Lipids for conjugation – The key to targeted LNPs

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Lipid nanoparticles (LNPs) have become pivotal carriers for nucleic acids, specifically RNA and DNA, yet achieving precise tissue- or cell-specific delivery remains a major challenge [1]. Surface conjugation of targeting ligands, enabled by functionalized PEG-lipids such as DSPE-PEG-maleimide, DSPE-PEG-NHS, or DSPE-PEG-azide, provides a versatile strategy to modulate biodistribution and promote receptor-specific uptake [2]. These conjugatable lipids support bioconjugation chemistries including maleimide–thiol, NHS–amine, and azide–DBCO click reactions, enabling covalent attachment of antibodies, peptides, or small-molecule ligands. Recently, bioorthogonal systems such as tetrazine–TCO have emerged as rapid, selective, and catalyst-free alternatives, further advancing conjugation strategies [2]. Such surface functionalization enhances targeting precision, circulation stability, and overall therapeutic efficacy, making it a cornerstone of next-generation LNP design.

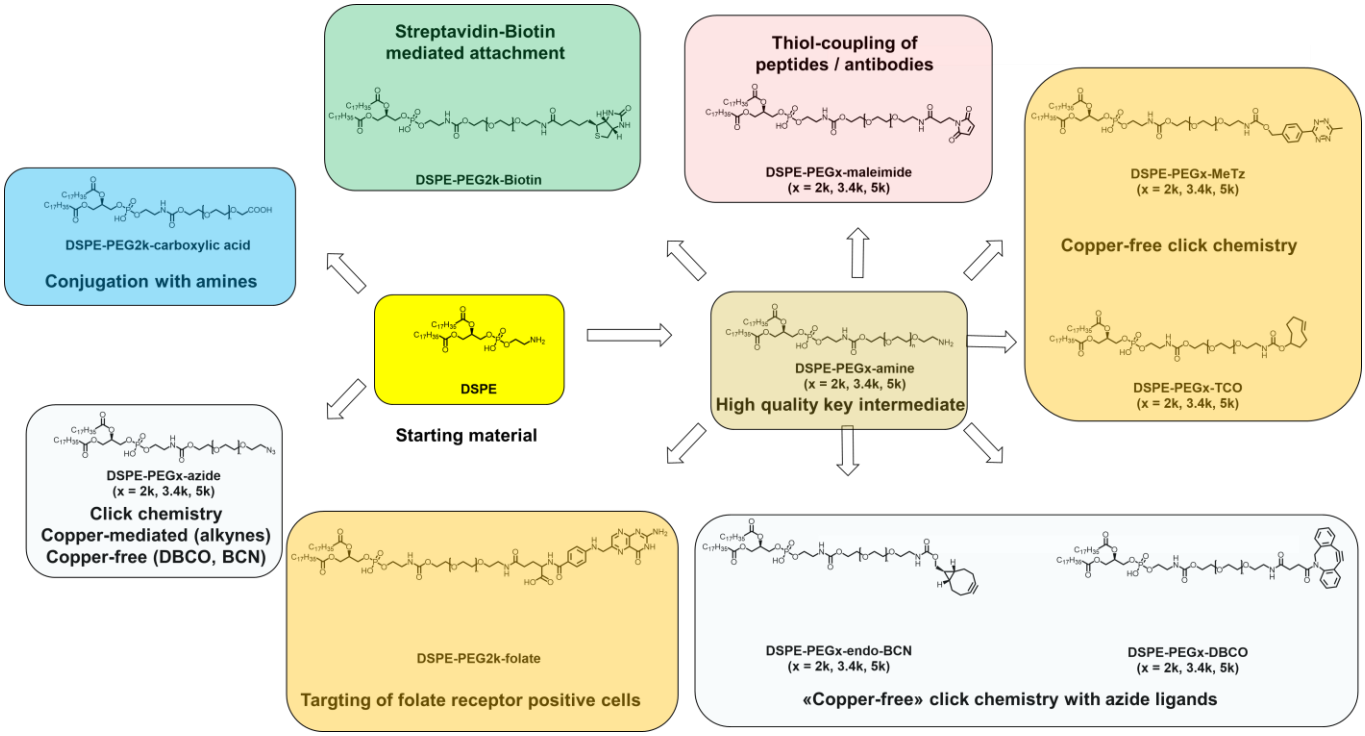

Figure 1: Lipids for conjugation – product range

While being a powerful tool, the scale-up of conjugation technology remains challenging. Conjugation efficiency is critically impacted by both quality of the lipids used as well as the stability of the conjugation agents under the conditions of LNP formulation and conjugation. Having control over the critical parameters impacting the stability of the conjugation agents during formulation and conjugation is a must to

ensure both reproducibility and scalability. At CordenPharma we achieve this control by combing a quality-by-design development approach with state-of-the-art technologies, leveraging on decades of experience and expertise in consistently delivering a wide range of high-quality lipids to support our customers' needs.

[1] Tenchov R., Sasso J. M., Zhou, Q. A., *Bioconjugate Chem.* **2023**, *34*, 941-960.
[2] Gao, P., *Beilstein J. Nanotechnol*. **2025**, *16*, 1914-1930.