

DC65682 | RCB-4-8

Instructions for Use

RCB-4-8 is a biodegradable ionizable lipid nanoparticle (LNP) engineered for efficient pulmonary mRNA delivery and in vivo genome editing, as detailed in the primary research article "Combinatorial design of nanoparticles for pulmonary mRNA delivery and genome editing" (Li et al., Nature Biotechnology 2023). Synthesized from a combinatorial library of 720 biodegradable lipids via a three-component reaction system, RCB-4-8 features an alkyne-containing lipid tail and tertiary amine headgroup, optimized through high-throughput screening for superior lung-targeting capabilities. Its unique molecular design incorporates hydrolyzable ester and carbonate groups, enabling rapid biodegradation (<30% lung retention at 48 h vs. >90% for conventional lipids) while maintaining high transfection efficiency. When formulated with DOTAP instead of DOPE, RCB-4-8 LNPs achieved 100-fold higher luciferase mRNA expression in murine lungs compared to FDA-approved MC3 LNPs and mediated 95% GFP knockout in vitro. In Ai9 reporter mice, intratracheal delivery of RCB-4-8 loaded with Cre mRNA edited 53% of total lung cells after three doses, while codelivery with Cas9 mRNA/sgRNA yielded 7.2% tdTomato⁺ cells, rising to 17% when combined with AAV-sgRNAs. With an optimal particle size of 85.7 nm (PDI 0.11) and >87% mRNA encapsulation, RCB-4-8 supports repeat dosing and represents a transformative platform for inhalable gene therapies targeting congenital lung diseases like cystic fibrosis.

Product information

CAS No.	Not available
Chemical Name	RCB-4-8
Formula	C ₆₈ H ₁₂₀ N ₂ O ₁₀
M.Wt	1,125.7
Purity	ELSD-HPLC>95%
Storage	Original product: up to 1 year under the storage conditions stated on the vial, kept tightly sealed. Stock solutions: aliquots at -20°C, generally up to one month.
Shipping condition	Ships from Shanghai. Pure lipid is stable during ice-pack transport.

Formulation & study context

Literature values apply to the cited study only. Administration routes describe research, not clinical instructions.

A complete product-specific formulation has not been verified. No standard ratio is substituted.

N/P ratio	Not reported in the verified record
Cargo	Not available in the verified record
Administration route	Not available in the verified record
Animal model	Not available in the verified record

Formulation process Not available in the verified record

N/P is a nitrogen-to-phosphate molar ratio. Lipid:cargo mass ratio is a different quantity and must not be used as N/P.

Stock-solution preparation table

Calculated using product-page MW: 1125.7 g/mol. Volumes are final solution volumes.

Mass	1 mM	5 mM	10 mM
10 mg	8.883 mL	1.777 mL	0.888 mL
25 mg	22.208 mL	4.442 mL	2.221 mL
50 mg	44.417 mL	8.883 mL	4.442 mL
100 mg	88.834 mL	17.767 mL	8.883 mL
250 mg	222.084 mL	44.417 mL	22.208 mL

Volume (mL) = mass (mg) × 1000 / [MW (g/mol) × concentration (mM)]. Mathematical conversions only; not measured solubility. Confirm solvent compatibility and the exact material before preparation.

Handling & storage

Provided that storage conditions are as stated on the product vial and the vial is kept tightly sealed, the product can be stored for up to 1 year.

Wherever possible, prepare and use solutions on the same day. If stock solutions must be prepared in advance, store them as aliquots in tightly sealed vials at -20°C. Generally, these will be usable for up to one month.

Before use, and prior to opening the vial, allow the product to equilibrate to room temperature for at least 1 hour.

References

Li, B., Manan, R.S., Liang, S.-Q., et al. Combinatorial design of nanoparticles for pulmonary mRNA delivery and genome editing. Nat. Biotechnol.