



## LipidLaunch™ MC3 LNP Kit (Loadable)

---

Item No. 502868

[www.caymanchem.com](http://www.caymanchem.com)

Customer Service 800.364.9897

Technical Support 888.526.5351

1180 E. Ellsworth Rd • Ann Arbor, MI • USA

## TABLE OF CONTENTS

|                            |    |                                   |
|----------------------------|----|-----------------------------------|
| <b>GENERAL INFORMATION</b> | 3  | Materials Supplied                |
|                            | 3  | Safety Data                       |
|                            | 4  | Precautions                       |
|                            | 4  | If You Have Problems              |
|                            | 5  | Storage and Stability             |
|                            | 5  | Materials Needed But Not Supplied |
| <b>INTRODUCTION</b>        | 6  | Background                        |
|                            | 7  | About This Kit                    |
| <b>PREPARATION</b>         | 8  | Reagent Preparation               |
| <b>PROTOCOL</b>            | 9  | Reagent Protocol                  |
|                            | 12 | Example Data                      |
| <b>RESOURCES</b>           | 14 | Troubleshooting                   |
|                            | 14 | References                        |
|                            | 15 | Notes                             |
|                            | 15 | Warranty and Limitation of Remedy |

## GENERAL INFORMATION

### Materials Supplied

Kit will arrive packaged as a -80°C kit. After opening the kit, store individual components as stated below.

| Item Number | Item Name                       | Quantity/Size | Storage Temperature |
|-------------|---------------------------------|---------------|---------------------|
| 401055      | LipidLaunch™ MC3 LNP (Loadable) | 2 vials       | -80°C               |
| 401053      | LNP Dilution Buffer D (1X)      | 1 vial/20 ml  | -20°C               |
| 400812      | LNP Encapsulation Buffer Tablet | 1 tablet      | RT                  |

If any of the items listed above are damaged or missing, please contact our Customer Service department at (800) 364-9897 or (734) 971-3335. We cannot accept any returns without prior authorization.



**WARNING: THIS PRODUCT IS FOR RESEARCH ONLY - NOT FOR HUMAN OR VETERINARY DIAGNOSTIC OR THERAPEUTIC USE.**

### Safety Data

This material should be considered hazardous until further information becomes available. Do not ingest, inhale, get in eyes, on skin, or on clothing. Wash thoroughly after handling. Before use, the user must review the complete Safety Data Sheet, which has been sent *via* email to your institution.

## Precautions

**Please read these instructions carefully before beginning this assay.**

The reagents in this kit have been tested and formulated to work exclusively with Cayman Chemical's LipidLaunch™ MC3 LNP Kit (Loadable).

## If You Have Problems

### Technical Service Contact Information

**Phone:** 888-526-5351 (USA and Canada only) or 734-975-3888

**Email:** techserv@caymanchem.com

In order for our staff to assist you quickly and efficiently, please be ready to supply the lot number of the kit (found on the outside of the box).

## Storage and Stability

Kit components should be stored as directed in the Materials Supplied section (see page 3) and used before the expiration date indicated on the outside of the box.

## Materials Needed But Not Supplied

1. A source of nuclease-free water. Pure water - glass-distilled or deionized - may not be acceptable.
2. Adjustable pipettes; multichannel or repeating pipettor recommended

## Background

Lipid nanoparticles (LNPs) are a subset of lipid-based drug delivery (LBDD) systems that utilize ionizable cationic lipids, such as DLin-MC3-DMA (MC3), for the delivery of nucleic acid payloads to cells.<sup>1,2</sup> LNPs are typically composed of four types of lipids: a cationic or ionizable cationic lipid, a helper phospholipid, a PEGylated lipid, and cholesterol. Release of LNP cargo into target cells is heavily influenced by the ionizable cationic lipid component, which undergoes protonation in the acidic environment of the endosomes, resulting in membrane disruption and release of cargo into the cell.<sup>3</sup> MC3 is an ionizable cationic aminolipid that has been used in combination with other lipids in the formation of LNPs for the delivery of cargos, such as mRNA, siRNA, and plasmid DNA *in vitro* and *in vivo*.<sup>4-6</sup> In mice, MC3-containing LNPs have been shown to accumulate in the muscle, non-draining lymph nodes, and spleen.<sup>6</sup> Cayman's LipidLaunch™ MC3 LNP Kit (Loadable) uses the ionizable cationic aminolipid MC3 to facilitate efficient payload delivery in research models with reduced toxicity compared to traditional methods.

## About This Kit

Cayman's LipidLaunch™ MC3 LNP Kit (Loadable) provides cargo-ready, empty, MC3 LNPs. These LNPs are capable of rapid encapsulation of nucleic acids, without the need for incubation steps, enabling subsequent delivery to target cells or other downstream research applications. LipidLaunch™ LNPs (Loadable) demonstrate very low toxicity compared to traditional lipid-based transfection methods.

Conventionally loaded LNPs typically require specialized equipment to ensure consistent control of particle size, while also requiring large reaction volumes. LipidLaunch™ MC3 LNPs (Loadable) enable users to encapsulate cargo in low reaction volumes offering greater flexibility in the scale of preparation while preserving costly nucleic acid cargo.

LipidLaunch™ MC3 LNP (Loadable) performance is dependent on a variety of factors, including cargo type and cell line, so optimization of these parameters is necessary. To aid in optimization, consider using Cayman's LipidLaunch™ LNP Screening Set (Loadable) (Item No. 502868) or LipidLaunch™ MC3 LNPs preloaded with luciferase mRNA (Item No. 40108).

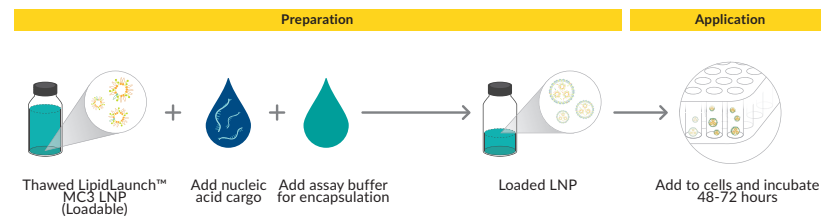


Figure 1. Protocol summary

## Reagent Preparation

### 1. LipidLaunch™ MC3 LNP (Loadable) - (Item No. 401055)

Each vial contains 150 µl of LipidLaunch™ MC3 LNP (Loadable). After thawing, store on ice. Invert the vial or pipette up and down 2-3 times to fully mix. Each vial of MC3 LNPs provides sufficient volume to transfect up to 50 wells using 24-well plates. Once thawed, the loadable LNPs are stable for up to one week when stored at 4°C. If not using all at once, the loadable LNPs may be frozen and stored at -80°C for up to one month. Do not subject to more than one freeze-thaw cycle.

### 2. LNP Dilution Buffer D (1X) - (Item No. 401053)

This vial contains 20 ml LNP Dilution Buffer D (1X). This optional reagent is intended for optimizing the cargo:LNP loading ratio prior to encapsulation (see [Cargo Encapsulation](#), page 10).

### 3. Encapsulation Buffer Preparation

Dissolve the LNP Encapsulation Buffer Tablet (Item No. 400812) in 10 ml of sterile-filtered nuclease-free water. The Encapsulation Buffer will be stable for six months when stored at 4°C.

## Reagent Protocol

### General Information

- LNP loading can be performed at room temperature.
- If not using loaded LNPs immediately, store at 4°C. Do not freeze.
- It is recommended to use loaded LNPs within one week. Stability of loaded LNPs may vary depending on the cargo type and handling prior to loading.
- Loaded LNPs can be diluted directly into culture medium or a neutral buffer of choice.
- If transfecting cells, optimal expression is typically observed using 0.5-2 µl of loaded LNPs per 100 µl of medium.
- Loaded LNPs may be sterile-filtered using 0.2 µm polyethersulfone (PES) syringe filters without affecting performance.

## 1. Cargo Encapsulation

- Prepare cargo in nuclease-free water. If using RNA, it is recommended to optimize by initially loading with 10-100 ng/ $\mu$ l.
- Loadable LNPs may be optionally diluted with LNP Dilution Buffer D (1X) prior to encapsulation.
- LNPs are loaded by adding reagents in a specific order:
  1. Gently mix loadable LNPs with cargo.
  2. Add Encapsulation Buffer to complete loading.
- Cargo and LNP volumes can be varied, however, **it is necessary that the volume of Encapsulation Buffer added is one-third the combined volume of cargo and LNP.**
- Table 1, below, shows an example of recommended loading volumes. Scale accordingly.

| Procedure                  | Volume     |
|----------------------------|------------|
| Add Loadable LNP           | 20 $\mu$ l |
| Add Cargo                  | 4 $\mu$ l  |
| Pipette up and down to mix |            |
| Add Encapsulation Buffer   | 8 $\mu$ l  |
| Pipette up and down to mix |            |

Table 1. Recommended initial loading conditions

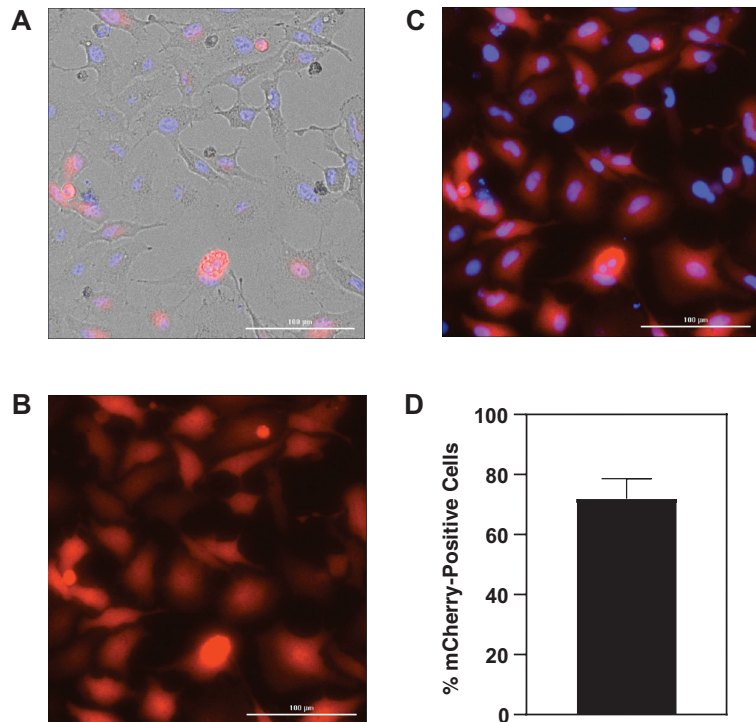
## 2. Characterization

A variety of techniques are available to characterize LNPs prior to *in vitro* or *in vivo* use.

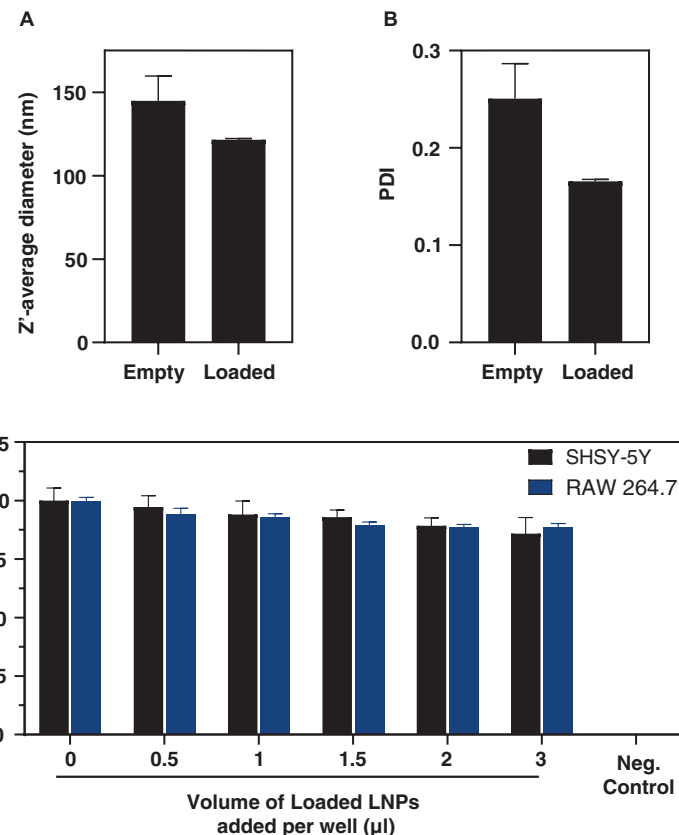
| Attribute                          | Assay(s)  |
|------------------------------------|---|
| Particle size and distribution     | Dynamic light scattering (DLS)                                  |
| Zeta potential                     | Laser doppler electrophoresis                                   |
| Lipid quantification and integrity | RP-HPLC, SE-HPLC, IP-HPLC                                       |
| Encapsulation efficiency           | Fluorescent dyes (RiboGreen); UV spectroscopy with Triton X-100 |
| LNP morphology                     | Microscopy (cryo TEM, ESEM, AFM)                                |
| Translation or knockdown analyses  | Cell-based reporter assays, Western blotting                    |

Table 2. LNP attributes and corresponding assays. Adapted from Schoenmaker, L., *et al.*<sup>7</sup>

## Example Data



**Figure 2.** Typical transfection results with mCherry mRNA-loaded LipidLaunch™ MC3 LNPs (Loadable). A549 cells were transfected with loadable LNPs following encapsulation of mCherry mRNA (2  $\mu$ l LNP, 200 ng mRNA per 100  $\mu$ l medium). Fluorescence images were collected at 20X magnification 72 hours later (Bar size: 100  $\mu$ m); (A) Brightfield/mCherry/Hoechst merge, (B) mCherry, (C) mCherry/Hoechst merge, (D) The transfection efficiency was determined by scoring the percentage of mCherry-positive cells.



**Figure 3.** Characterization of mCherry mRNA-loaded LipidLaunch™ MC3 LNPs (Loadable). (A) The average loaded particle size and (B) polydispersity index (PDI) were determined via DLS. (C) The viability of SHSY-5Y and RAW 264.7 cells transfected with mCherry mRNA-loaded (100 ng/well) LNPs was determined via Cayman's Resazurin Cell Viability Assay Kit (Item No. 702540) 48 hours following transfection. Negative control wells were incubated with Triton-X 100.

## Troubleshooting

| Problem                       | Possible Causes  | Recommended Solutions   |
|-------------------------------|--|---|
| Poor encapsulation efficiency | A. RNA/cargo is degraded<br>B. Reagents added in incorrect order<br>C. RNA was prepared incorrectly<br>D. Suboptimal cargo:LNP ratio | A. Use fresh RNA/cargo<br>B. Ensure cargo and LNP are mixed prior to adding the Encapsulation Buffer<br>C. Dissolve RNA in nuclease-free water<br>D. Optimize cargo concentration and cargo:LNP ratio |

## References

- Mitchell, M.J., Billingsley, M.M., Haley, R.M., *et al. Nat. Rev. Drug Discov.* **20(2)**, 101-124 (2021).
- Viegas, C., Patrício, A.B., Prata, J.M., *et al. Pharmaceutics* **15**, 1593 (2023).
- Han, X., Zhang, H., Butowska, K., *et al. Nat. Commun.* **12**, 7233 (2021).
- Jayaraman, M., Ansell, S.M., Mui, B.L., *et al. Angew. Chem. Int. Ed. Engl.* **51(34)**, 8529-8533 (2012).
- Li, Z., Yang, Z., Lapidus, R.G., *et al. Am. J. Cancer Res.* **5(10)**, 3098-3110 (2015).
- Algarni, A., Pilkington, E.H., Suys, E.J.A., *et al. Biomater. Sci.* **10(11)**, 2940-2952 (2022).

## Warranty and Limitation of Remedy

Buyer agrees to purchase the material subject to Cayman's Terms and Conditions. Complete Terms and Conditions including Warranty and Limitation of Liability information can be found on our website.

This document is copyrighted. All rights are reserved. This document may not, in whole or part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form without prior consent, in writing, from Cayman Chemical Company.

©03/27/2026, Cayman Chemical Company, Ann Arbor, MI, All rights reserved. Printed in U.S.A.

