Investigation of the Interaction of Halogenated Polyaromatic Hydrocarbons with BSA and The analysis of PAHs levels in Whale Pond Brook

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Abstract

Bovine serum albumin (BSA), a globular protein found in blood, plays an integral role in the body. It is responsible for binding and transporting ligands and fatty acids in the bloodstream. When combined with environmental pollutants, BSA undergoes conformational changes that affect its function as a carrier protein. Studying this interaction will not only shed light on properties of the pollutants in vivo, but will also explain the relationship between the structure and function of BSA.

The pollutants being examined are polyaromatic hydrocarbons (PAHs). They are harmful to both humans and animals because of their carcinogenic nature. PAHs are primarily found in fossil fuels and tar deposits, and are byproducts of incomplete combustion.

The interactions between two PAHs, 1-bromopyrene and 2-chloroanthracene, and BSA were investigated using spectroscopic methods. Fluorescence and synchronous fluorescence spectroscopy revealed that both PAHs quenched the intrinsic fluorescence of BSA. Ultraviolet spectroscopy was used to confirm the existence of static quenching in the interaction process. Together, with 3-D fluorescence, these spectroscopic methods determined that the interaction of BSA with PAHs induces conformational and environmental changes in BSA.

Polychlorinated biphenyls (PCBs) are another class of PAHs. PCBs are persistent organic pollutants because they remain attached to sediment in the environment and are known as one of the greatest impairments to NJ waters. Whale Pond Brook is a stream that runs along Monmouth University and eventually empties into a coastal lake. Whale Pond Brook is heavily polluted by urban run-off, which directly affects its water and surrounding coastal ecosystem. Therefore, the PCB levels in Whale Pond Brook

soil was investigated. Dispersive liquid-liquid microextraction, a trending technique, was used to extract PCBs from the soil samples followed by injection into the gas chromatography-tandem mass spectrometry. The results revealed that there are trace level of PCBs in Whale Pond Brook.