

MPLA-SM VacciGrade™

Monophosphoryl Lipid A from *S. minnesota* R595; TLR4-based adjuvant

Catalog code: vac-mpla

<https://www.invivogen.com/mpla-vaccigrade>

For research use only. Not for use in humans.

Version 24I13-AK

PRODUCT INFORMATION

Contents

- 1 mg Monophosphoryl Lipid A (MPLA-SM) VacciGrade™
- 10 ml sterile endotoxin-free physiological water (NaCl 0.9%)

Storage and Stability

- MPLA-SM VacciGrade™ is provided as a lyophilized clear lipidic film, and is shipped at room temperature. Store at -20°C. Lyophilized product is stable for 1 year when properly stored.
- Upon resuspension, prepare aliquots of MPLA-SM and store at -20°C. Resuspended product is stable for 6 months when properly stored. Avoid repeated freeze-thaw cycles.

Quality control

- Biological activity has been tested using cellular assays.
- The presence of other bacterial components (e.g. lipoproteins) is controlled using HEK-Blue™ TLR2 cells.
- MPLA-SM VacciGrade™ is guaranteed sterile.

PRODUCT DESCRIPTION

MPLA-SM is a preparation of Monophosphoryl Lipid A (MPLA) derived from the lipopolysaccharide (LPS) of *Salmonella minnesota* R595 (Re mutant). InvivoGen's MPLA-SM is a potent Toll-like receptor 4 (TLR4) agonist. Importantly, it is free of TLR2-activating contaminants.

MPLA-SM triggers human and mouse TLR4 responses, although with varying activity on human TLR4. The complexity of the process for natural extraction of MPLA-SM from LPS generates multiple hexa-acylated and under-acylated congeneric forms. This congener mix is responsible for different TLR4 agonist potency of each preparation¹.

Note: MPLA-SM lots that display a higher potency for human TLR4 are denoted with an asterisk (MPLA-SM* VacciGrade™, cat code vac-mpla2).

BACKGROUND

Monophosphoryl Lipid A (MPLA) is a natural compound derived from the lipopolysaccharide (LPS) component of the cell wall of Gram-negative bacteria. LPS is a potent activator of the immune system. Its recognition by Toll-like receptor 4 (TLR4) leads to NF- κ B and IRF activation and the production of proinflammatory cytokines and interferons, respectively². Thus, LPS features many characteristics needed for an effective vaccine adjuvant. However, large uncontrolled amounts of LPS are extremely toxic and can cause devastating diseases³.

Wild-type LPS, referred to as smooth (sLPS) comprises three covalently linked regions: a Lipid A backbone, an oligosaccharide core, and O-polysaccharide chains. Some bacteria produce a truncated LPS, without O-side chains, referred to as rough (rLPS)⁴. LPS biological activity is mediated through Lipid A recognition by TLR4 and is commensurate to number of Lipid A fatty acyl chains³. Hexa-acylated (6 chains) Lipid A is a highly potent TLR4 agonist, while under-acylated (4-5 chains) Lipid A induces lower or antagonistic responses⁵.

Acidic extraction of Lipid A from LPS produces MPLA, which displays reduced toxicity while retaining the ability to activate TLR4^{6,7}. The reduced toxicity of MPLA is attributed to the preferential triggering of the IRF pathway upon TLR4 activation, resulting in decreased induction of inflammatory cytokines⁸.

METHODS

Preparation of sterile stock solution (1 mg/ml)

- Add 1 ml of DMSO to 1 mg of MPLA-SM VacciGrade™ and vortex until complete solubilization, then sonicate.
- Prepare aliquots of stock solution and store at -20°C. Further dilutions can be prepared with endotoxin-free physiological water (provided).

Notes:

- The suspension may appear to contain floating fine particles. Sonication may help to disperse these particles. Difficulties may be encountered for solubilization at higher concentrations.
- Alternatively, MPLA-SM VacciGrade™ can be resuspended in DMSO containing 0.2 % triethylamine.

Working Concentration: 2 - 20 μ g/mouse

TECHNICAL SUPPORT

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1. Wang YQ. *et al.*, 2020. MPL Adjuvant Contains Competitive Antagonists of Human TLR4. *Front. Immunol.* 11:577823. 2. Kuzmich, NN. *et al.*, 2017. TLR4 Signaling Pathway Modulators as Potential Therapeutics in Inflammation and Sepsis. *Vaccines (Basel)* 5:1618-22. 3. Steimle, A. *et al.* 2016. Structure and function: Lipid A modifications in commensals and pathogens. *Int J Med Microbiol* 306, 290-301. 4. Raetz CR. 1990. Biochemistry of endotoxins. *Annu. Rev. Biochem.* 59, 129-70. 5. Cochet, F. & Peri, F. 2017. The role of carbohydrates in the lipopolysaccharide (LPS)/Toll-Like Receptor 4 (TLR4) Signalling. *Int J Mol Sci* 18. 6. Qureshi N. *et al.*, 1982. Purification and structural determination of nontoxic lipid A obtained from the lipopolysaccharide of *Salmonella typhimurium*. *J. Biol. Chem.*, 257:11808-15. 7. Romero CD. *et al.*, 2011. The Toll-Like Receptor 4 agonist monophosphoryl Lipid A augments innate host resistance to systemic bacterial infection. *Infect Immun.* 79: 3576–3587. 8. Mata-Haro V. *et al.*, 2007. The vaccine adjuvant monophosphoryl lipid A as a TRIF-biased agonist of TLR4. *Science.* 316(5831):1628-32.

RELATED PRODUCTS

Product	Description	Catalog Code
Adjuvants		
MPLAs VacciGrade™ (Synthetic MPLA)	TLR4 agonist	vac-mpls
AddaVax™	Squalene-Oil-in-water	vac-adx-10
AddaS03™	AS03-like vaccine adjuvant	vac-as03-10
Allhydrogel® adjuvant 2%	Aluminum hydroxide gel	vac-alu-50
Adju-Phos® adjuvant	Aluminum phosphate gel	vac-phos-250
Quil-A® adjuvant	Saponin vaccine adjuvant	vac-quil
CFA	Complete Freund's adjuvant	vac-cfa-10
IFA	Incomplete Freund's adjuvant	vac-ifa-10
c-di-GMP VacciGrade™	STING agonist	vac-nacdg
Flagellin FliC VacciGrade™	TLR5 agonist	vac-fla
Imiquimod VacciGrade™	TLR7 agonist	vac-imq
ODN 1585 VacciGrade™	murine TLR9 agonist	vac-1585-1
ODN 1826 VacciGrade™	murine TLR9 agonist	vac-1826-1
ODN 2395 VacciGrade™	human/murine TLR9 agonist	vac-2395-1
ODN 2006 VacciGrade™	human TLR9 agonist	vac-2006-1
Pam3CSK4 VacciGrade™	TLR2 agonist	vac-pms
Poly(I:C) (HMW) VacciGrade™	TLR3 agonist	vac-pic
R848 VacciGrade™	TLR7/8 agonist	vac-r848
TDB VacciGrade™	Mincle agonist	vac-tdb
Conjugatable PRRs		
STG-982	conjugatable STING agonist	vac-stg982
STG-968	conjugatable STING agonist	vac-stg968
TL7-887	conjugatable TLR7 agonist	vac-tl7887
TL7-975	conjugatable TLR7 agonist	vac-tl7975
OVA Antigen		
EndoFit™ Ovalbumin	For <i>in vivo</i> use; endotoxin level < 1EU/mg	vac-pova

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