

CHEMPHYSICHEM

Supporting Information

Lamellar versus Micellar Structures—Aggregation Behavior of a Three-Chain Cationic Lipid Designed for Nonviral Polynucleotide Transfer

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Analytical Data of DiTT4 and Precursors:

Precursor B (ditetradecylmalonic acid monoethyl ester):

C₃₃H₆₄O₄; M = 524.9 g mol⁻¹; white crystals; yield: 54 %; melting point 33-35 °C; ESI-MS: 1047.6 [2M-H]⁻; elemental analysis: calc. C 75.52 H 12.29, found C 75.56 H 12.04; ¹H-NMR [CDCl₃, 400 MHz, 27 °C] δ[ppm]= 0.88 [t, ³J(H,H) = 7.0 Hz, 3H; -(CH₂)₂CH₃]; 1.25-1.36 [m, 27H; -CH₂-alkyl, -OCH₂CH₃]; 1.87-1.98 [m, 2H; (-CH₂)CH(COEt)COOH]; 3.37 [t, ³J(H,H) = 7.3 Hz, 1H; (-CH₂)CH(COEt)COOH]; 4.23 [q, ³J(H,H) = 7.1 Hz, 2H; -OCH₂CH₃]

Precursor B (2-[(N-{6-[(tert.-butoxycarbonyl)amino]-1-oxo-1-[(N-tetradecyl)amino]hexan-(2S)-2-yl]amino)carbonyl]-2-tetradecylhexadecan acid):

C₅₆H₁₀₉N₃O₆, M = 920.48 g mol⁻¹; white waxy solid; yield: 92 %; melting point: 47-52 °C; ESI-MS: 919,6 [M-H]⁻; elemental analysis: calc. C 71.67 H 11.92 N 4.48 (C₅₆H₁₀₉N₃O₆+1×H₂O), found C 72.00 H 11.78 N 4.68, ¹H-NMR [CDCl₃, 500 MHz, 27 °C] δ[ppm]= 0.88 [t, ³J(H,H) = 6.9 Hz, 9H; 3×-(CH₂)₂CH₃]; 1.13-2.03 [m, 91H; -CH₂-alkyl, -(CH₂)₃CH₂NHBOC, -OC(CH₃)₃]; 3.04-3.24 [m, 4H; -CH₂NHBOC, -CH₂NHCO-]; 4.38-4.40 [m, 1H; -COCH(NHCO-)CH₂-]; 4.65 [s, 1H; -NHBOC]; 6.27 [s, 1H; -NHCO-]; 7.48 [s, 1H; -NHCO-]

DiTT4 (N-[6-amino-1-oxo-1-(N-tetradecylamino)hexan-(2S)-2-yl]-N'-{2-[N,N-bis(2-aminoethyl)amino]ethyl}-2,2-ditetradecylpropan diamide):

C₅₇H₁₁₇N₇O₃; M: 948,58 g mol⁻¹; colorless waxy solid; yield: 80 %; ESI-MS: 948,9 [M+H]⁺; HRMS: calc. 948.9291 Da (C₅₇H₁₁₈N₇O₃ [M+H]⁺) found 948.9323 Da; ¹H-NMR: [CDCl₃, 500 MHz, 27 °C] δ[ppm]= 0.87 [t, ³J(H,H) = 6.9 Hz, 9H; 3×-CH₃]; 1.13-1.94 [m, 82H; -CH₂-alkyl, -(CH₂)₃CH₂NH₂]; 2.57-2.65 [m, 6H; -CH₂N(CH₂CH₂NH₂)₂]; 2.72-2.80 [m, 2H; lysin-CH₂NH₂]; 2.85 [t, ³J(H,H) = 5.1 Hz, 4H; 2×-CH₂NH₂]; 3.12-3.39 [m, 4H; 2×-CH₂NHCO-]; 4.58-4.62 [m, 1H; -COCH(NHCO-)CH₂-]; 7.63 [t, ³J(H,H) = 5.2 Hz, 1H; -NHCO-]; 7.37 [d, ³J(H,H) = 7.5 Hz, 1H; -COCH(NHCO-)CH₂-]; 8.46 [t, ³J(H,H) = 4.4 Hz, 1H; -NHCO-]; ¹³C-NMR [CDCl₃, 125 MHz, 27 °C] δ[ppm]= 14.1, 22.7, 24.98, 25.04, 27.0, 29.3, 29.48, 29.51, 29.52, 29.64, 29.65, 29.7, 29.89, 29.90, 30.8, 31.9, 32.3, 36.6, 37.3, 37.4, 39.1, 39.6, 40.8, 52.6, 53.9, 55.0, 57.3, 171.4, 172.5, 174.5