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The effect of the detergent micelles type on the tetrapeptide NAc-SFVG-OMe conformational structure: NMR studies in solution

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Abstract

Process determination of short peptides binding on the cell surface has major implications in better understanding the molecular recognition of cell surfaces. As such methods as on-cell nuclear magnetic resonance (NMR) spectroscopy are very difficult, a large number of membrane mimetic systems such as bilayers, bicelles and detergent micelles use. Micelles are the most frequently used membrane mimetics for the structure determination of peptides and proteins by solution NMR. Anionic detergents such as SDS can be more denaturing than the other types, non-ionic micelles being the mildest. Zwitterionic detergent micelles such as DPC are used to mimic eukaryote membranes while the negatively charged SDS micelles would resemble bacterial membranes. Unfortunately, no rules apply when searching for the right detergent. In present paper we studied the effect of the detergent micelles (sodium dodecyl sulfate (SDS) and dodecylphosphocholine (DPC)) on the tetrapeptide SFVG conformational structure. Was shown that the peptide backbone structure is the same in both types of micelles but the sidechain orientation of nonpolar aromatic (Phenylalanine), aliphatic (Glycine) and polar uncharged (Serine) groups are different.

Keywords

Detergent, Membrane mimetics, NMR, Oligopeptides, Protein structure