Product Data Sheet

Product Name: Peptidoglycan
Cat. No.: GF04826

Chemical Properties

Cas. No.	27814-48-8		
Formula	$C_3H_5NO_4$	M.Wt	119.076
Solubility		Storage	Store at -20°C
General tips	For obtaining a higher solubility , please warm the tube at 37 °C and shake it in the ultrasonic bath for a while.Stock solution can be stored below -20°C for several months.		
Shipping Condition	Evaluation sample solution : ship with blue ice All other available size: ship with RT , or blue ice upon request.		
Structure			

Protocol

Cell experiment [1]:

Cell lines	Keratinocytes

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Preparation Method	Keratinocytes were seeded as indicated and cultured for 24 h at 37°C in a humidified atmosphere containing 5% CO_2. Twenty-four hours later, the medium was changed and supplemented with 1.2 mM calcium. After 24 h, cells were treated with Peptidoglycan (20μg/ml) for 48h.
Reaction Conditions	20μg/ml; 48h
Applications	Peptidoglycan promotes the production of TNF-α and IL-6 in Keratinocytes.

Animal experiment [2]:

Animal models	C57BL/6 mice
Preparation Method	Thirteen-week-old male C57BL6 mice received daily intraperitoneal injection of Peptidoglycan at a dose of 1.2 mg/kg/day for 4 weeks. Body weight was monitored weekly. Food consumption of each cage hosting 6 mice was recorded weekly.
Dosage form	1.2mg/kg/day for 4 weeks; i.p.
Applications	Peptidoglycan induced the progression of steatohepatitis of mice.

References:

[1] Wang L, Cheng B, Ju Q, et al. AhR Regulates Peptidoglycan-Induced Inflammatory Gene Expression in Human Keratinocytes. J Innate Immun. 2022;14(2):124-134.
[2] Jin M, Lai Y, Zhao P, et al. Effects of peptidoglycan on the development of steatohepatitis. Biochim Biophys Acta Mol Cell Biol Lipids. 2020 Apr;1865(4):158595.

Background

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Peptidoglycan from Bacillus subtilis(Peptidoglycan) is a major component of the bacterial cell wall and is a polymer composed of sugars and amino acids. Peptidoglycan forms a mesh-like layer outside the bacterial cell membrane, providing structural strength and rigidity to the bacteria. Peptidoglycan also acts as a bioactive molecule to regulate the development, physiology, and pathology of eukaryotic cells [1]. Peptidoglycan is composed of long linear glycan chains cross-linked by short peptide stems. The glycan chains consist of repeating units of the disaccharide N-acetylglucosamine-β(1,4)-N-acetylmuramic acid[GlcNAc-β(1,4)-MurNAc], and the peptide stems are typically composed of alternating L-amino acids and D-amino acids [2]. Peptidoglycan is involved in modulating the activity of various signaling pathways and has the capacity to activate the immune response of the host, often being used as a disease inducer [3, 4].

In vitro, Peptidoglycan(20μg/ml) stimulates Toll-like receptor 2(TLR2) on the surface of keratinocytes, promoting the expression of JNK/MAPK and FosB signaling pathways stimulated by the aryl hydrocarbon receptor to enhance the activity of the IL-1β and IL-6 promoters, ultimately stimulating an inflammatory response [5]. Peptidoglycan(200μg/ml) can promote the secretion of TNF-α and IL-6 by activated macrophages, while increasing the activity of the NF-κB and MAPK signaling pathways [6].

In vivo, Peptidoglycan(1.2mg/kg/day) was administered via intraperitoneal injection to male C57BL/6 mice for 4 weeks. Peptidoglycan did not alter food intake or body weight gain in mice but severely impaired glucose tolerance and insulin sensitivity. Peptidoglycan increased the fat mass and epididymal fat tissue weight of mice, as well as plasma and hepatic triglyceride levels and plasma cholesterol content [7]. Peptidoglycan(5mg/kg/day) was injected intravitreally into BALB/c mice for 6 hours. Peptidoglycan increased the number of inflammatory cells infiltrating the iris of the mice, including the number of rolling, adhering, and infiltrating leukocytes [8].

References:

[1] Bastos PAD, Wheeler R, Boneca IG. Uptake, recognition and responses to peptidoglycan in the mammalian host. FEMS Microbiol Rev. 2021 Jan 8;45(1):fuaa044.
[2] Vollmer W, Blanot D, de Pedro MA. Peptidoglycan structure and architecture. FEMS Microbiol Rev. 2008 Mar;32(2):149-67.
[3] Kolonitsiou F, Syrokou A, Karamanos NK, et al. Immunoreactivity of 80-kDa peptidoglycan and teichoic acid-like substance of slime producing S. epidermidis and specificity of their antibodies

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studied by an enzyme immunoassay. J Pharm Biomed Anal. 2001 Jan;24(3):429-36.
[4] Caruso R, Warner N, Inohara N, et al. NOD1 and NOD2: signaling, host defense, and inflammatory disease. Immunity. 2014 Dec 18;41(6):898-908.
[5] Wang L, Cheng B, Ju Q, et al. AhR Regulates Peptidoglycan-Induced Inflammatory Gene Expression in Human Keratinocytes. J Innate Immun. 2022;14(2):124-134.
[6] Wang F, Li Y, Yang C, et al. Mannan-Binding Lectin Suppresses Peptidoglycan-Induced TLR2 Activation and Inflammatory Responses. Mediators Inflamm. 2019 Jan 9;2019:1349784.
[7] Jin M, Lai Y, Zhao P, et al. Effects of peptidoglycan on the development of steatohepatitis. Biochim Biophys Acta Mol Cell Biol Lipids. 2020 Apr;1865(4):158595.
[8] Rosenzweig HL, Galster K, Vance EE, et al. NOD2 deficiency results in increased susceptibility to peptidoglycan-induced uveitis in mice. Invest Ophthalmol Vis Sci. 2011 Jun 9;52(7):4106-12.

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