

Reconsideration of a structural model of a casein micelle for small-angle X-ray scattering measurements

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要旨

The structure of casein micelles has been extensively studied over several decades, and a variety of models have been proposed to depict the structure of bovine casein micelles. However, the exact structure of casein micelles remains unclear. The interpretation of small-angle X-ray scattering (SAXS) profiles in relation to the internal structure of the casein micelle is also an ongoing debate. In this study, a structural model of a casein micelle for SAXS measurements was reconsidered by comparing experimentally obtained SAXS profiles with the theoretically calculated curves using various structural models, including the liquid-like submicelle model, aggregate model composed of submicelles, simple nanocluster model in which colloidal calcium phosphate (CCP) randomly disperses in a micelle, the structural model with water channels, and the structural model with water domains. In addition, the micelle model with hard regions proposed by Bouchoux et al. (*Biophys. J.* 99, 3754–3762) was also revisited. This hard region model was improved to the water domain model by changing interpretation of the calculated model. The results show that all the SAXS profiles calculated based on our models, except for the simple nanocluster model, could reproduce features of the experimental profile. However, comparing the parameters obtained by fitting revealed that the structural model with water domains was the most reasonable.