

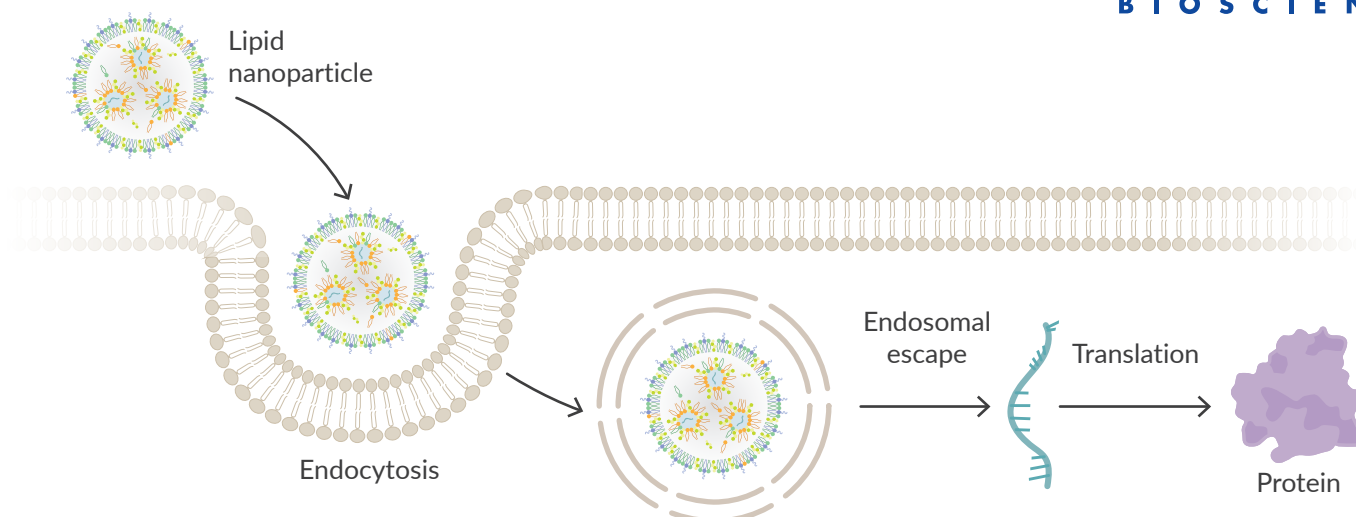
# Lipid-Based Drug Delivery Tools

Lipid-based drug delivery (LBDD) systems, like lipid nanoparticles (LNPs), liposomes, solid lipid nanoparticles (SLNs), and nanostructured lipid carriers (NLCs), show great potential in overcoming the limitations of conventionally formulated drugs, enhancing their therapeutic efficacy. Cayman supports the development of LBDD systems from formulation to validation. We offer an expansive collection of research tools for the preparation of LBDD particles, as well as contract services for custom lipid synthesis, LNP and lipoplex formulation, and LBDD system characterization.



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*LNPs are internalized by target cells via endocytosis. During endosomal escape, cationic lipids become positively charged in the acidic environment of the endosome, disrupting the endosomal membrane and releasing the oligonucleotides into the cytosol, where translation occurs.*

## Discover Tools for Lipid Nanoparticles

**Accelerate your therapeutic discovery  
with Cayman's Lipid Nanoparticle  
Exploration Kits**

**LNP-102 Exploration Kit**

Item No. 35425

**LNP-0315 Exploration Kit**

Item No. 35426

### FEATURES:

- Prepare SM-102- or ALC-0315-containing LNPs
- Includes a complete set of conveniently packaged reagents
- Encapsulate mRNA or siRNA cargo
- Eliminate the need for specialized equipment

### FEATURED INSIDE

- | COVID-19 vaccine components
- | High-purity lipids
- | ELISAs & multiplex assays for immune responses
- | Toxicity assays

An Introduction to Lipid Nanoparticle Formulation:

## BASIC CONCEPTS & PREPARATION PROCEDURES

Includes simple protocols & tips to start exploring LNPs

READ THE ARTICLE

[www.caymanchem.com/LNP-intro](http://www.caymanchem.com/LNP-intro)

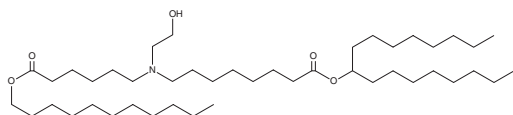
# High-Purity LBDD Components

## Cationic Lipids

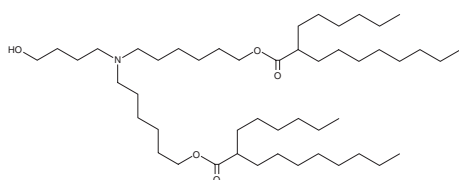
Cationic lipids are used in LNPs to encapsulate oligonucleotides and promote endosomal escape. Cayman offers both ionizable cationic lipids and permanently charged cationic lipids to suit your application.

### FEATURED PRODUCTS

#### SM-102 - Item No. 33474



#### ALC-0315 - Item No. 34337



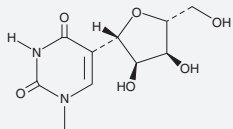
SM-102 and ALC-0315 are ionizable cationic lipids ( $pK_a$ s = 6.68 and 6.09, respectively) that have been used in mRNA-based COVID-19 vaccines.

Item No.	Product Name
34366	93-O17O
34367	93-O17S
34363	DLin-KC2-DMA
34364	DLin-MC3-DMA
25726	1,2-Dioleoyl-3-dimethylammonium-propane (DODAP)
15109	1,2-Dioleoyloxy-3-dimethylamino-propane (DODMA)
15110	1,2-Dioleoyl-3-trimethylammoniumpropane (DOTAP) (chloride)
35051	L-319
34372	Lipid 5
35337	Lipid 29

See all cationic lipids for LBDD at [www.caymanchem.com](http://www.caymanchem.com)

### FEATURED PRODUCT

#### 1- Methylpseudouridine - Item No. 35401



A nucleoside analog that increases the thermodynamic and biological stability of RNA. It has been incorporated into mRNA for COVID-19 vaccines.

## Neutral Phospholipids

Neutral phospholipids have a role in membrane fusion and can be used to modify the net surface charge of the LBDD particle.

### Phosphocholines (PCs)

Item No.	Product Name
15097	1,2-Dimyristoyl- <i>sn</i> -glycero-3-PC (1,2-DMPC)
15098	1,2-Dioleoyl- <i>sn</i> -glycero-3-PC (1,2-DOPC)
10009473	1,2-Dipalmitoyl- <i>sn</i> -glycero-3-PC (1,2-DPPC)
34800	Phosphatidylcholines (soy)
15102	1-Palmitoyl-2-oleoyl- <i>sn</i> -glycero-3-PC (1,2-POPC)

### Phosphoethanolamines (PEs)

Item No.	Product Name
15091	1,2-Dioleoyl- <i>sn</i> -glycero-3-PE (1,2-DOPE)
15092	1,2-Dipalmitoyl- <i>sn</i> -glycero-3-PE (1,2-DPPE)

See all neutral phospholipids for LBDD at [www.caymanchem.com](http://www.caymanchem.com)

## Anionic Lipids

Anionic lipids prevent particle aggregation during storage.

### Phosphoserines (PSs)

Item No.	Product Name
29983	1,2-Dioleoyl- <i>sn</i> -glycero-3-PS (1,2-DOPS) (sodium salt)
15088	1,2-Dipalmitoyl- <i>sn</i> -glycero-3-PS (1,2-DPPS) (sodium salt)
25847	Phosphatidylserines (soy) (sodium salt)

### Phosphoglycerols (PGs)

Item No.	Product Name
15084	1,2-Dilauroyl- <i>sn</i> -glycero-3-PG (1,2-DLPG) (sodium salt)
15085	1,2-Dimyristoyl- <i>sn</i> -glycero-3-PG (1,2-DMPG) (sodium salt)
20957	1,2-Dioleoyl- <i>sn</i> -glycero-3-PG (1,2-DOPG) (sodium salt)
15086	1,2-Dipalmitoyl- <i>sn</i> -glycero-3-PG (1,2-DPPG) (sodium salt)
25846	Phosphatidylglycerols (egg) (sodium salt)
15105	1-Palmitoyl-2-oleoyl- <i>sn</i> -glycero-3-PG (1,2-POPG) (sodium salt)

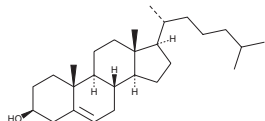
See all anionic lipids for LBDD at [www.caymanchem.com](http://www.caymanchem.com)

## Sterol Lipids

Sterol lipids provide stability to the LBDD particle and promote membrane fusion. Some sterol lipids are used as emulsifiers in SLNs and NLCs.

### FEATURED PRODUCT

#### Cholesterol - Item No. 9003100



A major sterol produced in mammalian cells. It is a component of various LBDD systems, where it has a role in membrane fusion and stability.

Item No.	Product Name
25698	Cholesteryl Hemisuccinate
26439	Cholesteryl Myristate
26472	Cholesteryl Oleate
16943	DC-Chol (hydrochloride)
29176	Dehydrocholic Acid
18231	Deoxycholic Acid (sodium salt hydrate)
26584	HAPC-Chol
20253	Lithocholic Acid
26585	MHAPC-Chol

See all sterol lipids for LBDD at [www.caymanchem.com](http://www.caymanchem.com)

## Glycerolipids

Item No.	Product Name
26847	1,2,3-Tridocosanoyl Glycerol
23336	1,2,3-Trilauroyl Glycerol
26952	1,2,3-Trioctanoyl Glycerol
26871	1,2,3-Trioleoyl Glycerol
23334	1,2,3-Tripalmitoyl Glycerol
23335	1,2,3-Tristearoyl Glycerol

See all glycerolipids for LBDD at [www.caymanchem.com](http://www.caymanchem.com)

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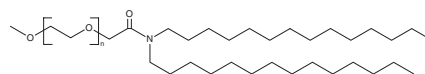
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## PEGylated Lipids

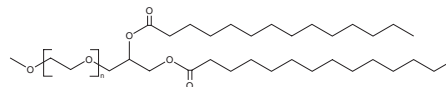
PEGylated lipids prevent opsonization, improving particle stability and increasing its bioavailability. Some PEGylated lipids also contain terminal functional groups, which are used to conjugate targeting molecules.

### FEATURED PRODUCTS

#### ALC-0159 - Item No. 34336



#### DMG-PEG(2000) - Item No. 33945



ALC-0159 and DMG-PEG(2000) are PEGylated lipids that have been used in mRNA-based COVID-19 vaccines.

Item No.	Product Name
34650	DPPE-MPEG(2000)
26000	DSPE-PEG(2000)-amine (sodium salt)
34272	DSPE-PEG(2000) Maleimide (ammonium salt)
28181	DSPE-MPEG(2000) (sodium salt)
33360	DSPE-MPEG(2000) (ammonium salt)

## Sphingolipids

Item No.	Product Name
10007946	C16 Sphingomyelin (d18:1/16:0)
31559	Sphingomyelins (buttermilk)
62570	Sphingosine-1-phosphate (d18:1)

See all sphingolipids for LBDD at [www.caymanchem.com](http://www.caymanchem.com)

## Small Molecule Cargo

LNPs are superior for the encapsulation of oligonucleotides, whereas other LBDD systems are preferable for the delivery of small molecules.

Explore more than 4,700 small molecule inhibitors available at Cayman

# Target Assessment

Target assessment is a critical part of drug discovery that shows therapeutic efficacy of LBDD systems.

## Monitor Endosomal Escape

Endosomal escape is the process by which LNP cargo is delivered to the cytosol.

Item No.	Product Name
16221	Calcein
30752	Cy5 (triethylamine salt)
10011443	LAMP1 Monoclonal Antibody (Clone Ly1C6)
25152	LysoBrite™ Blue

[See all fluorescent probes at www.caymanchem.com](http://www.caymanchem.com)

## Reporter Assays

Determine the effects of LNP cargo on the target of interest or outcomes on downstream signaling events. Cayman has partnered with INDIGO Biosciences to provide nuclear receptor assay kits.

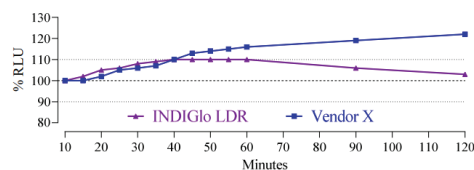
[See all reporter assays at www.caymanchem.com](http://www.caymanchem.com)

## Tools for Luciferase Detection

LNPs with mRNA encoding the reporter protein firefly luciferase are used to determine efficacy and biodistribution.

### INDIGlo Luciferase Detection Reagent Kit Item No. 36495

Quantitate luciferase activity in mammalian reporter cells expressing firefly luciferase



- Perform with homogenous or non-homogenous strategies
- Emitted light is stable for 2 hrs
- Supplied in a ready-to-use format

### Luciferase Assay Reagents

Item No.	Product Name
20398	Luciferase (firefly, recombinant)
25836	D-Luciferin

# Immunogenicity & Toxicity

The safety of an LBDD system depends on the balance between immunogenicity and toxicity. Cayman offers ELISAs and multiplexed assays to measure target protein and antibody responses.

## Cytokine Detection Assays

Item No.	Product Name
583301	Interleukin-1 $\alpha$ (human) ELISA Kit
583311	Interleukin-1 $\beta$ (human) ELISA Kit
501030	Interleukin-6 (human) ELISA Kit
583371	Interleukin-6 (mouse) ELISA Kit
28325	Q-Plex™ Human Cytokine - Inflammation (9-plex)
28332	Q-Plex™ Mouse Cytokine - Inflammation (14-plex)

[See all cytokine detection assays at www.caymanchem.com](http://www.caymanchem.com)

## Antibody ELISA Kits

Item No.	Product Name
501240	Mouse IgG ELISA Kit
500830	Anti-Ovalbumin IgG1 (mouse) ELISA Kit
500840	Anti-Ovalbumin IgE (mouse) ELISA Kit

[See all primary and secondary antibodies for ELISA at www.caymanchem.com](http://www.caymanchem.com)

## Cellular & Liver Toxicity Assays

Item No.	Product Name
601170	LDH Cytotoxicity Assay Kit
701640	Aspartate Aminotransferase Colorimetric Activity Assay Kit
700260	Alanine Transaminase Colorimetric Activity Assay Kit

### Learn how researchers used Cayman's assays to evaluate LNP liver toxicity

Ionizable Lipid Nanoparticles for In Utero mRNA Delivery

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