

INNATE IMMUNITY

PRR LIGANDS



The most comprehensive library of PAMPs

- ❖ Largest collection of PRR agonists and antagonists
- ❖ Highest quality ligands
- ❖ Activity and contaminant levels thoroughly tested

Pattern recognition receptors (PRRs) recognize a wide variety of ligands, called pathogen-associated molecular patterns (PAMPs), discriminating bacteria, fungi and other pathogens. InvivoGen offers the most comprehensive choice of ligands known to activate specific PRRs. InvivoGen strives to provide PRR ligands of the highest quality by thoroughly validating our ligands to ensure lot-to-lot reproducibility.

Choose from our extensive collection:

- TLR Ligands
- NLR Ligands
- RLR Ligands
- CLR Ligands
- CDS/STING Ligands
- Inflammasome Inducers
- Microbiota Ligands
- Multi-PRR Ligands

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PRR LIGANDS

The innate immune system is an evolutionarily conserved system acting as a first-line of defense against invading microbial pathogens and other potential threats to the host. A range of pattern recognition receptors (PRRs) recognize specific pathogen-associated molecular patterns (PAMPs) exclusively present on microbes such as bacteria, fungi, parasites, and viruses. The main PRR families of the innate immune system are the Toll-Like receptors (TLRs), NOD-Like receptors (NLRs), C-type lectin receptors (CLRs), RIG-I-Like receptors (RLRs), cytosolic DNA sensors (CDS), and the aryl hydrocarbon receptor (AhR). InvivoGen offers a comprehensive range of high quality PAMPs known to activate these PRRs.

TLR Ligands

TLR2 Agonists

TLR2 (also known as CD282) is a membrane surface receptor involved in the recognition of a wide array of microbial molecules. These molecules represent broad groups of species, such as Gram-positive and Gram-negative bacteria, as well as mycoplasma and yeast. They include peptidoglycan, lipoteichoic acid, and lipoproteins from bacteria, lipoarabinomannan from mycobacteria, and zymosan from yeast cell walls. The variety of TLR2 ligands is the greatest among all the TLRs and this is due to the heterodimerization needed for TLR2-mediated responses. TLR2 forms a heterodimer with TLR6 to recognize diacylated lipoproteins, whereas the TLR1/TLR2 heterodimer binds triacylated lipoproteins. Moreover, the CD14 co-receptor enhances pathogen recognition by TLR2. TLR2 signaling is MyD88 (myeloid differentiation primary-response protein 88)-dependent and requires the adaptor molecule TIRAP (TIR-associated protein) to induce the production of pro-inflammatory cytokines following AP-1 (activator protein 1) and NF- κ B (nuclear factor- κ B) nuclear translocation.

TLR3 Agonists

TLR3 (also known as CD283) is an endosomal receptor that recognizes double-stranded RNA (dsRNA), a molecular pattern associated with viral infection. Polyinosine-polycytidylic acid (poly(I:C)), a synthetic analog of dsRNA, is the ligand of choice for TLR3. TLR3 signals mainly through a MyD88-independent pathway involving the adapter protein TRIF (TIR domain-containing adaptor protein-inducing IFN- β). Phosphorylation of IRF3 (IFN regulatory factor 3) leads to the production of IFN- β (interferon β) with the subsequent activation of IFN-stimulated response elements (ISRE). Additionally, TLR3 signaling leads to the nuclear translocation of AP-1 and NF- κ B and to the production of pro-inflammatory cytokines.

TLR4 Agonists

TLR4 is the receptor for Gram-negative lipopolysaccharide (LPS) and lipid A, its toxic moiety. In order to respond to LPS, TLR4 interacts with three different extracellular proteins: LPS binding protein (LBP), CD14 and myeloid differentiation protein 2 (MD-2). TLR4 signaling comprises two pathways: the MyD88-dependent and MyD88-independent pathways. The MyD88-dependent pathway involves AP-1 and NF- κ B nuclear translocation and leads to the production of inflammatory cytokines. The MyD88-independent pathway activates IRF3 and involves another adaptor molecule, TRAM (TRIF-related adaptor molecule), and leads to the production of IFN- β and the expression of IFN-inducible genes through the activation of IRF3.

TLR5 Agonists

The cell surface receptor TLR5 recognizes flagellin, the major component of the bacterial flagellar filament, from both Gram-positive and Gram-negative bacteria. Activation of TLR5 stimulates the production of pro-inflammatory

cytokines through signaling via the adaptor protein MyD88. As a homodimer, TLR5 can generate a pro-inflammatory signal, suggesting that it might be the only TLR participating in flagellin recognition.

TLR7/8 Agonists

TLR7 and TLR8 are endosomal receptors involved in the response to viral infection. They recognize GU-rich short single-stranded RNA, as well as small synthetic molecules, such as imidazoquinolines and nucleoside analogues. TLR7/TLR8 signaling is MyD88-dependent and is mediated by the nuclear translocation of AP-1 and NF- κ B, in addition to the phosphorylation of IRF7 (IFN regulatory factor 7). IRF7 promotes the induction of ISRE and the subsequent expression of type I IFN genes, whereas AP-1 and NF- κ B activation results in the production of pro-inflammatory cytokines.

TLR9 Agonists

The endosomal receptor TLR9 (also known as CD289) recognizes specific unmethylated CpG-ODN sequences that distinguish microbial DNA from mammalian DNA. Three types of stimulatory ODNs have been described: Class A (Type D), Class B (Type K) and Class C. Similar to most other TLRs, TLR9 signaling is MyD88-dependent, involving the transcription factors AP-1, NF- κ B, and IRF7. TLR9-induced pro-inflammatory cytokine production is mediated by AP-1 and NF- κ B, whereas TLR9-induced IFN- α/β production is mediated by IRF7. The cytokine and IFN response is highly dependent on the class of CpG-ODN used to stimulate TLR9.

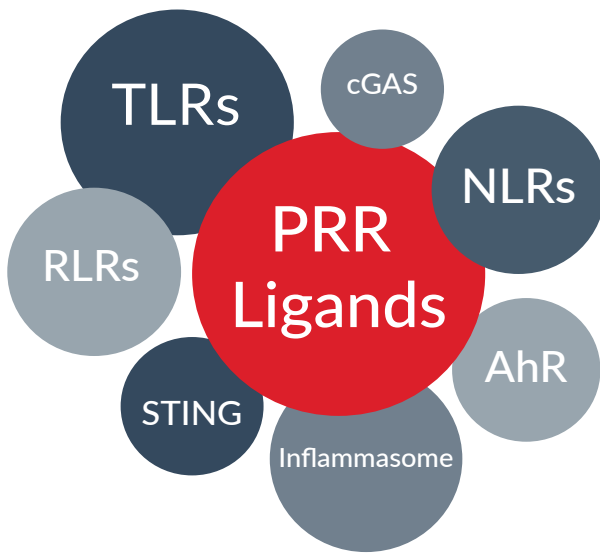
TLR13 Agonists

TLR13 is an endosomal TLR expressed in mice. Although its role and ligands remain unclear, 23S ribosomal RNA (rRNA) has been identified as a TLR13 ligand. TLR13 induces cytokine production in a MyD88- and UNC93B-dependent manner through the activation of AP-1 and NF- κ B. TLR13 signaling also results in IFN- β production through the activation of IRF7. Humans lack TLR13 and probably rely on other pathogen receptors to detect pathogenic bacterial infection.

NLR Ligands

NOD1/2 Agonists

NOD1 (also known as CARD4) and NOD2 (also known as CARD15) are intracellular PRRs that sense bacterial peptidoglycans (PGNs). NOD1 senses the D- γ -glutamyl-meso-DAP dipeptide (iE-DAP), which is found in PGNs of all Gram-negative and certain Gram-positive bacteria, whereas NOD2 recognizes the muramyl dipeptide (MDP) structure found in almost all bacteria. Both iE-DAP and MDP must be delivered intracellularly either by bacteria that invade the cell or through other cellular uptake mechanisms. Ligand-bound NOD1 and NOD2 oligomerize and signal via the serine/threonine RIP2 kinase. Once activated, RIP2 mediates ubiquitination of NEMO/IKK γ leading to the activation of NF- κ B and the production of inflammatory cytokines.



Inflammasome Inducers

Inflammasomes are multimeric protein complexes that are generally comprised of a member of the NLR family, such as NLRP3 and NLRC4, the adaptor protein ASC (apoptosis-associated speck-like protein with a CARD) and pro-caspase-1. They assemble in the cytoplasm of innate immune cells in response to cytosolic PAMPs or DAMPs (danger-associated molecular patterns). They promote the secretion of the pro-inflammatory cytokines IL-1 β and IL-18 and cause a rapid and pro-inflammatory form of cell death called pyroptosis. The most intensely studied inflammasome is the NLRP3 (NLR family, pyrin domain containing 3) inflammasome. It is activated by a broad variety of stimuli, including danger signals (e.g. ATP), crystalline substances (e.g. MSU) and microbial toxins (e.g. nigericin). The NLRC4 (NLR containing a caspase activating and recruitment domain 4) /NAIP (neuronal apoptosis inhibitory protein) inflammasome is triggered by cytosolic flagellin from various bacteria, such as *Salmonella typhimurium* and *Pseudomonas aeruginosa*. The NLRP1 inflammasome induces caspase-1 in response to diverse stimuli, including *Bacillus anthracis* lethal toxin, *Toxoplasma gondii*, muramyl dipeptide, and host intracellular ATP depletion.

RLR Ligands

RIG-I/MDA-5 Agonists

RIG-I and MDA-5 are cytoplasmic RNA helicases that recognize intracellular double-stranded RNA (dsRNA), a molecular pattern associated with viral infection. Despite their overall structural similarity, they detect distinct viral species. RIG-I participates in the recognition of Paramyxoviruses (Newcastle disease virus (NDV), Sendai virus (SeV)), Rhabdoviruses (vesicular stomatitis virus (VSV)), Flaviviruses (hepatitis C (HCV)) and Orthomyxoviruses (Influenza), whereas MDA-5 is essential for the recognition of Picornaviruses (encephalo-myocarditis virus (EMCV)) and poly(I:C), a synthetic analog of viral dsRNA. Although RIG-I and MDA-5 recognize different ligands, they share common signaling features. Upon recognition of dsRNA, they are recruited by the adaptor IPS-1 (also known as MAVS, CARDIF or VISA) to the outer membrane of the mitochondria, leading to the activation of several transcription factors including IRF3, IRF7 and NF- κ B. IRF3 and IRF7 control expression of type I IFNs, while NF- κ B regulates the production of pro-inflammatory cytokines.

CLR Ligands

Dectin-1 Agonists

Dectin-1 is a member of the C-type lectin receptor (CLR) family and plays an important role in antifungal innate immunity. Dectin-1 is a specific transmembrane receptor of β -glucans, which are glucose polymers found

in the cell walls of fungi, including the yeasts *Saccharomyces cerevisiae* and *Candida albicans*. Upon binding to its ligand, Dectin-1 triggers phagocytosis and signaling through the kinase Syk and the adaptors CARD9-Bcl10-Malt1, leading to the production of reactive oxygen species (ROS), the activation of NF- κ B and the subsequent production of pro-inflammatory cytokines. Dectin-1 and TLR2 work in tandem to enhance their respective signaling responses.

Dectin-2 Agonists

Dectin-2 is a type II transmembrane CLR that binds high mannose-type carbohydrates and was shown to be the functional receptor for α -mannans. Upon binding to its ligand, Dectin-2 signals through the kinase Syk and the adaptors CARD9/Bcl-10/MALT1 triggering the activation of NF- κ B and the subsequent production of pro-inflammatory cytokines. Dectin-2 is implicated in anti-bacterial immunity and allergy.

Mincle Agonists

Mincle is a multi-functional danger receptor that recognizes a wide variety of ligands such as damaged cells, fungus, yeast and mycobacteria. Exogenous ligands for Mincle include fungal α -mannose, and the mycobacterial glycolipid, trehalose-6'6'-dimycolate (TDM; also known as cord factor) the immunostimulatory component of *Mycobacterium tuberculosis*. Furthermore, Mincle senses damaged cells by recognizing endogenous DAMPs. One such DAMP identified is the spliceosome-associated protein 130 (SAP130), a soluble factor released by necrotic cells. Mincle triggers signaling through Syk leading to CARD9-dependent NF- κ B activation. Syk induces also the mobilization of intracellular calcium (Ca²⁺) and the activation of the calcineurin-NFAT pathway.

CDS & STING Ligands

Cytosolic DNA Sensor (CDS) Agonists

CDSs detect damaged, mislocalized or pathogenic DNA, typically inducing type I IFN production through the TBK1-IRF3 pathway. DNA is normally compartmentalized in the nucleus or mitochondria; however, if it is not processed or transported correctly, then it can accumulate in the cytosol. Alternatively, viral or microbial DNA can enter the cytosol of host cells upon infection. Several CDSs have been identified, including the adenosine deaminase DAI, the helicase DDX41, the IFN-inducible IFI16 protein, and cGAS (cyclic GMP-AMP synthase). AIM2 is another cytosolic DNA sensor, which upon activation forms an inflammasome that leads to the secretion of IL-1 β .

STING Agonists

STING, initially thought to serve solely as an adaptor protein for mediating signaling by CDSs, was found to be a direct sensor of cyclic dinucleotides (CDNs). CDNs are important messengers in bacteria, affecting numerous responses of the prokaryotic cell, as well as in mammalian cells, acting as drivers of the innate immune response. CDNs and xanthone derivatives, such as DMXAA, bind to and activate STING, leading to a potent type I IFN response in a TBK1-IRF3-dependent manner.

AhR Ligands

AhR Agonists

The aryl hydrocarbon receptor (AhR) is a ligand-dependent transcriptional factor capable of sensing a wide range of structurally different exogenous and endogenous molecules. AhR ligands vary in their structure, and their binding affinity can significantly differ between mouse and human AhR. AhR agonists have been found to arise from xenobiotics such as pollutants, and indoles mainly derived from tryptophan metabolism occurring in the stomach and in the gut, as well as in other organs upon photo-oxidation or oxidative stress.

PRR Ligands

*To ensure the **absence** of bacterial contaminants (i.e. lipoproteins and endotoxins), TLR2 and TLR4 activation has been assessed by cellular assays.

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
TLR LIGANDS					
TLR2 Agonists					
CU-T12-9 NEW	Synthetic TLR2-TLR1 compound	TLR2 +/- TLR4 -	10nM - 10µM	10mg	tlrl-cut129
CL401 VacciGrade™	Preclinical grade CL401	VacciGrade™	20 - 50 µg/mouse	5 mg	vac-c401-5
CL413 - Adilipoline™	PAM2CK4-conjugated hydroxyadenine compound	TLR2 +/- TLR4 -	50 pg - 10 µg/ml	500 µg	tlrl-c413
CL413 VacciGrade™	Preclinical grade CL413	VacciGrade™	20 - 50 µg/mouse	5 mg	vac-c413-5
CL429	Pam2C-conjugated murabutide	TLR2 +/- TLR4 -	1 ng - 10 µg/ml	5 mg	tlrl-c429
CL429 VacciGrade™	Preclinical grade CL429	VacciGrade™	20 - 50 µg/mouse	5 mg	vac-c429
CU-T12-9	Synthetic TLR2-TLR1 compound	TLR2 +/- TLR4 -	10nM - 10µM	10mg	tlrl-cut129
FSL-1	Synthetic diacylated lipoprotein - TLR2/6	TLR2 +/- TLR4 -	1 - 100 ng/ml	100 µg	tlrl-fsl
HKBF	Heat Killed <i>Bacteroides fragilis</i>	TLR2 +/- TLR4 -	10 ⁶ - 10 ⁷ cells/ml	10 ⁹ cells	tlrl-hkbf
HKEB	Heat Killed <i>Escherichia coli</i> O111:B4	TLR2 +/- TLR4 +	10 ⁵ - 10 ⁷ cells/ml	10 ¹⁰ cells	tlrl-hkeb
HKLM	Heat Killed <i>Listeria monocytogenes</i>	TLR2 +/- TLR4 -	10 ⁷ - 10 ⁸ cells/ml	10 ¹⁰ cells	tlrl-hklm
HKLR	Heat Killed <i>Lactobacillus rhamnosus</i>	TLR2 +/- TLR4 -	10 ⁸ - 10 ⁹ cells/ml	10 ¹⁰ cells	tlrl-hklr
HKMT	Heat Killed <i>Mycobacterium tuberculosis</i>	TLR2 +/- TLR4 -	100 ng - 10 µg/ml	10 mg 50 mg	tlrl-hkmt-1 tlrl-hkmt-5
HKPA	Heat Killed <i>Pseudomonas aeruginosa</i>	TLR2 +/- TLR4 -	10 ⁵ - 10 ⁷ cells/ml	10 ¹⁰ cells	tlrl-hkpa
HKSA	Heat Killed <i>Staphylococcus aureus</i>	TLR2 +/- TLR4 -	10 ⁶ - 10 ⁸ cells/ml	10 ¹⁰ cells	tlrl-hksa
HKSE	Heat Killed <i>Staphylococcus epidermidis</i>	TLR2 +/- TLR4 -	10 ⁷ - 10 ⁹ cells/ml	10 ¹⁰ cells	tlrl-hkse
HKSP	Heat Killed <i>Streptococcus pneumoniae</i>	TLR2 +/- TLR4 -	10 ⁷ - 10 ⁹ cells/ml	10 ¹⁰ cells	tlrl-hksp
HKST	Heat Killed <i>Salmonella typhimurium</i>	TLR2 +/- TLR4 +	10 ⁴ - 10 ⁹ cells/ml	10 ¹⁰ cells	tlrl-hkst
LPS-PG	Standard Lipopolysaccharide from <i>P. gingivalis</i>	TLR2 +/- TLR4 +	10 ng - 10 mg/ml	1 mg	tlrl-pglps
LTA-BS	Lipoteichoic acid from <i>Bacillus subtilis</i>	TLR2 +/- TLR4 +	100 ng - 1 µg/ml	5 mg	tlrl-lta
LTA-SA	Lipoteichoic acid from <i>S. aureus</i>	TLR2 +/- TLR4 +	100 ng - 1 µg/ml	5 mg	tlrl-slta
LTA-SA Purified	Purified lipoteichoic acid from <i>S. aureus</i>	TLR2 +/- TLR4 -	1 ng - 1 µg/ml	5 mg	tlrl-pslta
Pam2CSK4	Synthetic diacylated lipoprotein - TLR2(6)	TLR2 +/- TLR4 -	1 - 100 ng/ml	1 mg	tlrl-pm2s-1
Pam3CSK4	Synthetic triacylated lipoprotein - TLR1/2	TLR2 +/- TLR4 -	1 - 300 ng/ml	1 mg	tlrl-pms
Pam3CSK4 Biotin	Biotinylated Pam3CSK4	TLR2 +/- TLR4 -	10 - 300 ng/ml	50 µg	tlrl-bpms
Pam3CSK4 Rhodamine	Rhodamine-labeled Pam3CSK4	TLR2 +/- TLR4 -	1 - 300 ng/ml	50 µg	tlrl-rpms
Pam3CSK4 VacciGrade™	Preclinical grade Pam3CSK4	VacciGrade™	2 - 20 µg/mouse	1 mg	vac-pms
PGN-BS	Peptidoglycan from <i>B. subtilis</i>	TLR2 +/- TLR4 -	1 - 10 µg/ml	5 mg	tlrl-pgnb3
PGN-EK	Peptidoglycan from <i>E. coli</i> K12	TLR2 +/- TLR4 +	1 - 10 µg/ml	1 mg	tlrl-pgnek
PGN-SA	Peptidoglycan from <i>S. aureus</i>	TLR2 +/- TLR4 -	0.1 - 10 µg/ml	5 mg	tlrl-pgns2
Zymosan	Cell wall preparation of <i>S. cerevisiae</i>	TLR2 +/- TLR4 -	1-10 µg/ml	100 mg	tlrl-zyn
TLR3 Agonists					
Poly(A:U)	Polyadenylic-polyuridylic acid	TLR2 -/TLR4 -	300 ng- 100 µg/ml	10 mg	tlrl-pau
Poly(I:C) (HMW)	Polyinosine-polycytidylic acid High molecular weight (1.5-8 kb)	TLR2 -/TLR4 -	30 ng - 10 µg/ml	10 mg 50 mg	tlrl-pic tlrl-pic-5
Poly(I:C) (HMW) Biotin	Biotinylated poly(I:C) (HMW)	TLR2 -/TLR4 -	30 ng - 10 µg/ml	10 µg	tlrl-picb
Poly(I:C) (HMW) Fluorescein	Fluorescein-labeled poly(I:C) (HMW)	TLR2 -/TLR4 -	10 ng - 10 µg/ml	10 µg	tlrl-picf
Poly(I:C) (HMW) Rhodamine	Rhodamine-labeled poly(I:C) (HMW)	TLR2 -/TLR4 -	10 ng - 10 µg/ml	10 µg	tlrl-picr
Poly(I:C) (HMW) VacciGrade™	Preclinical grade poly(I:C) (HMW)	VacciGrade™	10 µg - 100 µg/mouse	10 mg	vac-pic
Poly(I:C) (LMW)	Polyinosine-polycytidylic acid Low molecular weight (0.2-1 kb)	TLR2 -/TLR4 -	30 ng - 10 µg/ml	25 mg 250 mg	tlrl-picw tlrl-picw-250
Poly(I:C) (LMW) Rhodamine	Rhodamine-labeled poly(I:C) (LMW)	TLR2 -/TLR4 -	100 ng - 10 µg/ml	10 µg	tlrl-piwr

PRR Ligands

* Vaccigrade™ PRR ligands are guaranteed sterile and have minimal endotoxin levels (<0.005 EU/μg).

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
TLR4 Agonists					
CRX-527	Synthetic Lipid A analog	TLR2 - /TLR4 +	100 pg/ml - 10 ng/ml	1 mg	tlrl-crx527
LPS-B5	Standard lipopolysaccharide from <i>E. coli</i> O55:B5	TLR2 + /TLR4 +	100 pg - 1 μg/ml	5 mg	tlrl-b5lps
LPS-B5 Ultrapure	Ultrapure lipopolysaccharide from <i>E. coli</i> O55:B5	TLR2 - /TLR4 +	100 pg - 1 μg/ml	5 mg	tlrl-pb5lps
LPS-EB	Standard lipopolysaccharide from <i>E. coli</i> O111:B4	TLR2 + /TLR4 +	10 ng - 10 μg/ml	5 mg	tlrl-eb1ps
LPS-EB Biotin	Biotinylated ultrapure LPS from <i>E. coli</i> O111:B4	TLR2 + /TLR4 +	10 ng - 10 μg/ml	500 μg	tlrl-3blps
LPS-EB Ultrapure	Ultrapure lipopolysaccharide from <i>E. coli</i> O111:B4	TLR2 - /TLR4 +	10 ng - 10 μg/ml	5x10 ⁶ EU	tlrl-3pelps
LPS-EB Vaccigrade™	Preclinical grade ultrapure LPS from <i>E. coli</i> O111:B4	Vaccigrade™	0.1 - 25 μg/mouse	5x10 ⁶ EU	vac-3pelps
LPS-EK	Standard lipopolysaccharide from <i>E. coli</i> K12	TLR2 + /TLR4 +	1 ng - 10 μg/ml	5 mg	tlrl-ek1ps
LPS-EK Ultrapure	Ultrapure lipopolysaccharide from <i>E. coli</i> K12	TLR2 - /TLR4 +	1 ng - 10 μg/ml	1 mg	tlrl-pek1ps
LPS-PG	Standard lipopolysaccharide from <i>P. gingivalis</i>	TLR2 + /TLR4 +	100 ng - 10 μg/ml	1 mg	tlrl-pg1ps
LPS-PG Ultrapure	Ultrapure lipopolysaccharide from <i>P. gingivalis</i>	TLR2 - /TLR4 +	100 ng - 10 μg/ml	1 mg	tlrl-ppg1ps
LPS-SM Ultrapure	Ultrapure lipopolysaccharide from <i>S. minnesota</i>	TLR2 - /TLR4 +	10 ng - 10 μg/ml	5 mg	tlrl-sm1ps
MPLA-SM	Monophosphoryl lipid A from <i>S. minnesota</i>	TLR2 - /TLR4 +	10 ng - 1 μg/ml	1 mg	tlrl-mpla
MPLA-SM Vaccigrade™	Preclinical grade detoxified MPLA	Vaccigrade™	2 - 20 μg/mouse	1 mg	vac-mpla
MPLA Synthetic	Synthetic monophosphoryl lipid A	TLR2 - /TLR4 +	300 pg - 100 ng/ml	1 mg	tlrl-mpls
MPLA Synthetic Vaccigrade™	Preclinical grade synthetic MPLA	Vaccigrade™	2 - 20 μg/mouse	1 mg	vac-mpls
TLR4 Antagonist					
LPS-RS	Lipopolysaccharide from <i>Rhodobacter sphaeroides</i>	TLR2 + /TLR4 -	10 ng - 10 μg/ml	5 mg	tlrl-rslps
LPS-RS Ultrapure	Ultrapure lipopolysaccharide from <i>R. sphaeroides</i>	TLR2 - /TLR4 -	10 ng - 10 μg/ml	1 mg	tlrl-prslps
TLR5 Agonists					
FLA-BS	Standard flagellin from <i>B. subtilis</i> - 10% pure	TLR2 + /TLR4 +	10 ng - 10 μg/ml	100 μg	tlrl-bsfla
FLA-BS Ultrapure	Ultrapure flagellin from <i>B. subtilis</i> - >95% pure	TLR2 - /TLR4 -	1 ng - 1 μg/ml	50 μg	tlrl-pbsfla
FLA-PA Ultrapure	Ultrapure flagellin from <i>P. aeruginosa</i> - >95% pure	TLR2 - /TLR4 -	1 ng - 1 μg/ml	50 μg	tlrl-pafla
FLA-ST	Standard flagellin from <i>S. typhimurium</i> - 10% pure	TLR2 + /TLR4 +	10 ng - 10 μg/ml	100 μg	tlrl-stfla
FLA-ST Ultrapure	Ultrapure flagellin from <i>S. typhimurium</i> - >95% pure	TLR2 - /TLR4 -	10 - 100 ng/ml	10 μg 50 μg	tlrl-epstfla tlrl-epstfla-5
RecFLA-ST	Recombinant flagellin from <i>S. typhimurium</i>	TLR2 - /TLR4 -	10 - 100 ng/ml	50 μg 10 μg	tlrl-flic-50 tlrl-flic-10
Flagellin Flic Vaccigrade™	Preclinical grade RecFLA-ST	Vaccigrade™	1 - 10 μg/mouse	50 μg	vac-fla
TLR5 Antagonist					
hTLR5-Fc	Soluble ectodomain of TLR5	TLR2 - /TLR4 -	10 ng - 1 μg/ml	50 μg	fc-htr5
TLR7 Agonists					
CL264	Adenine analog	TLR2 - /TLR4 -	50 ng - 10 μg/ml	500 μg 5 mg	tlrl-c264e tlrl-c264e-5
CL307	Hydroxyadenine spermine compound	TLR2 - /TLR4 -	5 ng - 1 μg/ml	500 μg	tlrl-c307
CL347 - AdiFectin™	Hydroxyadenine spermine compound	TLR2 - /TLR4 -	300 ng - 3 μg/ml	500 μg	tlrl-c347
CL401 Vaccigrade™	Preclinical grade CL401	Vaccigrade™	20 - 50 μg/mouse	1 mg	vac-c401-5
CL413 - Adilipoline™	PAM2CK4-conjugated hydroxyadenine compound	TLR2 + /TLR4 -	50 pg - 10 μg/ml	500 μg	tlrl-c413
CL413 Vaccigrade™	Preclinical grade CL413	Vaccigrade™	20 - 50 μg/mouse	5 mg	vac-c413-5
Gardiquimod™	Imidazoquinoline compound	TLR2 - /TLR4 -	0.1 - 3 μg/ml	500 μg 5 mg	tlrl-gdqs tlrl-gdq-5
Imiquimod (R837)	Imidazoquinoline compound	TLR2 - /TLR4 -	1 - 5 μg/ml	500 μg 5 mg	tlrl-imqs tlrl-imq
Imiquimod Vaccigrade™	Preclinical grade Imiquimod	TLR2 - /TLR4 -	10 - 100 μg/mouse	5 mg	vac-imq
Loxoribine	Guanosine analog	TLR2 - /TLR4 -	1 mM (300 μg/ml)	50 mg	tlrl-lox

PRR Ligands

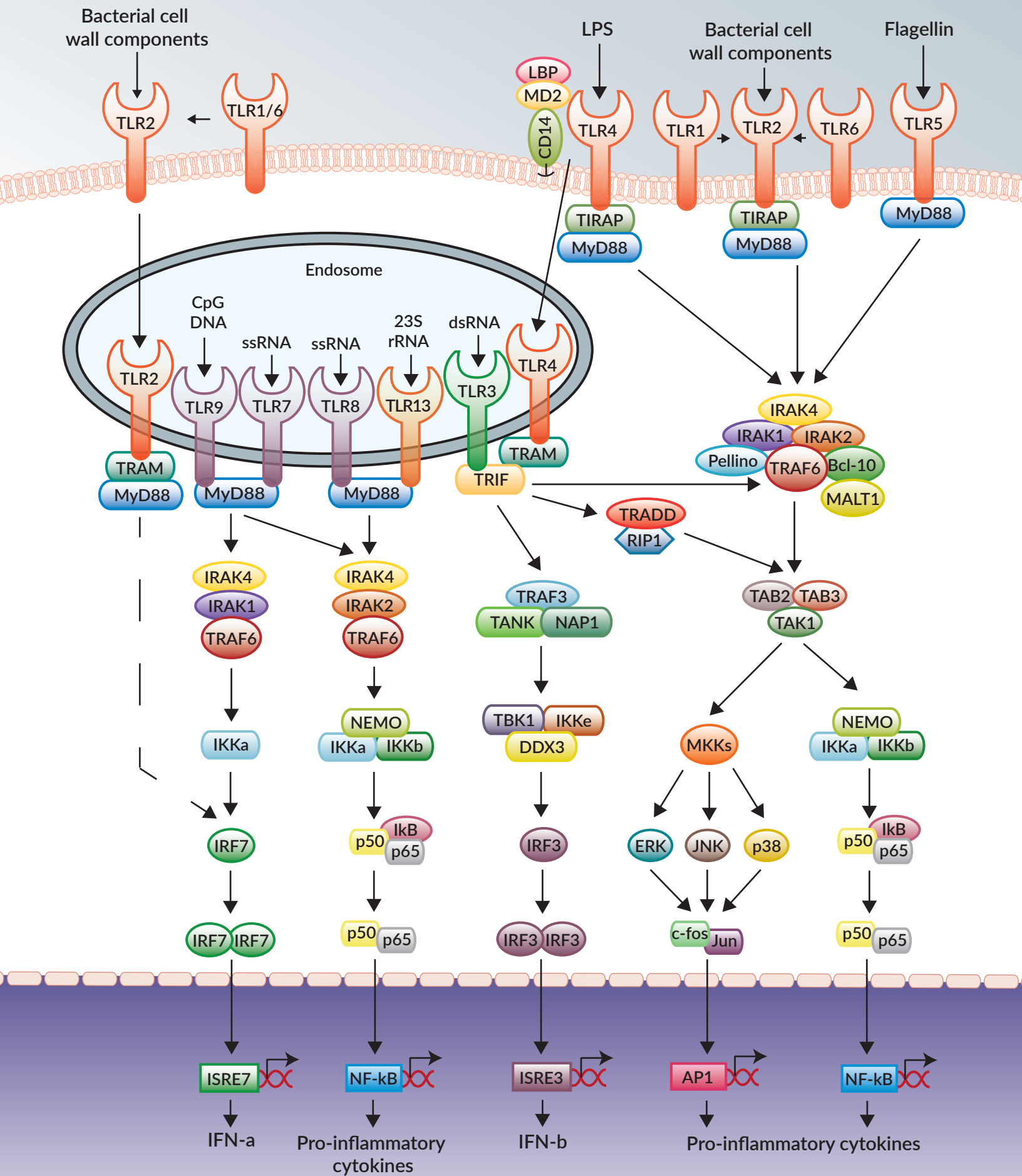
*To ensure the **absence** of bacterial contaminants (i.e. lipoproteins and endotoxins), TLR2 and TLR4 activation has been assessed by cellular assays.

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
TLR8 Agonists					
ORN06/LyoVec™	ssRNA with 6 UUGU repeats / LyoVec™	TLR2 -/TLR4 -	0.25 - 5 µg/ml	4x25µg	tlrl-orn6
ssPolyU Naked	RNA homopolymer	TLR2 -/TLR4 -	1 - 10 µg/ml	10mg 10 x 10mg	tlrl-sspu tlrl-sspu-100
ssPolyU/LyoVec™	RNA homopolymer / LyoVec™	TLR2 -/TLR4 -	1 - 10 µg/ml	4x25µg	tlrl-lpu
ssRNA40/LyoVec™	HIV-1 LTR-derived ssRNA / LyoVec™	TLR2 -/TLR4 -	0.25 - 5 µg/ml	4x25µg	tlrl-lrna40
ssRNA41/LyoVec™	ssRNA40 control / LyoVec™	TLR2 -/TLR4 -	0.25 - 5 µg/ml	4x25µg	tlrl-lrna41
TL8-506	Benzoazepine analog	TLR2 -/TLR4 -	10 - 100 ng/ml	500 µg	tlrl-tl8506
TLR8 Antagonists					
CU-CPT9a NEW	Potent and selective TLR8 inhibitor	TLR2 -/TLR4 -	1 - 10 µM	10 mg	inh-cc9a
TLR7/8 Agonists					
CL075	Thiazoquinoline compound	TLR2 -/TLR4 -	100 ng - 5 µg/ml	500 µg 5 mg	tlrl-c75 tlrl-c75-5
CL097	Imidazoquinoline compound	TLR2 -/TLR4 -	50 ng - 5 µg/ml	500 µg 5 mg	tlrl-c97 tlrl-c97-5
Poly(dT)	Thymidine homopolymer ODN (17 mer)	TLR2 -/TLR4 -	10 µM	100nmol	tlrl-pt17
R848 (resiquimod)	Imidazoquinoline compound	TLR2 -/TLR4 -	10 ng - 10 µg/ml	500 µg 5 mg	tlrl-r848 tlrl-r848-5
R848 VacciGrade™	Preclinical grade R848	VacciGrade™	10 - 100 µg/mouse	5 mg	vac-r848
TLR9 Agonists					
<i>E. coli</i> ssDNA/LyoVec™	<i>E. coli</i> single stranded DNA/LyoVec™ complexes	TLR2 -/TLR4 -	1 - 10 µg/ml	200 µg	tlrl-ssec
dsDNA-EC	<i>E. coli</i> K12 genomic DNA	TLR2 -/TLR4 -	30ng-1 µg/ml	200 µg	tlrl-ecdna
ODN 1585	Stimulatory CpG ODN Type A Mouse specific	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-1585 tlrl-1585-1 tlrl-1585-5
ODN 1585 control	Negative control for ODN 1585	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-1585c tlrl-1585c-1 tlrl-1585c-5
ODN 1585 VacciGrade™	Preclinical grade ODN 1585	VacciGrade™	20 - 50 µg/mouse	1 mg	vac-1585-1
ODN 1668	Stimulatory CpG ODN Type B Mouse specific	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-1668 tlrl-1668-1 tlrl-1668-5
ODN 1668 control	Negative control for ODN 1668	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-1668c tlrl-1668c-1 tlrl-1668c-5
ODN 1668 FITC	FITC-labeled CpG ODN - mouse specific, type B	TLR2 -/TLR4 -	1 - 5 µM	50 µg	tlrl-1668f
ODN 1826	Stimulatory CpG ODN Type B Mouse specific	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-1826 tlrl-1826-1 tlrl-1826-5
ODN 1826 control (ODN 2138)	Negative control for ODN 1826	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-1826c tlrl-1826c-1 tlrl-1826c-5
ODN 1826 Biotin	Biotinylated CpG ODN - mouse specific, type B	TLR2 -/TLR4 -	1 - 5 µM	2 x 50 µg	tlrl-1826b
ODN 1826 FITC	FITC-labeled CpG ODN - mouse specific, type B	TLR2 -/TLR4 -	1 - 5 µM	50 µg	tlrl-1826f
ODN 1826 VacciGrade™	Preclinical grade ODN 1826	VacciGrade™	20 - 50 µg/mouse	1 mg	vac-1826-1
ODN 2006 (ODN7409)	Stimulatory CpG ODN Type B Human specific	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-2006 tlrl-2006-1 tlrl-2006-5
ODN 2006 control (ODN 2137)	Negative control for ODN 2006	TLR2 -/TLR4 -	1 - 5 µM	200 µg 1 mg 5 mg	tlrl-2006c tlrl-2006c-1 tlrl-2006c-5

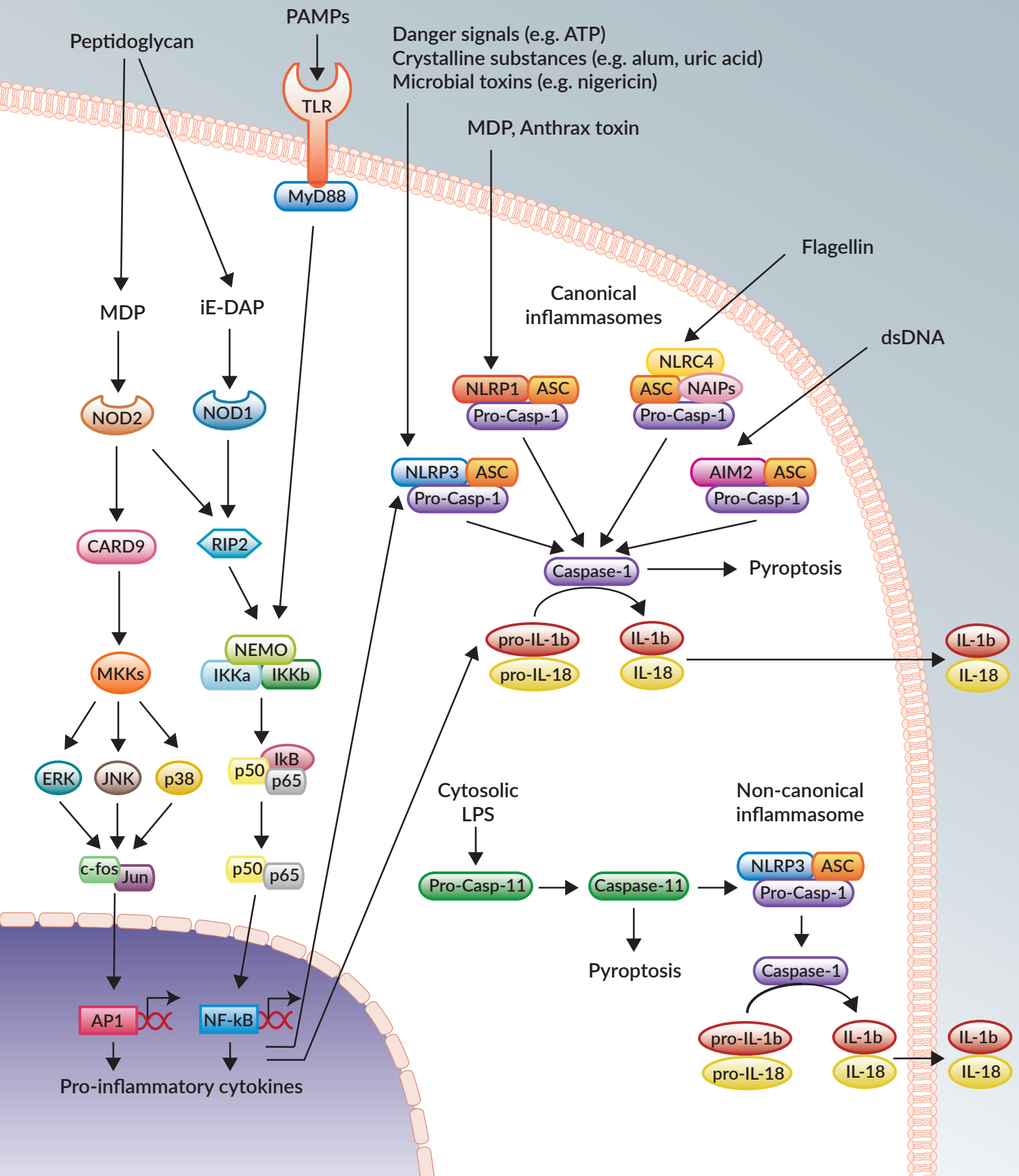
PRR Ligands

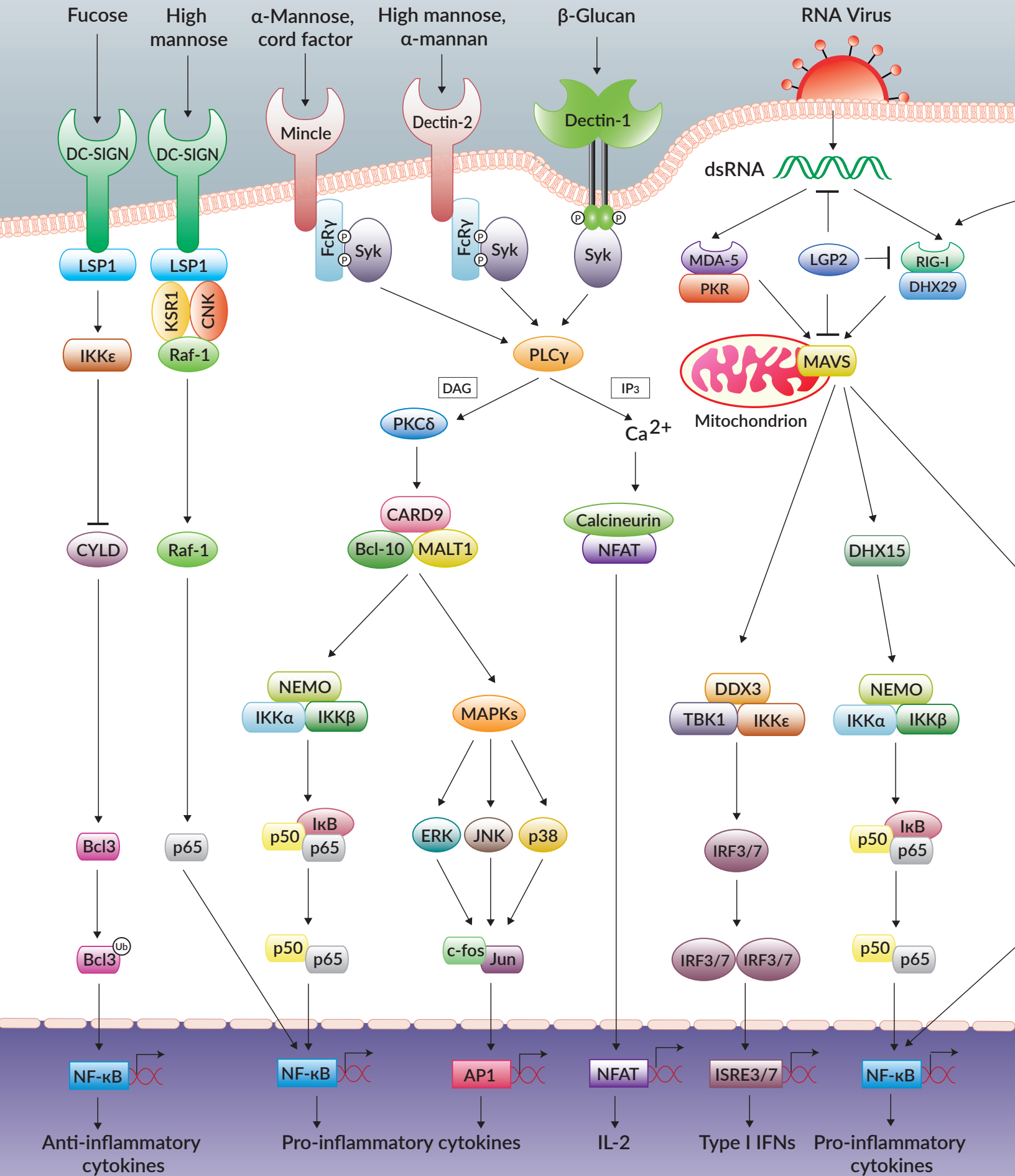
* Vaccigrade™ PRR ligands are guaranteed sterile and have minimal endotoxin levels (<0.005 EU/μg).

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
TLR9 Agonists					
ODN 2006 Biotin	Biotinylated CpG ODN - human specific, type B	TLR2 -/ TLR4 -	1 - 5 μM	2 x 50 μg	tlrl-2006b
ODN 2006 FITC	FITC-labeled CpG ODN - human specific, type B	TLR2 -/ TLR4 -	1 - 5 μM	50 μg	tlrl-2006f
ODN 2006-G5	Stimulatory CpG ODN Type B Human specific	TLR2 -/ TLR4 -	5 μM	200 μg 1 mg 5 mg	tlrl-2006g5 tlrl-2006g5-1 tlrl-2006g5-5
ODN 2006-G5 Control	Negative control for ODN 2006-G5	TLR2 -/ TLR4 -	5 μM	200 μg	tlrl-2006g5c
ODN 2006 Vaccigrade™	Preclinical grade ODN 2006	Vaccigrade™	20 - 50 μg/mouse	1 mg	vac-2006-1
ODN 2007	Stimulatory CpG ODN Type B Bovine / porcine	TLR2 -/ TLR4 -	5 μM	200 μg 1 mg 5 mg	tlrl-2007 tlrl-2007-1 tlrl-2007-5
ODN 2007 control	Negative control for ODN 2007	TLR2 -/ TLR4 -	5 μM	200 μg 1 mg 5 mg	tlrl-2007c tlrl-2007c-1 tlrl-2007c-5
ODN 2216	Stimulatory CpG ODN Type A Human specific	TLR2 -/ TLR4 -	1 - 5 μM	200 μg 1 mg 5 mg	tlrl-2216 tlrl-2216-1 tlrl-2216-5
ODN 2216 control (ODN 2138)	Negative control for ODN 2216	TLR2 -/ TLR4 -	1 - 5 μM	200 μg 1 mg 5 mg	tlrl-2243 tlrl-2243-1 tlrl-2243-5
ODN 2216 Biotin	Biotinylated CpG ODN - human specific, type A	TLR2 -/ TLR4 -	1 - 5 μM	2 x 50 μg	tlrl-2216b
ODN 2216 FITC	FITC-labeled CpG ODN - human specific, type A	TLR2 -/ TLR4 -	1 - 5 μM	50 μg	tlrl-2216f
ODN 2336	Stimulatory CpG ODN Type A Human specific	TLR2 -/ TLR4 -	1 - 5 μM	200 μg 1 mg 5 mg	tlrl-2336 tlrl-2336-1 tlrl-2336-5
ODN 2336 control	Negative control for ODN 2336	TLR2 -/ TLR4 -	1 - 5 M	200 μg 1 mg 5 mg	tlrl-2336c tlrl-2336c-1 tlrl-2336c-5
ODN 2395	Stimulatory CpG ODN Type C Human / mouse	TLR2 -/ TLR4 -	5 μM	200 μg 1 mg 5 mg	tlrl-2395 tlrl-2395-1 tlrl-2395-5
ODN 2395 control	Negative control for ODN 2395	TLR2 -/ TLR4 -	1 - 5 μM	200 μg 1 mg 5 mg	tlrl-2395c tlrl-2395c-1 tlrl-2395c-5
ODN 2395 FITC	FITC-labeled CpG ODN - human specific, type C	TLR2 -/ TLR4 -	1 - 5 μM	50 μg	tlrl-2395f
ODN 2395 Vaccigrade™	Preclinical grade ODN 2395	Vaccigrade™	20 - 50 μg/mouse	1 mg	vac-2395-1
ODN BW006 (ODN684)	Class B CpG ODN, human & mouse	TLR2 -/ TLR4 -	1 - 50 μg/ml	200 μg	tlrl-bw006
ODN BW007	Negative control for ODN BW006	TLR2 -/ TLR4 -	1 - 50 μg/ml	200 μg	tlrl-bw007
ODN D-SL01	Class B CpG ODN, multispecies	TLR2 -/ TLR4 -	1 - 5 μM	200 μg	tlrl-dsl01
ODN D-SL03	Class C CpG ODN, multispecies	TLR2 -/ TLR4 -	1 - 5 μM	200 μg	tlrl-dsl03
ODN M362	Stimulatory CpG ODN Type C Human / mouse	TLR2 -/ TLR4 -	1 - 5 μM	200 μg 1 mg 5 mg	tlrl-m362 tlrl-m362-1 tlrl-m362-5
ODN M362 Control	Negative control for ODN M362	TLR2 -/ TLR4 -	5 μM	200 μg 1 mg 5 mg	tlrl-m362c tlrl-m362c-1 tlrl-m362c-5
TLR9 Antagonists					
ODN 2088	Inhibitory ODN, mouse preferred	TLR2 -/ TLR4 -	100 nM - 10 μM	200 μg 1 mg 5 mg	tlrl-2088 tlrl-2088-1 tlrl-2088-5
ODN 2088 control	Negative control for ODN 2088	TLR2 -/ TLR4 -	100 nM - 10 μM	200 μg 1 mg 5 mg	tlrl-2088c tlrl-2088c-1 tlrl-2088c-5
ODN 4084-F	Class B inhibitory ODN	TLR2 -/ TLR4 -	100 nM - 10 μM	200 μg	tlrl-4084
ODN INH-18	Inhibitory ODN, human & mouse	TLR2 -/ TLR4 -	0.1 - 10 μM	200 μg	tlrl-inh18

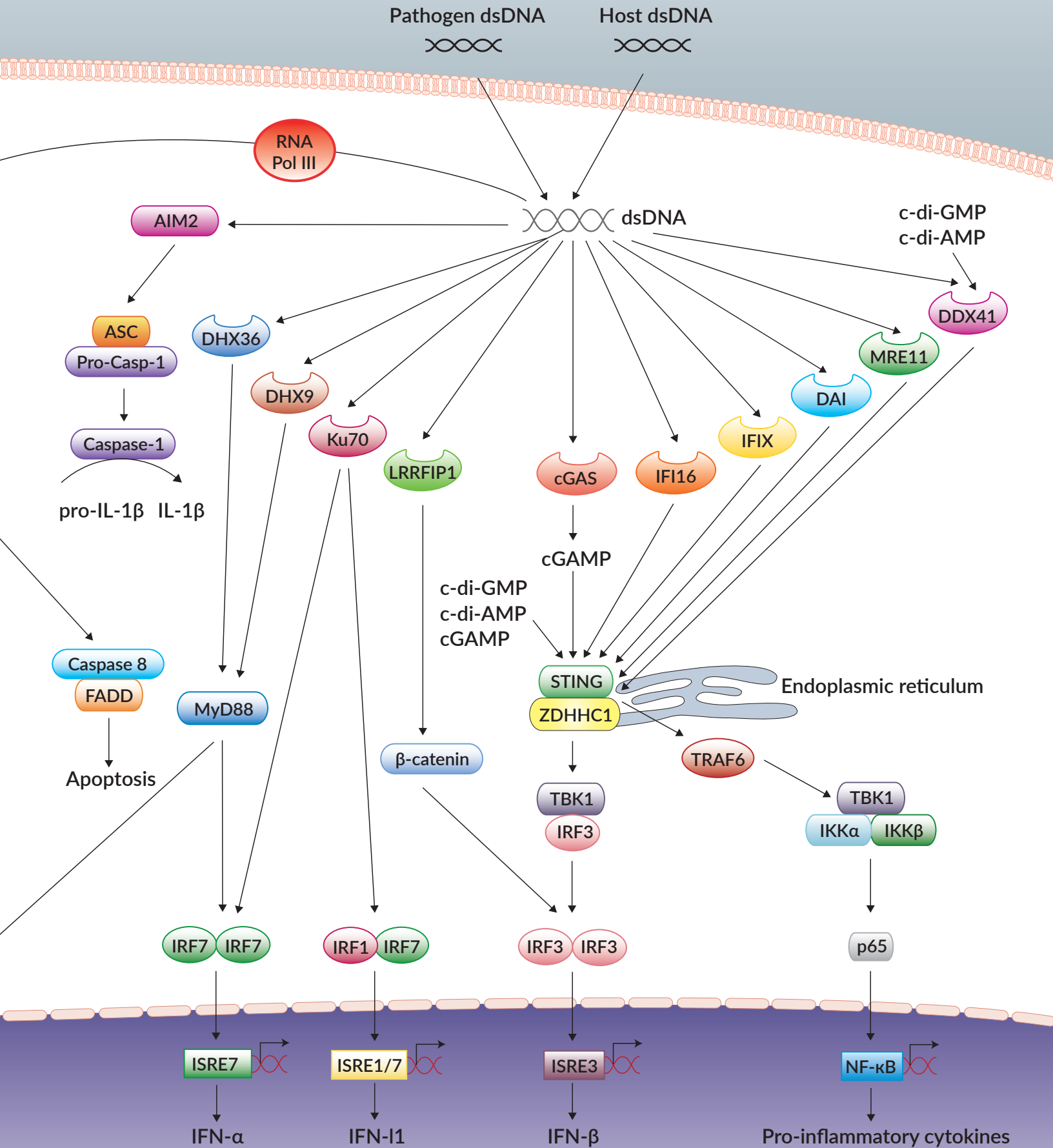


TLR & NLR Signaling Pathways





CLR, RLR & CDS Signaling Pathways



PRR Ligands

*To ensure the **absence** of bacterial contaminants (i.e. lipoproteins and endotoxins), TLR2 and TLR4 activation has been assessed by cellular assays.

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
TLR9 Antagonists					
ODN TTAGGG (A151)	Inhibitory ODN, human preferred	TLR2 -/ TLR4 -	100 nM - 10 µM	200 µg 1 mg	tlrl-ttag151 tlrl-ttag151-1
ODN TTAGGG (A151) control	Negative control for ODN TTAGGG	TLR2 -/ TLR4 -	100 nM - 10 µM	200 µg 1 mg	tlrl-ttagc tlrl-ttagc-1
TLR13 Agonists					
ORN Sa19	<i>S. aureus</i> 23S rRNA-derived oligoribonucleotide	TLR2 -/ TLR4 -	0.02 - 2 µg/ml	200 µg	tlrl-orn19
ORN Sa19 Control	Control oligoribonucleotide for ORN Sa19	TLR2 -/ TLR4 -	0.02 - 2 µg/ml	200 µg	tlrl-orn19c
NLR LIGANDS					
NOD1 Agonists					
C12-iE-DAP	Acylated derivative of iE-DAP	TLR2 -/ TLR4 -	1 ng - 1 µg/ml	1 mg	tlrl-c12dap
C14-Tri-LAN-Gly	Meso-lanthionine tri-peptide (CL243)	TLR2 -/ TLR4 -	1 ng - 1 µg/ml	1 mg	tlrl-ctlg
iE-DAP	D-γ-Glu-mDAP	TLR2 -/ TLR4 -	1 - 100 µg/ml	5 mg	tlrl-dap
iE-Lys	iE-DAP negative control	TLR2 -/ TLR4 -	1 - 100 µg/ml	5 mg	tlrl-lys
Tri-DAP	L-Ala-γ-D-Glu-mDAP	TLR2 -/ TLR4 -	100 ng - 10 µg/ml	1 mg	tlrl-tdap
NOD2 Agonists					
CL429	Pam2C-conjugated murabutide	TLR2 +/ TLR4 -	1 ng - 10 µg/ml	5 mg	tlrl-c429
CL429 VacciGrade™	TLR2/NOD2 agonist	VacciGrade™	20 -50 µg/mouse	5 mg	vac-c429
L18-MDP	Muramyldipeptide with a C18 fatty acid chain	TLR2 -/ TLR4 -	1 - 100 ng/ml	1 mg	tlrl-lmdp
MDP	Muramyldipeptide (L-D isoform, active)	TLR2 -/ TLR4 -	10 ng - 10 µg/ml	5 mg	tlrl-mdp
MDP control	Muramyldipeptide (D-D isoform, inactive)	TLR2 -/ TLR4 -	10 ng - 10 µg/ml	5 mg	tlrl-mdpc
M-Tri _{Lys}	Synthetic muramyl tripeptide	TLR2 -/ TLR4 -	100 ng - 10 µg/ml	1 mg	tlrl-mtl
Murabutide	Synthetic derivative of muramyldipeptide	TLR2 -/ TLR4 -	1 - 100 ng/ml	5 mg	tlrl-mbt
N-Glycolyl-MDP	N-glycolylated muramyldipeptide	TLR2 -/ TLR4 -	100 ng - 10 µg/ml	5 mg	tlrl-gmdp
NOD1/2 Agonists					
M-Tri _{DAP}	MurNac-L-Ala-γ-D-Glu-mDAP	TLR2 -/ TLR4 -	100 ng - 10 µg/ml	1 mg	tlrl-mtd
PGN-ECndi Ultrapure	Insoluble peptidoglycan from <i>E. coli</i> K12	TLR2 -/ TLR4 -	1 - 5 µg/ml	5 mg	tlrl-kipgn
PGN-ECndss Ultrapure	Soluble sonicated peptidoglycan from <i>E. coli</i> K12	TLR2 -/ TLR4 -	1 - 5 µg/ml	1 mg	tlrl-ksspgn
PGN-SAndi Ultrapure	Insoluble peptidoglycan from <i>S. aureus</i>	TLR2 -/ TLR4 -	1 - 5 µg/ml	5 mg	tlrl-sipgn
INFLAMMASOME INDUCERS					
AIM2 Inflammasome Agonists					
Poly(dA:dT) Naked	Poly(dA-dT)•poly(dT-dA)	TLR2 -/ TLR4 -	10 ng/ml - 1 µg/ml	200 µg 1 mg	tlrl-patn tlrl-patn-1
Poly(dA:dT)/LyoVec	Poly(dA-dT)•poly(dT-dA)/LyoVec™ complexes	TLR2 -/ TLR4 -	10 ng - 10 µg/ml	100 µg	tlrl-patc
Poly(dA:dT)/Rhodamine	Rhodamine labeled poly(dA-dT)•poly(dT-dA)	TLR2 -/ TLR4 -	100 ng - 10 µg/ml	10 µg	tlrl-patrh
NLRC4 Inflammasome inducers					
LFn-Needle NEW	T3SS Needle protein fused to Lethal Factor	TLR2-/TLR4-	0.16 - 100 ng/ml	5 µg	tlrl-ndl
LFn-Rod NEW	T3SS Inner Rod protein fused to Lethal	TLR2-/TLR4	16 ng/ml - 10 µg/ml	50 µg	tlrl-rod
NLRP1 Inflammasome Inducers					
L18-MDP	Muramyldipeptide with a C18 fatty acid chain	TLR2 -/ TLR4 -	1 - 100 ng/ml	1 mg	tlrl-lmdp
MDP	Muramyldipeptide (L-D isoform, active)	TLR2 -/ TLR4 -	10 ng - 10 µg/ml	5 mg	tlrl-mdp
NLRP3 Inflammasome Inducers					
Alum	Alum Hydroxide suspension	TLR2 -/ TLR4 -	50-500 µg/ml	500µL	tlrl-aloh
ATP	Adenosine 5'-triphosphate disodium salt	TLR2 -/ TLR4 -	5 mM	1 g	tlrl-atpl

PRR Ligands

* VacciGrade™ PRR ligands are guaranteed sterile and have minimal endotoxin levels (<0.005 EU/μg).

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
NLRP3 Inflammasome Inducers					
CPPD Crystals	Calcium pyrophosphate dihydrate	TLR2 -/ TLR4 -	1 - 50 μg/ml	5 mg	tlr-cppd
Hemozoin	Synthetic heme crystal	TLR2 -/ TLR4 -	50 - 400 μg/ml	5 mg	tlr-hz
MSU Crystals	Monosodium urate (uric acid)	TLR2 -/ TLR4 -	50 - 200 μg/ml	5 mg 25 mg	tlr-msu tlr-msu-25
Nano-SiO ₂	Nanoparticles of silica dioxide	TLR2 -/ TLR4 -	10 - 200 μg/ml	20 mg	tlr-sio-2
Nigericin	Nigericin, sodium salt	TLR2 -/ TLR4 -	1 μM	10 mg 50 mg	tlr-nig tlr-nig-5
TDB	Synthetic analog of the cord factor	TLR2 -/ TLR4 -	1 - 100 μg/ml	2 mg	tlr-tdb
Non-canonical Inflammasome Inducers					
E. coli OMVs	Purified outer membrane vesicles from <i>E. coli</i> BL21	TLR2 +/ TLR4 +	0.2-100 μg/ml	100 μg	tlr-omv-1
E. coli OMVs InvivoFit™	Sterile grade of outer membrane vesicles from <i>E. coli</i>	TLR2 +/ TLR4 +	10-100 μg/mouse	500 μg	tlr-omv
Curdlan	Beta-1,3-glucan from <i>Alcaligenes faecalis</i>	TLR2 -/ TLR4 -	0.1 - 100 μg/ml	1 g	tlr-curd
HKCA	Heat-killed <i>Candida albicans</i>	TLR2 -/ TLR4 -	10 ⁸ cells/ml	10 ⁹ cells	tlr-hkca
Pustulan	Beta-glucan from <i>Lasallia pustulata</i>	TLR2 -/ TLR4 -	0.1 - 100 μg/ml	100 mg	tlr-pst
Zymosan Depleted	Hot alkali treated zymosan	TLR2 -/ TLR4 -	100 μg/ml	10 mg	tlr-zyd
RLR LIGANDS					
RIG-I Agonists					
3p-hpRNA	5' triphosphate hairpin RNA	TLR2 -/ TLR4 -	10 ng - 1 μg/ml	25 μg	tlr-hprna
3p-hpRNA/LyoVec NEW	3p-hpRNA/LyoVec complexes	TLR2 -/ TLR4 -	10 ng - 3 μg/ml	25 μg	tlr-hprnalv
5'ppp-dsRNA	5'Triphosphate blunt-end double-stranded RNA	TLR2 -/ TLR4 -	300 ng - 1 μg/ml	25 μg 100 μg	tlr-3prna tlr-3prna-100
5'ppp-dsRNA/LyoVec™	5'ppp-dsRNA/LyoVec™ complexes	TLR2 -/ TLR4 -	300 ng - 1 μg/ml	25 μg 100 μg	tlr-3prnalv tlr-3prnalv-100
5'ppp-dsRNA Control	Blunt-end double-stranded RNA, control	TLR2 -/ TLR4 -	300 ng - 1 μg/ml	25 μg 100 μg	tlr-3prnac tlr-3prnac-100
5'ppp-dsRNA Control/LyoVec™	5'ppp-dsRNA Control/LyoVec™ complexes	TLR2 -/ TLR4 -	300 ng - 1 μg/ml	25 μg 100 μg	tlr-3prnacvl tlr-3prnacvl-100
RIG-I/MDA-5 Agonists					
Poly(I:C) (HMW)/LyoVec™	Poly(I:C) (HMW)/LyoVec™ complexes	TLR2 -/ TLR4 -	100 ng - 1 μg/ml	100 μg	tlr-piclv
Poly(I:C) (LMW)/LyoVec™	Poly(I:C) (LMW)/LyoVec™ complexes	TLR2 -/ TLR4 -	100 ng - 1 μg/ml	100 μg	tlr-picwlv
CLR LIGANDS					
Dectin-1 Agonists					
Beta-Glucan Peptide	Beta-glucan from <i>Trametes versicolor</i>	TLR2 -/ TLR4 -	1 - 100 μg/ml	50 mg	tlr-bgp
Curdlan	Beta-1,3-glucan from <i>Alcaligenes faecalis</i>	TLR2 -/ TLR4 -	100 μg/ml	1 g	tlr-curd
HKCA	Heat-killed <i>Candida albicans</i>	TLR2 -/ TLR4 -	10 ⁸ cells/ml	10 ⁹ cells	tlr-hkca
Laminarin	Soluble beta-glucan from <i>Laminaria digitata</i>	TLR2 +/ TLR4 -	1 - 100 μg/ml	100 mg	tlr-lam
Pustulan	Beta-glucan from <i>Lasallia pustulata</i>	TLR2 -/ TLR4 -	1 - 100 μg/ml	100 mg	tlr-pst
Scleroglucan	Beta-glucan from <i>Sclerotium rolfisii</i>	TLR2 +/ TLR4 +	1 - 100 μg/ml	100 mg	tlr-scg
WGP Dispersible	Whole Glucan Particles, insoluble	TLR2 -/ TLR4 -	1 - 200 μg/ml	50 mg	tlr-wgp
WGP Soluble	Whole Glucan Particles, soluble	TLR2 -/ TLR4 -	1 ng - 1 μg/ml	50 mg	tlr-wgps
Zymosan	Cell wall preparation from <i>S. cerevisiae</i>	TLR2 +/ TLR4 -	1 - 10 μg/ml	100 mg	tlr-zyn
Zymosan Depleted	Hot alkali treated zymosan	TLR2 -/ TLR4 -	100 μg/ml	10 mg	tlr-zyd
Dectin-2 Agonist					
Furfurman	Malassezia furfur cell wall preparation	TLR2 -/ TLR4 -	100 ng - 10 μg/ml	10 mg	tlr-ffm

PRR Ligands

*To ensure the **absence** of bacterial contaminants (i.e. lipoproteins and endotoxins), TLR2 and TLR4 activation has been assessed by cellular assays.

PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
Mincle Agonists					
β -GlcCer NEW	Synthetic β -glucosylceramide	TLR2-/TLR4-	1-10 μ g/ml	5 mg	tlrl-bglcer
GlcC ₁₄ C ₁₈	Glucosyl-6-tetradecyloctadecanoate	TLR2 -/ TLR4 -	10 ng - 1 μ g/ml	2 mg	tlrl-gcc
HKMT	Heat Killed <i>Mycobacterium tuberculosis</i>	TLR2 +/ TLR4 -	10 - 100 μ g/ml	10 mg 50 mg	tlrl-hkmt-1 tlrl-hkmt-5
TDB	Synthetic analog of the cord factor	TLR2 -/ TLR4 -	1 - 100 μ g/ml	2 mg	tlrl-tdb
TDB VacciGrade™	Preclinical grade TDB	VacciGrade™	1 - 100 μ g/mouse	2 mg	vac-tdb
TDB-HS15	Formulated TDB	TLR2 -/ TLR4 -	0.3 - 100 μ g/ml	2 mg	tlrl-stdb
TDM	Trehalose-6,6-dimycolate; also known as cord factor	TLR2 -/ TLR4 -	300 ng-10 μ g/ml	2 mg	tlrl-tdm
CDS & STING LIGANDS					
CDS Agonists					
ODN TTAGGG (A151)	Inhibitory ODN, human preferred	TLR2 -/ TLR4 -	100 nM - 10 μ M	200 μ g 1 mg	tlrl-ttag151 tlrl-ttag151-1
dsDNA-EC	<i>E. coli</i> K12 genomic DNA	TLR2 -/ TLR4 -	30 ng - 1 μ g/ml	200 μ g	tlrl-ecdna
G3-YSD	Y-form DNA	TLR2 -/ TLR4 -	100 ng - 1 μ g/ml	200 μ g	tlrl-ydna
G3-YSD Control	Control for Y-form DNA	TLR2 -/ TLR4 -	100 ng - 1 μ g/ml	200 μ g	tlrl-ydnac
HSV-60 Naked	HSV1-derived 60 bp oligonucleotide	TLR2 -/ TLR4 -	30 ng - 10 μ g/ml	200 μ g	tlrl-hsv60n
HSV-60 LyoVec™	Precomplexed HSV1-derived 60 bp ODN	TLR2 -/ TLR4 -	300 ng - 10 μ g/ml	100 μ g	tlrl-hsv60c
HSV-60c Naked	Control for HSV-60 ODN	TLR2 -/ TLR4 -	30 ng - 10 μ g/ml	200 μ g	tlrl-hsv60cn
HSV-60c/LyoVec™	Precomplexed control for HSV-60 ODN	TLR2 -/ TLR4 -	300 ng - 10 μ g/ml	100 μ g	tlrl-hsv60cc
ISD Naked	Interferon stimulatory DNA	TLR2 -/ TLR4 -	100 ng - 10 μ g/ml	200 μ g	tlrl-isdn
ISD/LyoVec™	Precomplexed interferon stimulatory DNA	TLR2 -/ TLR4 -	300 ng - 10 μ g/ml	100 μ g	tlrl-isdc
ISD Control Naked	Non-immunostimulatory ODN	TLR2 -/ TLR4 -	100 ng - 10 μ g/ml	200 μ g	tlrl-isdcn
ISD Control/LyoVec™	Precomplexed non-immunostimulatory ODN	TLR2 -/ TLR4 -	300 ng - 10 μ g/ml	100 μ g	tlrl-isdcc
Poly(dA:dT) Naked	Poly(dA-dT)•poly(dT-dA)	TLR2 -/ TLR4 -	1 - 5 μ g/ml	200 μ g 1 mg	tlrl-patn tlrl-patn-1
Poly(dA:dT)/LyoVec™	Poly(dA-dT)•poly(dT-dA)/LyoVec™ complexes	TLR2 -/ TLR4 -	1 - 5 μ g/ml	100 μ g	tlrl-patc
Poly(dA:dT)/Rhodamine	Rhodamine labeled poly(dA-dT)•poly(dT-dA)	TLR2 -/ TLR4 -	30 ng - 10 μ g/ml	10 μ g	tlrl-patrh
Poly(dG:dC) Naked	Poly(dG-dC)•poly(dG-dC)	TLR2 -/ TLR4 -	10 ng - 10 μ g/ml	200 μ g	tlrl-pgcn
Poly(dG:dC)/LyoVec™	Poly(dG-dC)•poly(dG-dC)/LyoVec™ complexes	TLR2 -/ TLR4 -	10 ng - 10 μ g/ml	100 μ g	tlrl-pgcc
VACV-70 Naked	Vaccinia virus-derived 70 bp oligonucleotide	TLR2 -/ TLR4 -	30 ng - 10 μ g/ml	200 μ g	tlrl-vav70n
VACV-70/LyoVec™	Precomplexed vaccinia virus-derived 70 bp ODN	TLR2 -/ TLR4 -	300 ng - 10 μ g/ml	100 μ g	tlrl-vav70c
VACV-70c Naked	Control for VACV-70 ODN	TLR2 -/ TLR4 -	30 ng - 10 μ g/ml	200 μ g	tlrl-vav70cn
VACV-70c/LyoVec™	Precomplexed control for VACV-70 ODN	TLR2 -/ TLR4 -	300 ng - 10 μ g/ml	100 μ g	tlrl-vav70cc
STING Agonists					
2'2'-cGAMP	2'5'-2'5' Cyclic GMP-AMP	TLR2 -/ TLR4 -	100 ng - 100 μ g/ml	500 μ g 1 mg	tlrl-nacga22 tlrl-nacga22-1
2'3'-cGAMP	2'5'-3'5' Cyclic GMP-AMP	TLR2 -/ TLR4 -	100 ng - 100 μ g/ml	200 μ g 500 μ g 1 mg 5 mg	tlrl-nca23-02 tlrl-nacga23 tlrl-nacga23-1 tlrl-nacga23-5
2'3'-cGAMP Control	Linear dinucleotide analog of 2'3'-cGAMP	TLR2 -/ TLR4 -	100 ng - 100 μ g/ml	1 mg	tlrl-nagpap
2'3'-cGAMP VacciGrade™	Preclinical grade 2'5'-3'5' cyclic GMP-AMP	VacciGrade™	5 - 50 μ g/mouse	1 mg	vac-nacga23
2'3'-cGAM(PS)2 (Rp/Sp)	Bis-phosphorothioate analog of 2'3'-cGAMP	TLR2 -/ TLR4 -	100 ng - 100 μ g/ml	250 μ g	tlrl-nacga2srs
2'3'-c-di-AMP	Synthetic analog of c-di-AMP	TLR2 -/ TLR4 -	1 - 100 μ g/ml	500 μ g	tlrl-nacda23
2'3'-c-di-AM(PS)2 (Rp,Rp)	Bisphosphorothioate analog of 2'3'-c-di-AMP	TLR2 -/ TLR4 -	0.1-10 μ g/ml	100 μ g 500 μ g	tlrl-nada2r-01 tlrl-nacda2r
2'3'-c-di-AM(PS)2 (Rp,Rp) VacciGrade™	Preclinical grade of bisphosphorothioate analog of 2'3'-c-di-AMP	VacciGrade™	5-50 μ g/mouse	500 μ g	vac-nacda2r

PRR Ligands

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PRODUCT	ORIGIN/DESCRIPTION	GRADE*	WORKING CONCENTRATION	QTY	CATALOG CODE
STING Agonists					
2'3'-c-di-GMP	Synthetic analog of c-di-GMP	TLR2 -/ TLR4 -	1 - 100 μg/ml	500 μg	tlrl-nacd23
3'3'-cGAMP	3'5'-3'5' Cyclic GMP-AMP	TLR2 -/ TLR4 -	100 ng - 100 μg/ml	500 μg 1 mg 5x0.5 mg	tlrl-nacga tlrl-nacga-1 tlrl-nacga-2.5
3'3'-cGAMP Control	Linear dinucleotide analog of 3'3'-cGAMP	TLR2 -/ TLR4 -	100 ng - 100 μg/ml	1 mg	tlrl-nagpap
3'3'-cGAMP Fluorinated	Difluor cyclic [G(3',5')pA(3',5')p]	TLR2 -/ TLR4 -	100 ng - 10 μg/ml	100 μg	tlrl-nacgaf
cAIMP (CL592)	Cyclic [A(3',5')pI(3',5')p]	TLR2 -/ TLR4 -	300 ng - 30 μg/ml	500 μg	tlrl-nacai
cAIMP Difluor (CL614)	Difluor cyclic [A(3',5')pI(3',5')p]	TLR2 -/ TLR4 -	100 ng - 30 μg/ml	250 μg	tlrl-nacaidf
cAIM(PS)2 Difluor (Rp/Sp)	Difluor and bisphosphorothioate analog of cAIMP	TLR2 -/ TLR4 -	100 ng - 30 μg/ml	100 μg	tlrl-nacairs
c-di-AMP	3'5' Cyclic di-AMP	TLR2 -/ TLR4 -	1 - 100 μg/ml	1 mg 5 x 1 mg	tlrl-nacda tlrl-nacda-5
c-di-AMP Control	Linear dinucleotide analog of c-di-AMP - pApA	TLR2 -/ TLR4 -	1 - 100 μg/ml	1 mg	tlrl-napapa
c-di-AMP Vaccigrade™	Sterile 3'5' cyclic di-AMP	Vaccigrade™	5 - 50 μg/mouse	1 mg	vac-nacda
c-di-AMP Fluorinated	Difluoro [A(3',5')pA(3',5')p]	TLR2 -/ TLR4 -	300 ng - 30 μg/ml	100 μg	tlrl-nacdaf
c-di-GMP	3'5' Cyclic di-GMP	TLR2 -/ TLR4 -	10 - 100 μg/ml	1 mg 5 x 1 mg	tlrl-nacd2g tlrl-nacd2g-5
c-di-GMP Control	Linear dinucleotide 5'-pGpG; negative control for c-di-GMP	TLR2 -/ TLR4 -	10 - 100 μg/ml	1 mg	tlrl-napggg
c-di-GMP Vaccigrade™	Preclinical grade of cyclic [G(3',5')pG(3',5')p]	Vaccigrade™	5 - 50 μg/mouse	1 mg	tlrl-nacd2g
c-di-GMP Fluorinated	Difluoro cyclic [G(3',5')pG(3',5')p]	TLR2 -/ TLR4 -	3 - 100 μg/ml	100 μg	tlrl-nacd2gf
c-di-IMP	Cyclic [I(3',5')pI(3',5')p]	TLR2 -/ TLR4 -	10 - 100 μg/ml	1 mg	tlrl-nacdi
c-di-UMP	Negative control for c-di-IMP	TLR2 -/ TLR4 -	1 - 100 μg/ml	1 mg	tlrl-nacdu
DMXAA	5,6-dimethyl-xanthenone-4-acetic acid	TLR2 -/ TLR4 -	10 - 100 μg/ml	5 mg	tlrl-dmx
CDS & STING Inhibitors					
G140	NEW Human cGAS inhibitor	TLR2-/TLR4-	1 - 20 μM	2 mg	inh-g140
RU.521	NEW Murine cGAS inhibitor	TLR2-/TLR4-	200ng/ml - 20μg/ml	2 mg	inh-ru521
H-151	NEW Synthetic Indole Derivative - STING Inhibitor	TLR2-/TLR4-	4 ng/ml - 4 μg/ml	10 mg	inh-h151
AhR Ligands					
AhR Agonists					
Indirubin	NEW 2-(2-oxo-1H-indol-3-ylidene)-1H-indol-3-one	TLR2-/TLR4-	25 - 100 μM	10 mg	tlrl-indb
FICZ	6-Formylindolo[3,2-b]carbazole	TLR2 -/ TLR4 -	50 ng - 5 μg/ml	1 mg	tlrl-ficz
ITE	1' H-indole-3'-carbonyl)-thiazole-4-carboxylic acid methyl ester	TLR2 -/ TLR4 -	1 - 30 μM	10 mg	tlrl-ite
L-Kynurenine	Beta-Anthraniloyl-L-Alanine	TLR2 -/ TLR4 -	10 - 100 μg/ml	10 mg 5x10mg	tlrl-kyn tlrl-kyn-5
AhR Antagonists					
CH-223191	2-methyl-2H-pyrazole-3-carboxylic acid	TLR2 -/ TLR4 -	1 - 30 μM	10 mg	inh-ch22

PRR Reporter Cells

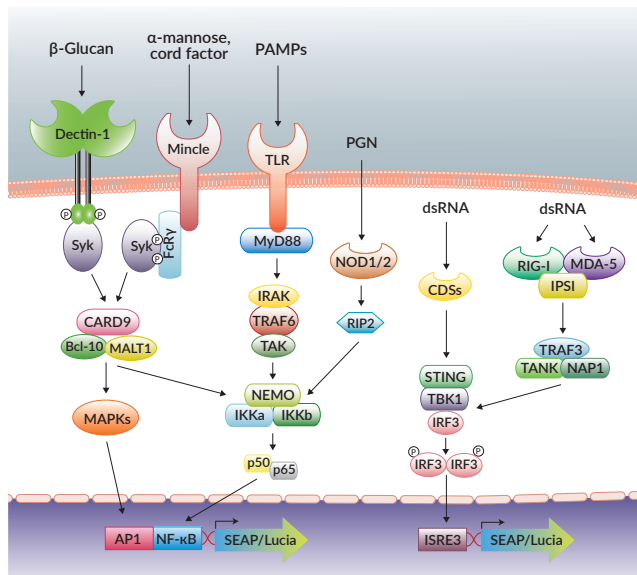
Non-Immune Reporter Cells

Cells that constitutively overexpress a given functional PRR gene are valuable tools for many applications, such as the study of the mechanisms involved in PRR recognition or signaling, and the development of novel therapeutic targets. InvivoGen provides human embryonic kidney (HEK)-293 cells that stably express a PRR gene as well as an NF- κ B-inducible SEAP (secreted embryonic alkaline phosphatase) reporter gene to specifically monitor the activation and downstream signaling of a number of PRRs.

HEK293-derived reporter cells

PRODUCT	CAT. CODE (human)	CAT. CODE (mouse)
HEK-Blue™ TLR2 Cells	hkb-htlr2	hkb-mtlr2
HEK-Blue™ TLR2-TLR1 Cells	hkb-htlr21	-
HEK-Blue™ TLR2-TLR6 Cells	hkb-htlr26	-
HEK-Blue™ TLR3 Cells	hkb-htlr3	hkb-mtlr3
HEK-Blue™ TLR4 Cells	hkb-htlr4	hkb-mtlr4
HEK-Blue™ TLR5 Cells	hkb-htlr5	hkb-mtlr5
HEK-Blue™ TLR7 Cells	hkb-htlr7	hkb-mtlr7
HEK-Blue™ TLR8 Cells	hkb-htlr8	hkb-mtlr8
HEK-Blue™ TLR9 Cells	hkb-htlr9	hkb-mtlr9
HEK-Blue™ TLR13 Cells	-	hkb-mtlr13
HEK-Blue™ NOD1 cells	hkb-hnod1	hkb-mnod1
HEK-Blue™ NOD2 cells	hkb-hnod2	hkb-mnod2
HEK-Blue™ Dectin1b cells	hkb-hdect1b	hkb-mdect1b

For the complete list of non-immune PRR reporter cells please visit www.invivogen.com/hek-293



Immune Reporter Cells

Cells of the immune system, including lymphocytes, monocytes, and macrophages, naturally express a large repertoire of PRRs. InvivoGen has developed stable reporter cells in several well-established immune cell models. These immune reporter cells stably express the Lucia luciferase (encoding a secreted luciferase) and/or SEAP reporter genes under the control of specific inducible promoters allowing to efficiently and conveniently monitor the activity of PRR ligands.

Variety of immune cells

- Human Jurkat T lymphocytes
- Human Ramos B lymphocytes
- Mouse RAW 264.7 macrophages
- Human THP-1 monocytes

InvivoGen's immune reporter cells can be used to study their physiological response to PRR ligands. In addition, some immune reporter cells have been modified (either by overexpression or knock-out of co-receptors) to provide enhanced or diminished responses to specific ligands.

Single or dual pathway studies

- NF- κ B/AP-1 and/or IRF

Choice of two secreted reporter genes

- SEAP and/or Lucia luciferase

Levels of SEAP and Lucia luciferase can be determined from the same cell supernatant using the highly-sensitive detection reagents QUANTI-Blue™ and QUANTI-Luc™, respectively.

PRR reporter cells are provided with the appropriate selective antibiotic(s) and are guaranteed mycoplasma-free.

PRODUCT	CAT. CODE
Jurkat-Dual™ (NF- κ B-Lucia, IRF-SEAP)	jktd-isnf
Ramos-Blue™ (NF- κ B-SEAP)	rms-sp
Ramos-Blue™ KD-MyD (NF- κ B-SEAP)	rms-kdmyd
RAW-Blue™ (NF- κ B-SEAP)	raw-sp
RAW-Blue™ ISG (IRF-SEAP)	raw-isg
RAW-Lucia™ ISG (IRF-Lucia)	rawl-isg
RAW-Lucia™ ISG-KO-cGAS (IRF-Lucia)	rawl-kocgas
RAW-Lucia™ ISG-KO-IFI16 (IRF-Lucia)	rawl-koif16
RAW-Lucia™ ISG-KO-IRF3 (IRF-Lucia)	rawl-koirf3
RAW-Lucia™ ISG-KO-STING (IRF-Lucia)	rawl-kostg
THP1-Blue™ ISG (IRF-SEAP)	thp-isg
THP1-Blue™ NF- κ B (NF- κ B-SEAP)	thp-nfkb
THP1-Lucia™ ISG (IRF-Lucia)	thpl-isg
THP1-Dual™ (NF- κ B-SEAP, IRF-Lucia)	thpd-nfis
THP1-Dual™ KO-MyD (NF- κ B-SEAP, IRF-Lucia)	thpd-komyd

For the complete list of immune PRR reporter cells visit: www.invivogen.com/reporter-cells