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Advanced Research on Structure–Function Relationships of Membrane Proteins

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Recent developments in the methodology of structure determination are providing high-resolution structures of membrane proteins, and a number of high-resolution structures of membrane proteins have been reported (~3.9% of PDB in 2026). Solid-state NMR spectroscopy does not require crystallization and is not restricted by the upper limits to molecular weight. Solution NMR spectroscopy was recently used to determine structures of membrane proteins using nanodisc as a membrane mimic system. For X-ray crystallography, it is becoming possible to determine structures of membrane proteins using membrane or membrane mimic systems to form the crystals. The recently developed time-resolved method allows for determining the structure of short-lived intermediates of membrane proteins. Attention is now being focused on cryo-electron microscopy, as it is a powerful method for determining the structure of membrane proteins using two-dimensional crystals. The determination of membrane protein structure based on single-molecular observation has been become possible.



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