

James & Esther King Biomedical Research Program

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*Chemistry and Biochemistry
Florida International University*

*2010 Program
New Investigator Research
(3-year project)*

Project Title: Conformational Dynamics in Vertebrate Hexacoordinate Hemoglobins

Project Summary: Two hexacoordinate heme proteins have recently been discovered in humans and other vertebrates. (Hexacoordinate heme means that there are six ligands in this pocket-shaped protein that hold a heme ion or iron atom in place). Neuroglobin (Ngb) has been found predominantly in brain tissue where it plays an important role in the protection of neuronal tissue under conditions of hypoxia (deprived of adequate oxygen) and ischemic (lack of blood supply) stress. Cytoglobin (Cygb) is found in connective tissue of body organs including lung, heart and brain. The physiological role of this protein has not been fully established; however, evidence points to its role in protecting cells against oxidative stress. Cygb was also associated with several types of cancer including sporadic non-small cell lung cancer, and head and neck cancer. Our long-term goal is to determine the physiological function of Ngb and Cygb and to understand the structure-function relationship in the family of hexacoordinate globins. Our goal in this study is to provide detailed information about ligand-induced changes in the structure of vertebrate hexacoordinated heme proteins and thus provide important insight into the mechanism of ligand interactions with Ngb and Cygb, which will lead to a clearer understanding of the role of these proteins in brain injuries and cancer and ultimately to novel therapeutic targets for the treatment of stroke.