Specific anion adsorption on dodecyl phosphocholine micelles

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Specific ion effects have been examined for a long time [1]. Considerable progress in the understanding of specific salt effects has been made in recent years, although the complete elucidation of the mechanism of specific ion action still remains a challenge [2]. In this presentation we use scattering methods to examine the micelles of the zwitterionic lipid dodecyl-phosphocholine (DPC) as a model-system to study specific ion effects. DPC is a single-chain analogue of the phosphatidyl-cholines, major constituents of biological membranes.

In older work it was found that the specific anion effects on the cmc of DPC are rather small, but a noticeable effect on the micellar size was observed [3,4]. Here we examine the effects of sodium salts of anions of the lyotropic series on the structure of the DPC micelles using a combination of SANS, SAXS, and DLS to obtain a detailed picture of the specific ionic adsorption on the micelles. Electrostatic potentials induced by the micellar adsorption are derived from the scattering results and are correlated to fluorescence R-ratios of ratiometric dyes embedded in the DPC micelles. The electrostatic and structural information is also used to support a cell-model for the micelles, from which the association constants of the anions with the micelles are evaluated. These are compared to analogous constants for ionic adsorption on Langmuir monolayers of related phosphatidyl cholines.