Special Issue

Nucleic Acid-Lipid Interactions: Bridging Molecular Insights with Therapeutic Applications

Message from the Guest Editors

Interactions between nucleic acids and lipid membranes are central to many biological and therapeutic processes—from DNA condensation in confined organelles to RNA delivery in lipid-based vectors. Lipid interfaces provide a tunable environment for organizing nucleic acids into functional assemblies, affecting their structure, dynamics, and accessibility. While DNA–lipid condensation has been studied in the context of gene packaging and delivery, recent advances highlight the equally crucial role of RNA–lipid interactions in both cellular regulation and therapeutic design. This Special Issue seeks to provide a comprehensive view of lipid–nucleic acid interactions, with a particular emphasis on structural transitions, condensation behavior, and the underlying physical mechanisms. We welcome contributions that integrate experimental techniques (e.g., SAXS, Cryo-EM, NMR, X-ray crystallography) with theoretical and computational modeling (e.g., MD simulations, data-driven approaches, machine learning). Studies that combine these approaches to unravel how membrane properties, ion distributions, and molecular architecture dictate nucleic acid behavior are particularly encouraged.

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Biomolecules is a multidisciplinary open-access journal that reports on all aspects of research related to biogenic substances, from small molecules to complex polymers. We invite manuscripts of high scientific quality that pertain to the diverse aspects relevant to organic molecules, irrespective of the biological question or methodology. We aim for a competent, fair peer review and rapid publication. Please look at some of the exciting work that has been published in *Biomolecules* so far. We would be delighted to welcome you as one of our authors.

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