

DC67564 | C-a16

Instructions for Use

C-a16 is an ionizable lipid engineered through Mannich reaction chemistry, designed to revolutionize mRNA delivery by synergizing high efficiency with minimized immune activation. Synthesized by reacting a phenolic tail derivative, formaldehyde, and a branched tertiary amine core under optimized ethanol conditions, this lipid integrates antioxidant phenol groups directly into its structure. These phenol moieties serve as intrinsic radical scavengers, effectively neutralizing intracellular reactive oxygen species that typically degrade mRNA and trigger inflammation. In lipid nanoparticle formulations, C-a16 constitutes the functional backbone, enabling superior mRNA encapsulation efficiency while maintaining a stable nanoparticle size of approximately 80–100 nm. Critically, it outperforms conventional lipids like DLin-MC3-DMA by achieving significantly higher target-protein expression in vivo alongside markedly reduced pro-inflammatory cytokine secretion. The antioxidant capability is not incidental but fundamental—quenching the phenol groups drastically diminishes both ROS suppression and delivery efficacy, confirming the design's mechanistic elegance. C-a16 represents a paradigm shift: its biomimetic antioxidant architecture addresses the chronic trade-off between delivery potency and immunogenicity, unlocking safer therapeutic applications for vaccines and gene therapies.

Product information

CAS No.	Not available
Chemical Name	C-a16
Formula	C72H112O6N4
M.Wt	1,129.71
Purity	>98%
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: 1129.71 g/mol. Volumes are final solution volumes.

Mass	1 mM	5 mM	10 mM
10 mg	8.852 mL	1.770 mL	0.885 mL
25 mg	22.130 mL	4.426 mL	2.213 mL
50 mg	44.259 mL	8.852 mL	4.426 mL
100 mg	88.518 mL	17.704 mL	8.852 mL
250 mg	221.296 mL	44.259 mL	22.130 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

Mannich reaction-based combinatorial libraries identify antioxidant ionizable lipids for mRNA delivery with reduced immunogenicity-N Gong, D Kim, MG Alameh, R El-Mayta, EL Han- Nature Biomedical ..., 2025