cGAS produces cyclic GMP-AMP

D'Eustachio, P., Jin, L., Shamovsky, V., Wu, J.
Introduction

Reactome is open-source, open access, manually curated and peer-reviewed pathway database. Pathway annotations are authored by expert biologists, in collaboration with Reactome editorial staff and cross-referenced to many bioinformatics databases. A system of evidence tracking ensures that all assertions are backed up by the primary literature. Reactome is used by clinicians, geneticists, genomics researchers, and molecular biologists to interpret the results of high-throughput experimental studies, by bioinformaticians seeking to develop novel algorithms for mining knowledge from genomic studies, and by systems biologists building predictive models of normal and disease variant pathways.

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Literature references


Reactome database release: 83

This document contains 1 reaction (see Table of Contents)

https://reactome.org
cGAS produces cyclic GMP-AMP

Stable identifier: R-HSA-3244614

Type: transition

Compartments: cytosol

Cyclic dinucleotides (such as c-di-GMP and c-di-AMP) are signaling molecules produced by bacteria. In host cells they are recognized by DNA sensors such as DDX41 and STING to trigger IFN production in a STING-dependent manner (Burdette DL et al. 2011; Yin Q et al. 2012; Parvatiyar K et al. 2012). Cyclic adenosine monophosphate-guanosine monophosphate (cyclic GMP-AMP, cGAMP) has been also implicated in stimulating host responses via STING (Wu J et al. 2013). Chemically synthesized cGAMP was shown to induce IFN-beta production in mouse fibrosarcoma cell line L929 with much higher potency than c-di-GMP and c-di-AMP. Most importantly, cGAMP was identified as the first cyclic di-nucleotide produced by mammalian cells (Wu J et al. 2013). DNA transfection or DNA virus infection of human and mouse cells triggered production of the endogenous second messenger cGAMP, which in turn interacted with STING to activate dimerization of IRF3 and induction of IFN beta (Wu J et al. 2013). cGAMP synthase (cGAS) was reported to catalyze the cGAMP production in the presence of DNA (Sun L et al. 2013). The structural study showed that cGAMP generated by cGAS contains G(2',5')pA and A(3',5')pG phosphodiester linkages, which is distinct from bacterial 3',5' cyclic dinucleotides (Gao P et al. 2013).

Literature references


Editions

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