Raman Spectroscopic Studies of Cystathionine β-Synthase

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Cystathionine β-synthase (CBS) catalyses the β-replacement reaction of homocysteine and serine to form cystathionine. This is part of the metabolic pathway that converts the amino acid methionine to cysteine *via* the intermediate homocysteine. Mutations in CBS are the major cause of elevated levels of homocysteine in humans, which has been found to cause health problems including dislocated eye lenses, cardiovascular disease, and skeletal abnormalities.

CBS binds a pyridoxal 5'-phosphate (PLP) cofactor, which is the catalytic site for the β-replacement reaction. Mammalian CBS also binds a heme group, iron protoporphyrin IX. The iron is low-spin six-coordinate with histidine and cysteine thiolate axial ligands. The heme and PLP groups are separated by approximately 20 Å. The heme is not involved in the catalytic reaction, but it has been postulated that it plays a role in the regulation of CBS activity. We have used resonance Raman spectroscopy to study this system because it can be used to probe both the heme and PLP cofactors.