transcription Factor Assays

- Sensitive, non-radioactive method to detect human p50 or p65 NF- $\kappa$ B from whole cell lysates
- Capture the transcription factor using a specific dsDNA sequence bound to the plate
- Detect the dsDNA-bound transcription factor with specific antibodies in an ELISA format
- Nuclear Extraction Kit available to aid in the isolation of nuclear and cytoplasmic fractions from cell lysates or tissue homogenates



Assay of cell lysates isolated from stimulated and non-stimulated HeLa cells demonstrating NF- $\kappa$ B (p65) activity.

Item No.	Product Name
10006912	NF- $\kappa$ B (human p50) Transcription Factor Assay Kit
10007889	NF- $\kappa$ B (p65) Transcription Factor Assay Kit
10009277	Nuclear Extraction Kit

TNF- $\alpha$ /NF- $\kappa$ B signaling inhibitors are available at [www.caymanchem.com](http://www.caymanchem.com)

## Cytokine Detection Assays

Item No.	Product Name
583301	Interleukin-1 $\alpha$ (human) ELISA Kit
583311	Interleukin-1 $\beta$ (human) ELISA Kit
501030	Interleukin-6 (human) ELISA Kit
500232	THUNDER™ Human IL-6 TR-FRET Biomarker Assay Kit
583371	Interleukin-6 (mouse) ELISA Kit
28325	Q-Plex™ Human Cytokine - Inflammation (9-plex)
28327	Q-Plex™ Human Cytokine - Screen (16-plex)
37808	Q-Plex™ Human Innate Immunity (7-Plex)
28329	Q-Plex™ Mouse Cytokine - Screen (16-plex)

See all cytokine detection assay kits at [www.caymanchem.com](http://www.caymanchem.com)

View all STING research tools at [www.caymanchem.com](http://www.caymanchem.com)