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pH-dependent Photodamage of β -lactoglobulin Mediated by Hydrophobic and Hydrophilic Porphyrins NICK FERNANDEZ, FANG TIAN, LORENZO BRANCALEON, University Texas at San Antonio — Dyes like the hydrophobic Protoporphyrin IX (PPIX) and hydrophilic m-Tetraphenylporphine sulfonate (TSPP) bind proteins via non-covalent interactions. The dyes' binding to β -lactoglobulin (β -lg) is pH dependent and their irradiation can generate photochemical events that alter the conformation of the protein. We investigated how the irradiation of the non-covalent complexes, at different pH, contributed to altering the structure of the protein. Our investigation used a combination of optical spectroscopic techniques that probe changes in the conformation of polypeptides. Irradiation of the dyes produces measurable changes in the fluorescence intensity and lifetime of the protein, that could be correlated with conformational of the protein. These changes were most significant above pH 7 where β -lg undergoes a conformational change that makes the binding site more accessible. Above pH 7, irradiation of both PPIX and TSPP produces a 1-2 nm shift in the emission maximum of the protein which does not occur at lower pH values. The effect of irradiation on the emission lifetime of β -lactoglobulin is even more dramatic as it lengthened the average lifetime of the protein's fluorescence from 1.68 to 1.95ns (for PPIX), from 1.53 to 1.98ns (for TSPP). The data suggest that at pH where they have access to the binding site of the protein, PPIX and TSPP have the chance of producing a photochemical reaction that modifies the conformation and damage β -lg.

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