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Direct protein photoinduced conformational changes using porphyrins. LORENZO BRANCALEON, IVAN SILVA, NICHOLAS FERNANDEZ, ERIC JOHNSON, SAMUEL SANSONE, University of Texas at San Antonio — Most proteins functions depend on the interaction with other ligands. These interactions depend on uniquely structured binding sites formed by the folding of the proteins. Ligands can often prompt intended as well as “accidental” protein structural changes. One can foresee that the ability to prompt and control post-translational protein folding could be a powerful tool to investigate protein folding mechanisms but also to inhibit certain proteins or induce new properties to proteins. One possible way to produce such structural disruption is the combination of light and photoactive ligands. This option has been investigated in recent years by exploiting photoisomerization and other properties of non-physiological dyes. We used an alternative approach which uses porphyrins as the “triggers” of structural changes. The advantage of porphyrins is that they can be found naturally in living cells. The photophysical properties of porphyrins can induce local as well as long range effects on the structure of the bound protein. Porphyrins are known to produce structural changes in porphyrin-specific proteins, however the novelty of our results is that we demonstrated that these dyes can also produce structural changes in non-porphyrin-specific globular proteins. We will present an overview of our research to-date in this field and its potential applications.

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