

The Interactions of Small Molecules with Biological Carrier Proteins

Dr. Stefanie R. Whitson (Stefanie-Whitson@utc.edu)

The aims of this project are to characterize the interactions of small organic molecules with carrier proteins found in blood. Sugars and fatty acids, amino and nucleic acid building blocks, steroid hormones, and end-products of normal cellular metabolism are just some of the small molecules which circulate in blood; non-native drug molecules like ibuprofen or acetaminophen are also circulated throughout the vascular system before arriving at target sites. Due to hydrophobic character, many native and non-native molecules require interaction with larger protein molecules to be transported throughout the body, the most abundant of which is serum albumin. In disease states, naturally-produced molecules may become toxic due to imbalances in their normal concentration, saturating carrier proteins that could transport other molecules. This project will examine the binding affinities, modes of possible inhibition, and competition between multiple small molecules for serum albumin. The first project the student will tackle will likely be to determine how the presence of fatty acids affects the binding of ibuprofen to albumin. A variety of experimental methods, including HPLC, fluorescence, UV-Vis spectroscopy, and mass spectrometry will be used in the analysis, coupled with computational methods to examine binding energies.

