

Recombinant Mouse CGAS Protein

For Research Use Only

1. Basic Product Information

Catalog No.: REP51755

Size: 10ug, 100ug

Protein Name: Cyclic GMP-AMP synthase (cGAMP synthase) (cGAS) (m-cGAS) (EC 2.7.7.86) (2'3'-cGAMP synthase) (Mab-21 domain-containing protein 1)

Synonym: Cgas, Mb21d1

UniProt ID: Q8C6L5

UniProt Link: www.uniprot.org/uniprotkb/Q8C6L5/entry

Species Source: Mouse

Expression System: HEK293T eukaryotic cell expression system Sequence

Length: 507 AA

Molecular Weight: 58 KD

Protein Tag: C-terminal His6

2. Amino Acid Sequence

MEDPRRRRTTAPRAKKPSAKRAPTQPSRTRAHAESCGPQRGARSRRRAERDGDTEKPRAPGPRVH
PARATELTCKDAQPSAMDAAGATARPAVRVPQQQAILDPELPAVREPQPPADPEARVVRGPSHRR
GARSTGQPRAPRGRSRKEPDKLKKVLDKLRLLKRDISEAAETVNVKVERLLRRMQKRESEFKGVEQL
NTGSYYEHVKISAPNEFDVMFKLEVPRIELQEYYETGAFYLVKFKRIPRGNPLSHFLEGEVLSATKML
SKFRKIIKEEVKEIKDIDVSVEKEKPGSPAVTLLIRNPEEISVDIILALESKGSWPISTKEGLPIQGWLGTK
VRTNLRREPFFYLVPKNAKDGNFSQGETWRLSFSHTEKYILNNHGIEKTCCCESSGAKCCRKECLKLM
KYLLEQLKKEFQELDAFCSYHVKTAIFHMTQDPQDSQWDPRNLSSCFDKLLAFFLECLRTEKLDHY
FIPKFNLFSQLIDRKSKEFLSKKIEYERNNGFPIFDKL

3. Buffer Composition

Liquid format: PBS-based buffer containing 50% glycerol. Glycerol concentration can be customized upon customer request; please state special requirements when placing your order.

Lyophilized format: Buffer before lyophilization is PBS supplemented with 6% trehalose.



4. Storage Conditions

Upon receipt, store the product at -20 °C or -80 °C. Aliquot the product for on-demand use to preserve protein activity and prevent denaturation and inactivation caused by repeated freeze-thaw cycles.

5. Product Description

This product is recombinant Cyclic GMP-AMP synthase (cGAMP synthase) (cGAS) (m-cGAS) (EC 2.7.7.86) (2',3'-cGAMP synthase) (Mab-21 domain-containing protein 1) produced using the HEK293T eukaryotic cell expression system. It is suitable for in-vitro functional assays, protein-protein interaction studies, antibody preparation and other biomedical research applications.

Protein Function: Nucleotidyltransferase that catalyzes the formation of cyclic GMP-AMP (2',3'-cGAMP) from ATP and GTP and plays a key role in innate immunity (PubMed:23258413, PubMed:23647843, PubMed:23722158, PubMed:26829768, PubMed:28214358, PubMed:29426904, PubMed:29625897, PubMed:32814054, PubMed:38740774). Catalysis involves both the formation of a 2',5' phosphodiester linkage at the GpA step and the formation of a 3',5' phosphodiester linkage at the ApG step, producing c[G(2',5')pA(3',5')p] (PubMed:23258413, PubMed:23647843, PubMed:23722158, PubMed:26829768, PubMed:28214358). Acts as a key DNA sensor: directly binds double-stranded DNA (dsDNA), inducing the formation of liquid-like droplets in which CGAS is activated, leading to synthesis of 2',3'-cGAMP, a second messenger that binds to and activates STING1, thereby triggering type-I interferon production (PubMed:23722158, PubMed:28095500, PubMed:28314590, PubMed:28363908, PubMed:39322678). Preferentially binds long dsDNA (around 45 bp) and forms ladder-like networks that function cooperatively to stabilize individual cGAS-dsDNA complexes (PubMed:28902841). Acts as a key foreign DNA sensor, the presence of double-stranded DNA (dsDNA) in the cytoplasm being a danger signal that triggers the immune responses (PubMed:23722158, PubMed:28314590, PubMed:28363908). Has antiviral activity by sensing the presence of dsDNA from DNA viruses in the cytoplasm (PubMed:23258413, PubMed:23647843, PubMed:23722158). Also acts as an innate immune sensor of infection by retroviruses by detecting the presence of reverse-transcribed DNA in the cytosol (PubMed:23929945). Detection of retroviral reverse-transcribed DNA in the cytosol may be indirect and be mediated via interaction with PQBP1, which directly binds reverse-transcribed retroviral DNA (By similarity). Also detects the presence of DNA from bacteria (By similarity). 2',3'-cGAMP can be transferred from producing cells to neighboring cells through gap junctions, leading to promote STING1 activation and convey immune response to connecting cells (PubMed:24077100, PubMed:31992625). 2',3'-cGAMP can also be transferred between cells by virtue of packaging within viral particles contributing to IFN-induction in newly infected cells in a cGAS-independent but STING1-dependent manner (PubMed:26229117). Also senses the presence of neutrophil extracellular traps (NETs) that are translocated to the cytosol following phagocytosis, leading to synthesis of 2',3'-cGAMP (PubMed:33688080). In addition to foreign DNA, can also be activated by endogenous nuclear or mitochondrial DNA (By similarity). When self-DNA leaks into the cytosol during cellular stress (such as mitochondrial stress, DNA damage, mitotic arrest or senescence), or is present in form of cytosolic micronuclei, CGAS is activated leading to a state of sterile inflammation (PubMed:28738408, PubMed:28759028). Acts as a regulator of cellular senescence by binding to cytosolic chromatin fragments that are present in senescent cells, leading to trigger type-I interferon production via STING1 and promote cellular senescence (PubMed:28759028). Also involved in the inflammatory response to genome instability and double-stranded DNA breaks: acts by localizing to micronuclei arising from genome instability (PubMed:28738408). Micronuclei, which are frequently found in cancer cells, consist of chromatin surrounded by its own nuclear membrane: following breakdown of the micronuclear envelope, a process associated with chromothripsis, CGAS binds self-DNA exposed to the cytosol, leading to 2',3'-cGAMP synthesis and subsequent activation of STING1 and type-I interferon production (PubMed:28738408). In a healthy cell, CGAS is however kept inactive even in cellular events that directly expose it to self-DNA, such as mitosis, when cGAS associates with chromatin directly after nuclear envelope breakdown or remains in the form of

postmitotic persistent nuclear cGAS pools bound to chromatin (By similarity). Nuclear CGAS is inactivated by chromatin via direct interaction with nucleosomes, which block CGAS from DNA binding and thus prevent CGAS-induced autoimmunity (PubMed:31808743, PubMed:32911480, PubMed:32911481, PubMed:32913000). Also acts as a suppressor of DNA repair in response to DNA damage: inhibits homologous recombination repair by interacting with PARP1, the CGAS-PARP1 interaction leading to impede the formation of the PARP1-TIMELESS complex (PubMed:30356214, PubMed:31544964, PubMed:35210392). In addition to DNA, also sense translation stress: in response to translation stress, translocates to the cytosol and associates with collided ribosomes, promoting its activation and triggering type-I interferon production (By similarity).

Subcellular Localization: Nucleus . Chromosome . Cell membrane ; Peripheral membrane protein . Cytoplasm, cytosol . Note=Mainly localizes in the nucleus, and at low level in the cytosol (PubMed:31544964, PubMed:31808743). On chromosomes, enriched on centromeric satellite and LINE DNA repeat elements (By similarity). Exported from the nucleus to the cytosol in a XPO1/CRM1 via the nuclear export signal in response to DNA stimulation (By similarity). Outside the nucleus, localizes at the cell membrane as a peripheral membrane protein in resting conditions: association to the cell membrane is mediated via binding to phosphatidylinositol 4,5-bisphosphate (PtdIns(4,5)P2) (PubMed:30827685). Localization at the cell membrane is required to limit the recognition of self-DNA (By similarity). Following detection of double-stranded DNA (dsDNA), released from the cell membrane into the cytosol in order to signal (By similarity). Upon transfection with dsDNA forms punctate structures that co-localize with DNA and Beclin-1 (BECN1) (By similarity). Phosphorylation at Tyr-201 promotes cytosolic retention (By similarity). In response to translation stress, translocates to the cytosol and associates with collided ribosomes (By similarity).

6. Notes

- Avoid repeated freeze-thaw cycles to maintain protein stability and biological activity.
- Please specify special buffer-composition requirements at the time of order placement.
- For research use only. Not intended for clinical diagnosis, therapeutic use or commercial manufacturing.