β-lactoglobulin covalent modification by phycocyanobilin: Effect on protein's techno-functional and IgE binding properties

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β-lactoglobulin (BLG) is the major milk allergen with many techno-functional properties desirable for the food industry. Our previous study demonstrated that phycocyanobilin (PCB), the bioactive pigment of *Spirulina platensis* with many health-promoting effects, covalently binds to BLG at physiological pH via free cysteine residue. To help produce hypoallergenic food, this study explored the possibility of reducing the allergenicity, while at the same time improving the techno-functional properties of BLG. Antioxidant properties, heat-induced changes, pepsin and pancreatin digestibility and IgE binding properties of BLG-PCB covalent adduct were investigated and compared to unmodified protein. BLG-PCB possesses enhanced antioxidative properties, while also being protected by PCB against free-radical induced oxidation. Although thermally as stable as unmodified protein, BLG-PCB is less susceptible to heat-induced oligomerization and aggregation under moderate heat treatment (63 ˚C, 30 min). The surface hydrophobicity of BLG-PCB is lower than that of BLG and, contrary to unmodified BLG, it does not change upon heating. The heating of BLG-PCB decreases its β-sheet content, making it less prone to the formation of amyloid-like structures. Covalently modified protein is more resistant to pepsin and pancreatin digestion in comparison to unmodified protein. Enzyme-linked immunosorbent assay indicated that covalent modification by PCB is effective in reducing the IgE-binding capacity of BLG. Taken together, these results indicate that BLG covalent modification by PCB improves BLG's techno-functional properties, without increasing its IgE binding abilities, thus making it a useful ingredient in the food industry.