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The Roles of Amphiphilic Additives in Crystallization of Calcium- and Integrin-Binding Protein.

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The interactions leading to crystallization of calcium- and integrin-binding protein (CIB) were characterized in terms of osmotic second virial coefficients (B_{22}) using self-interaction chromatography (SIC). In particular, the role of amphiphilic additives such as short-chain alkanediols in improving crystal growth was investigated. Alkanediols were found to be effective in preventing CIB precipitation at high salt concentrations necessary for crystallization, probably as a result of alkanediol interactions with hydrophobic regions on the protein surface. These insights led to significant improvement in crystal growth and ultimately diffraction to 2.3 Å. Overall, our investigation provides valuable insight into the important roles that amphiphilic additives play, which is essential to developing rational approaches to protein crystallization as well as the applicability of SIC to studying crystallization of novel proteins, particularly those that may otherwise be difficult to crystallize.