

# 3'3'-cGAMP VacciGrade™

Cyclic [G(3',5')pA(3',5')p], a STING ligand

Catalog # vac-nacga

For research use only. Not for use in humans.

Version # 15K27-MM

## PRODUCT INFORMATION

### Content:

- 1 mg (2 x 500 µg) lyophilized 3'3'-cGAMP VacciGrade™
- 10 ml sterile endotoxin-free physiological water (NaCl 0.9%)

### Storage and stability:

- 3'3'-cGAMP VacciGrade™ is shipped at room temperature and should be stored at -20 °C. Lyophilized product is stable for 1 year when properly stored.

- Upon resuspension, prepare aliquots of 3'3'-cGAMP VacciGrade™ and store at -20 °C. Resuspended product is stable for 6 months when properly stored. Avoid repeated freeze-thaw cycles.

### Quality control:

- 3'3'-cGAMP VacciGrade™ is a preclinical grade preparation of the cyclic dinucleotide 3'3'-cGAMP. It is prepared under strict aseptic conditions and is tested for the presence of endotoxins. 3'3'-cGAMP VacciGrade™ is guaranteed sterile and its endotoxin level is <0.005 EU/µg.

- Purity and structure has been determined by LC/MS and NMR: ≥ 95%

- Biological activity has been assessed by measuring induction of the interferon pathway in THP1-Blue™ ISG cells.

## METHODS

### Preparation of stock solution (1 mg/ml):

- Add 500 µl sterile endotoxin-free physiological water (provided) to 500 µg 3'3'-cGAMP VacciGrade™.

- Mix the solution by pipetting up and down.

**Working Concentration:** 5 - 50 µg/mouse

## CHEMICAL PROPERTIES

**Synonym:** cyclic GMP-AMP; c-GpAp sodium salt

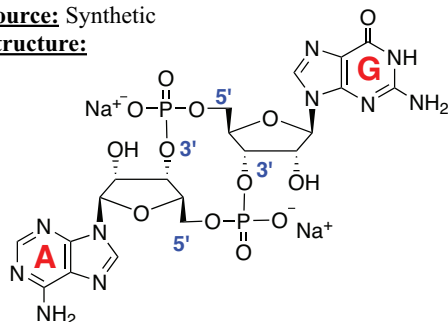
**Formula:** C<sub>20</sub>H<sub>22</sub>N<sub>10</sub>O<sub>13</sub>P<sub>2</sub>.2Na

**Molecular weight:** 718.38

**Solubility:** 50 mg/ml in physiological water

**Source:** Synthetic

**Structure:**



## DESCRIPTION

3'3'-cGAMP (cyclic [G(3',5')pA(3',5')p]) is a cyclic dinucleotide produced by bacteria. Cyclic dinucleotides (CDNs) are ubiquitous small molecule second messengers synthesized by bacteria that regulate diverse processes and are a relatively new class of adjuvants that have been shown to increase vaccine potency<sup>1</sup>. CDNs activate innate immunity by directly binding the endoplasmic reticulum-resident receptor STING (stimulator of interferon genes), activating a signaling pathway that induces the expression of interferon-β (IFN-β) and also nuclear factor-κB (NF-κB) dependent inflammatory cytokines<sup>1</sup>. Recently, 3'3'-cGAMP was reported to bind STING and subsequently induce TBK1-IRF3 (TANK-binding kinase 1 -IFN regulatory transcription factor 3)-dependent production of IFN-β<sup>2</sup>.

3'3'-cGAMP is also referred to as “canonical” cGAMP due the presence of the classical 3'-5' phosphodiester linkages between the guanosine and the adenosine. Structural and functional studies revealed that the canonical 3'3'-cGAMP produced by bacteria is distinct from the noncanonical 2'3'-cGAMP produced by mammalian cGAS<sup>3</sup>. Certain variants of STING are able to distinguish between canonical and noncanonical cGAMP<sup>4</sup>.

3'3'-cGAMP is more potent in activating IRF3 than c-di-IMP, c-di-AMP and c-diGMP, other cyclic dinucleotides that also bind to STING<sup>5</sup>.

**1. Dubensky TW. *et al.*, 2013.** Rationale, progress and development of vaccines utilizing STING-activating cyclic dinucleotide adjuvants. *Therapeutic Advances in Vaccines* 1(4): 131-143. **2. Zhang X. *et al.*, 2013.** Cyclic GMP-AMP containing mixed phosphodiester linkages is an endogenous high-affinity ligand for STING. *Mol Cell*.51(2):226-35. **3. Gao P. *et al.*, 2013.** Cyclic [G(2',5')pA(3',5')p] is the metazoan second messenger produced by DNA-activated cyclic GMP-AMP synthase. *Cell*. 153(5):1094-107. **4. Diner E. *et al.*, 2013.** The Innate Immune DNA Sensor cGAS Produces a Noncanonical Cyclic Dinucleotide that Activates Human STING. *Cell Rep*. 3(5):1355-61. **5. Burdette D. *et al.*, 2011.** STING is a direct innate immune sensor of cyclic di-GMP. *Nature*. 478(7370):515-8.

## RELATED PRODUCTS

Product	Description	Cat. Code
2'2'-cGAMP VacciGrade™	STING ligand	vac-nacga22
3'3'-cGAMP VacciGrade™	STING ligand	vac-nacga
AddaVax™	Squalene-Oil-in-water	vac-adx-10
Alhydrogel® 2%	Al(OH) <sub>3</sub> gel	vac-alu-250
c-di-GMP VacciGrade™	STING ligand	vac-nacdg
CFA	Complete Freund's adjuvant	vac-cfa-10
EndoFit™ Ovalbumin	For <i>in vivo</i> use	vac-efova
Flagellin FliC VacciGrade™	TLR5 ligand	vac-fla
MPLAs VacciGrade™	TLR4 ligand	vac-mpls
ODN 2006 VacciGrade™	Human TLR9 ligand	vac-2006-1
Poly(I:C) VacciGrade™	TLR3 ligand	vac-pic

## TECHNICAL SUPPORT

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