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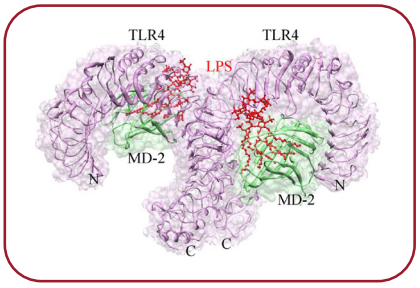

PRODUCT DATA SHEET

LPS from E. coli O8:K27 (S-form) TLRpure™ Sterile Solution

Cat. No.: IAX-100-006 **Lot. No.:**

Source	Lipopolysaccharide (LPS) from E. coli O8:K27, S-type (smooth/wild-type) LPS
Concentration	1mg/ml stabilised in sterile, double-distilled water (ddWater), without any additives
TLRpure™	No detectable TLR4 *independent* activity as determined by a mouse macrophage cell culture cytokine secretion assay using TLR4 deficient versus wild-type cells: standardised potent TLR4-specific agonist
Purity	Ultrapure. No detectable DNA, RNA and protein traces.
Purification Method	S-type LPS was isolated by the hot phenol-water method. Semi-purified LPS was subjected to further re-extraction cycles and ultracentrifugation steps, extensively electrodialysed to yield TLRpure™ LPS.
Sterility	Filter method: certified according to Ph. Eur. 9. Passed according to specification: • No growth in Thioglycolate medium at 30-35°C after 14 days. • No growth in Soybean Casein Digest Broth (TSB) at 20-25°C after 14 days.
Endotoxin Content	Bacterial Endotoxin Test (kinetic turbidimetric LAL method) certified according to Ph. Eur. 9. Endotoxin Content: >5,000,000 [EU/ml].
Appearance	Colourless, clear, aqueous solution
Handling	Keep sterile. Prepare aliquots or working dilutions from pre-warmed (~40°C) LPS stock solution just prior to use. Ready-made solution is cell culture-grade. To yield a 100µg/ml (100x) stock solution, add 100µl of LPS to 900µl endotoxin-free and sterile ddWater (Cat. No.: IAX-900-002), or 0.9% NaCl Solution (Cat. No.: IAX-900-003) or PBS (Cat. No.: IAX-900-001) and mix well.
Activity	Optimal concentration is dependent upon cell type, species, desired activation and analysis: 0.01-1.0µg/ml *in vitro* and 5-15mg/kg *in vivo* in animal rodent models. Does not activate any TLR other than TLR4 as tested up to 1µg/ml in relevant cellular systems (mouse macrophages).
Shipping	Ambient
Storage	2-8°C
Stability	2 years after receipt (unopened and as supplied). Diluted solutions are stable for 12 hours at 2-8°C.
MSDS	Available on request

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E. coli O8:K27 TLRpure™ LPS is a TLR4 specific agonist

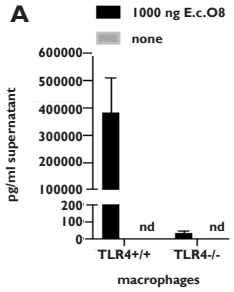
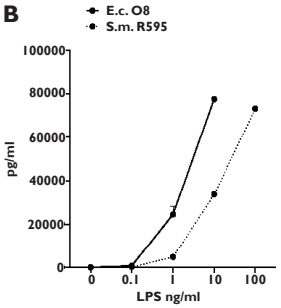


FIGURE:
A) Macrophages from wild-type (WT) TLR4 expressing or TLR4 deficient (TLR4 KO) mice were stimulated with 1µg/ml TLRpure™ E. coli O8:K27 S-LPS.
B) Dose-response with E. coli O8:K27 compared to S. minn. R595 (Re) LPS in mouse wild-type macrophages.
Cell culture supernatants were analysed by ELISA for IL-6 after 24h.
Optimal concentrations required for activation depend upon cell species (murine, human, others), cell culture conditions (FCS concentration), sampling time and cytokine analysis. Recommended range for S-type (wild-type) LPS: 0.01-1.0µg/ml.



Product Information

- TLRpure™ LPS purified according to an optimised and proprietary extraction and purification protocol, but based upon the methods published by Galanos, et al. (laboratory of Westphal and Lüderitz, Freiburg, Germany).
- TLRpure™ LPS lacks any detectable bacterial, (lipo-)protein, RNA or DNA or other TLR-stimulating activity due to its ultra-purified formulation. Its unique potency and purity are quality controlled using a physiological system of primary innate immune cells and a relevant biological cytokine expression read-out.
- All immunological activity of the Lipid A is exclusively dependent upon the presence of TLR4 as determined by the use of the corresponding control cells, where TLR4 has been genetically deleted or missing (from TLR4 deficient also called TLR4 knock-out KO mice).
- TLRpure™ LPS convenient ready-made stabilised solution makes it the reagent of choice for in vitro as well as in vivo experiments for superior reproducible and comparable results.
- Compared to LPS derived from conventional (semi-purified) LPS preparations, this product is derived from low yield TLRpure™ LPS produced on an industrial fermentation scale under precisely controlled growth conditions to yield large batch sizes, allowing custom formulations/packaging.

Product Specific References

[1] *Peripheral Inflammation, Apolipoprotein E4, and Amyloid-β Interact to Induce Cognitive and Cerebrovascular Dysfunction.* Marottoli FM, et al. ASN Neuro. (2017); 9:1

[2] *Lipopolysaccharide-Induced Neuroinflammation as a Bridge to Understand Neurodegeneration.* Batista CRA, et al. Int. J. Mol. Sci. (2019); 20: 2293

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General Information

- The innate immune response to lipopolysaccharide is essential for host defense against Gram-negative bacteria. In response to bacterial infection, the TLR4/MD-2 complex that is expressed on the surface of macrophages, monocytes, dendritic, and epithelial cells senses picomolar concentrations of endotoxic LPS and triggers the production of various pro-inflammatory mediators.
- Activation of cells by LPS is mediated on the plasma membrane by the Toll-like receptor 4 (TLR4), a member of the highly conserved protein family of TLRs, which are specialised in the recognition of microbial components. In mice, defects in TLR4 result in LPS unresponsiveness.
- For optimal interaction with LPS, TLR4 requires association with myeloid differentiation protein 2 (MD-2). According to current consensus activation of TLR4 is preceded by the transfer of LPS to membrane-bound (m) or soluble (s) CD14 by LPS-binding protein (LBP). This mechanism is believed to be generally true for LPS signaling. Re-form LPS and lipid A, but not S-form LPS, are capable of inducing TNF-a responses also in the absence of CD14. LPS, synthesized by most wild-type (WT) Gram-negative bacteria (S-form LPS), consists of three regions, the O-polysaccharide chain, which is made up of repeating oligosaccharide units, the core oligosaccharide and the lipid A, which harbors the endotoxic activity of the entire molecule. R-form LPS synthesized by the so-called rough (R) mutants of Gram-negative bacteria lacks the O-specific chain. Furthermore, the core-oligosaccharide may be present in different degrees of completion, depending on the class (Ra to Re) to which the mutant belongs. Notably, LPS from WT bacteria are always highly heterogeneous mixtures of S-form LPS molecules containing 1 to over 50 repeating oligosaccharide units and contain ubiquitously a varying proportion of R-form molecules lacking the O-specific chain. LPS are amphipathic molecules whose hydrophobicity decreases with increasing length of the sugar part.
- Based upon these differences, S- and R-form LPS show marked differences in the kinetics of their blood clearance and cellular uptake as well as in the ability to induce oxidative burst in human granulocytes and to activate the host complement system.
- In addition, LPS from extracellular bacteria which is either endocytosed or transfected into the cytosol of host cells or cytosolic LPS produced by intracellular bacteria is recognized by cytosolic proteases caspase-4/11 and hosts guanylate binding proteins that are involved in the assembly and activation of the NLRP3 inflammasome.
- One of the plausible mechanisms for LPS internalization and intracellular delivery involves LPS binding by high-mobility group box 1 (HMGB1) - an alarmin which can efficiently transport LPS into the cytoplasm through receptor for advanced glycation end products (RAGE)-mediated endocytosis. Through internalization of HMGB1-LPS complexes mediated by RAGE, HMGB1 induces destabilization of lysosomes for cytosolic LPS delivery.
- It has been also suggested that outer membrane vesicles (OMVs) — the naturally secreted products of Gram-negative bacteria — can function as cytosolic LPS delivery vehicles.

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References

[1] *Structural relationship of Salmonella 0 and R antigens*. Lüderitz O, Galanos C, et al. Ann. N.Y. Acad. Sci. (1966); 133:349

[2] *Defective LPS signaling in C3H/HeJ and C57BL/10ScCr mice: mutations in Tlr4 gene*. Poltorak A, He X, Smirnova I, Liu MY, Van Huffel C, Du X, Birdwell D, Alejos E, Silva M, Galanos C, Freudenberg M, Ricciardi-Castagnoli P, Layton B, Beutler B. Science (1998); 282:2085

[3] *CD14 is required for MyD88-independent LPS signaling*. Jiang Z, Georgel P, Du X, Shamel L, Sovath S, Mudd S, Huber M, Kalis C, Keck S, Galanos C, Freudenberg M, Beutler B. Nat. Immunol. (2005); 6:565

[4] *Defective immunogenic cell death of HMGB1-deficient tumors: compensatory therapy with TLR4 agonists*. Yamazaki T, et al. Cell Death and Differentiation (2014); 21:69

[5] *Lipopolysaccharide Recognition in the Crossroads of TLR4 and Caspase-4/11 Mediated Inflammatory Pathways*. Zamyatina A , Heine H. Front Immunol. (2020); 11: 585146