

Investigating Temperature and Ph-Dependent Phase Behavior of Lipid Nanoparticles With Small Angle X-Ray Scattering.

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Lipid nanoparticles (LNPs) have emerged as promising vaccine systems due to their ability to encapsulate messenger RNA and target specific cells. However, the stability and performance of LNPs are highly dependent on their structural properties, which can be influenced by environmental factors such as temperature and pH. By performing small angle x-ray scattering (SAXS) measurements, the size, shape, and internal structure of LNPs can be characterized under different conditions, providing insights into their stability and potential applications.

In this study, we investigated the structural properties of DSPC/DLin- DSPC/Cholesterol/MC3/DMG-PEG LNPs encapsidating RNA using SAXS measurements with a laboratory instrument (Xenocs Xeuss 3.0) across a range of temperatures and pH. Through these measurements, we can gain insight into the phase transitions observed in lipid nanoparticles, which can contribute to developing more effective and stable LNP-based drug delivery systems.