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Functional Improvements in Food Proteins in Multiple Aspects by Conjugation with Saccharides: Case Studies of β-Lactoglobulin-Acidic Polysaccharides Conjugates

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Many studies on the conjugates of proteins and saccharides (neoglycoproteins) have been carried out over the past 20 years to improve the function of proteins. However, most have been carried out by attachment or elimination of low-molecular weight molecules for single purposes. The structure-function relationship of the conjugates has not been well understood, and little is known about the improvement of proteins by conjugation with polysaccharides. We sought to achieve functional improvements in food proteins in multiple aspects by conjugation with charged polysaccharides. We chose bovine β-lactoglobulin (β-LG) as the target protein for improvement of the function and attached carboxymethyl dextrans (CMDs) of different molecular weight (10, 40, 70 and 162 kDa) covalently. After conjugation and purification, we explored the structure of the β-LG-CMD conjugates to prove that we could prepare conjugates while maintaining the native-like structure of protein molecule. By conjugation with CMDs, enhancement of thermal stability, improvement in the emulsifying properties and reduction of immunogenicity of β-LG could be achieved. Increases in the CMD content and net charge were viewed as the major factors in the improved emulsifying properties. Conjugation with high saccharide content using polysaccharides of higher molecular weight is believed to be effective in reduced immunogenicity of β-LG.

Keywords: β-lactoglobulin, carboxymethyl dextran, lipocalin, protein conjugation,

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