

Journey to Biochemical & Toxicological Research: Dr. Kim's Lab

Life! It is constantly bombarded with biological events which may be harmful or essential for our body. We are interested in biological roles of chemicals called quinones which may triggers benign to severe reactions in our body. Quinones come in many forms around us such as metabolites of Tylenol/other medicines, poison ivy, water treatment byproduct, or food preservatives. Have you ever wondered why Tylenol exhibits poisoning? Do you know how *N*-acetyl-*p*-benzoquinone imine is formed to poison us? How does poison ivy make us feel itchy and give us blisters? Is there any correlation between quinones and certain diseases such as Alzheimer disease which involves protein-misfolding? It goes on and on and you will find out the many things quinones can do in such biological processes through this research, while achieving hands-on skills in biotechnology that are essential in many professional world.

Project Summary: Biological role of PAH quinones

A group of small molecules called polycyclic aromatic hydrocarbons (PAHs) can be found everywhere from grilled meats to cosmetics, medicine, or even from poison ivy. A bad news is PAHs and their metabolites such as PAH quinones are harmful to us [1]. For this project, PAH quinones are the center of interest since they are known to be involved in causing toxic abnormal cell/tissue behavior, therefore leading to cancer. As to how PAH quinones exhibit their activities, it is not clearly understood. Previously, our lab found out that substituted benzoquinones can induce protein modifications in a complex manner [2-5]. In order to examine if PAH quinones can modify proteins, the student will utilize various biotechnologies such as electrophoresis, UV-Vis, fluorescence spectroscopy, microscopy. For more information, check out the published papers of my former research students (posted outside my office).

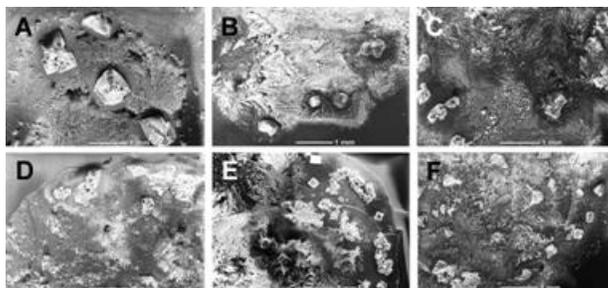
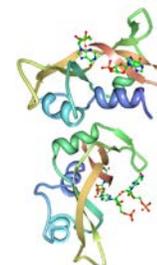


Figure Left. Microscopic images of modified RNase treated with *p*-benzoquinone and salts.

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- [5]. J. Kim; T. V. Albu; A. R. Vaughn; S. M. Kang; E. A. Carver; D. M. Stickle "A comparison study on ribonuclease A modifications induced by substituted *p*-benzoquinones", *Bioorganic Chemistry*, 2015, 59, 106.