Developing a Sensor to Detect Carbon Monoxide in Live Cells

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At low levels, carbon monoxide is known to serve as an important cellular signaling molecule. The study of carbon monoxide concentrations in living cells is very difficult, however, due to the lack of carbon monoxide sensors that are amenable to in vivo work. Proteins in certain organisms have the ability to bind the molecule carbon monoxide. One of these proteins is the CooA protein, which binds carbon monoxide very selectively in the organism *R. rubrum*. The CooA protein undergoes a large change in shape following the binding of carbon monoxide, and this project aims to develop a carbon monoxide sensor based on this CO-dependent conformational change in CooA. We mutated an amino acid in CooA so that a solvatochromic fluorophore can be attached to CooA. Solvatochromic fluorophores change color in different environments (polar versus non polar, for example). Therefore, once the solvatochromic fluorophore is attached to the CooA protein it will 'glow' one color when there is no CO around and will 'glow' another color when CO is present. This change in color will be due to the different environment that the fluorophore is exposed to following the shape change that CO binding initiates in CooA.

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Kedar and Eddie are both students in the Department of Chemistry's Biochemistry Lab. This lab provides students with the opportunity to work on an original research project during the semester. Both Eddie and Kedar are chemistry majors.

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