

DC67281 | BNT-51

Instructions for Use

BNT-51 is an ionizable thiolipid developed by Biontech, characterized by its sulfur-containing moieties and a multiarm dendron-like architecture. Synthesized via reactions between amine-containing compounds and sulfur-based halides or sulfonates, it forms stable lipid nanoparticles (LNPs) optimized for mRNA delivery. The LNPs exhibit uniform particle size (80–100 nm, PDI <0.2), near-neutral zeta potential, and high mRNA encapsulation efficiency (>90%), while maintaining payload integrity through freeze-thaw cycles and extended storage. In vitro, BNT-51 demonstrates low cytotoxicity (>80% cell viability in C2C12, HepG2, and HEK293 cells) and superior transfection efficiency compared to conventional lipids, particularly in immune cells such as CD4+/CD8+ T cells within PBMCs. Its modular design allows integration of stealth lipids (e.g., PEG or vitamin E derivatives) to prolong circulation time and minimize immune activation, as evidenced by low hemolysis and complement activation risks. In vivo, BNT-51-based LNPs enable targeted mRNA delivery to splenic macrophages, achieving potent genome editing (e.g., Cre mRNA) and therapeutic protein expression (e.g., BACH1) in preclinical models. With its tunable structure, robust stability, and cell-specific tropism, BNT-51 holds promise for advancing mRNA therapeutics in gene editing, cancer immunotherapy, and regenerative medicine, offering a versatile platform for next-generation nanomedicine.

Product information

CAS No.	Not available
Chemical Name	BNT-51
Formula	C47H99O5N3S2
M.Wt	850.45
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: 850.45 g/mol. Volumes are final solution volumes.

Mass	1 mM	5 mM	10 mM
10 mg	11.758 mL	2.352 mL	1.176 mL
25 mg	29.396 mL	5.879 mL	2.940 mL
50 mg	58.792 mL	11.758 mL	5.879 mL
100 mg	117.585 mL	23.517 mL	11.758 mL
250 mg	293.962 mL	58.792 mL	29.396 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

Not available