Novel Salt-Resistant Emulsifier Constructed by Protein-Polysaccharide Conjugation

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We reported that protein-polysaccharide conjugates prepared by spontaneous Maillard reaction in a controlled dry state revealed dramatic improvements of the functional properties of proteins, such as solubility, heat stability and emulsifying properties. The emulsifying properties of the Maillard-type protein-polysaccharide conjugate was remarkably salt-resistant. In order to evaluate the effect of glycosylation on the salt-resistant functional properties of protein on the molecular basis, we constructed two types of glycosylated lysozymes, a small oligomannose chain-linked form and a large polymannose-linked form, by using genetic engineering. cDNA encoding hen egg white lysozyme was subjected to site-directed mutagenesis to obtain the Asn-X-Thr/Ser sequence that is the signal for asparagine-linked glycosylation at the positions 19 and 49. The oligomannosyl and polymannosyl lysozymes were secreted in the yeast carrying cDNAs of G49N and R21T mutants. The polymannosyl lysozymes showed remarkable salt-resistant emulsifying property. As expected, the emulsifying property of polymannosyl lysozyme was much higher than that of oligomannosyl lysozyme. This result suggests that the attachment of polysaccharide is much more effective for the improvements of emulsifying property of proteins than that of oligosaccharide. Both protein-polysaccharide conjugates constructed by Maillard reaction and by genetic engineering showed much more salt-resistant emulsifying properties than commercial emulsifiers.