



# AMERICAN CHEMICAL SOCIETY KENTUCKY LAKE SECTION

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### KLS-ACS Web Page

<http://kentuckylake.sites.acs.org/>

## February 2013 Kentucky Lake Section Meeting

*Fresh Market Restaurant*

2255 East Wood St, Paris, TN 38242

**Thursday, February 28, 2013**

**Social @ 5:30 pm, Dinner @ 6:00 pm, Presentation @ 7:00 pm**

Menu Choice of:

Grilled chicken or pork chop w/ salad, veggie & potato  
Pasta primavera w/ salad

***The price is \$10 (Students \$5)***

**Presentation: "Environmental Toxicants and Colon Carcinogenesis: a Case Study With Benzo(a)pyrene"**

**Aramandla Ramesh, Ph.D.**

Associate Professor, Department of Biochemistry & Cancer Biology  
Meharry Medical College

See Reverse Side for Abstract & Biographical Sketch

## Comments from the Chair

Greetings everyone. Chemistry is an expansive field. For example, I hope you all enjoyed last month's meeting on a very practical side of chemistry, natural gas fueled vehicles. This month's meeting will focus on a medicinal aspect of chemistry in the fight against colon cancer, and next month will deal with the chemical industry. Variety is the spice of life.

Our section is still accepting nominations for the Howard Huyck Award. If there is an outstanding high school chemistry teacher you would like to nominate, please do so. Nominations will be accepted until this Friday, February 15<sup>th</sup>, and can be submitted via our website. (<http://kentuckylake.sites.acs.org>) While you are there, please take some time to explore. On the website you will have access to a wide variety of information from current newsletters to pictures of last month's meeting. We look forward to seeing you soon.

~Phil Shelton, Chair

## Environmental Toxicants and Colon Carcinogenesis: a Case Study With Benzo(a)pyrene

In the United States alone, around 60,000 lives/year are lost to colon cancer. Diet and environment have been implicated in the development of sporadic colon tumors. Since biotransformation of environmental toxicants is the prime driving force for carcinogenesis, ongoing studies in our laboratory focus on how different dietary ingredients alter the biotransformation of toxicants and susceptibility to colon cancer. Since our daily diet consists of fatty foods, we examined the effect of dietary fat on the development of colon tumors. We have chosen an ubiquitous environmental toxicant benzo(a)pyrene (BaP) and a transgenic mouse model for our studies. Benzo(a)pyrene was administered to Apc<sup>Min</sup> mice in unsaturated fat (USF; peanut oil) and saturated fat (SF; coconut oil) and BaP in tricaprylin (TC), at doses of 50 and 100 µg/kg via oral gavage over a 60-day period. Blood, colon and liver were collected at the end of exposure period. Benzo(a)pyrene exposure through dietary fat altered its metabolic fate in a dose-dependent manner, with 100 µg/kg dose group registering an elevated expression of BaP biotransformation enzymes, greater concentration of BaP metabolites, BaP-DNA adducts and more adenomas compared to the 50 µg/kg dose group. This effect was more pronounced for saturated fat group compared to the unsaturated fat group. These findings establish that BaP in saturated fat causes sustained induction of biotransformation enzymes and extensive metabolism of this toxicant. As a consequence, the reactive metabolites such as epoxides and quinones generated in colon and liver bind with DNA, form adducts resulting in colon tumors in a subchronic exposure regimen. Experiments are in progress to understand how obesity exacerbates the progression of colon tumors. Additionally, we are also investigating how olive oil (chief constituent of Mediterranean diet) and resveratrol (a phytochemical present in grapes, berries & citrus fruits) inhibit the development of colon tumors. In addition to our ongoing research, the scope for future studies in this area from the context of health disparities will be discussed.

### Aramandla Ramesh, Ph.D.



Dr. Aramandla Ramesh is an Associate Professor in the Department of Biochemistry & Cancer Biology at Meharry Medical College in Nashville, TN. Dr. Ramesh earned his first Ph.D. in Marine Microbiology from Annamalai University, India in 1986. He earned his second Ph.D. in Environmental Toxicology from Ehime University, Japan in 1992. His areas of expertise are bioavailability, toxicokinetics, and biotransformation, acute and subchronic toxicity of polycyclic aromatic hydrocarbons (PAHs). Current research in Dr. Ramesh's laboratory focuses on colon cancer caused by benzo(a)pyrene (BaP), a fat-soluble, widely distributed environmental chemical that belongs to the PAH family of compounds. Studies in his laboratory have shown that exposure of rats and mice to BaP and other PAHs through saturated fat cause induction of cytochrome P450 (CYP) family of enzymes resulting in the formation and distribution of reactive metabolites which stay in target tissues for a longer time and cause enhanced DNA damage. Ongoing research in his laboratory will eventually address the issue of how environmental factors (exposure to toxicants) and dietary practices (excessive intake of animal meat and fat products tainted with BaP) contribute to colorectal cancer in African Americans (third leading cause of cancer related mortalities) relative to other

racial/ethnic groups.

Dr. Ramesh has extensively published in environmental chemistry & toxicology (more than 50 peer-reviewed publications, and 6 book chapters). He successfully completed 4 National Institutes of Health (NIH)-funded projects in toxicology & chemical carcinogenesis. Two more projects are in progress. Dr. Ramesh served as a consultant to the Common Wealth Foundation, UK, International Development Research Centre, Canada, and Natural Environment Research Council (NERC), UK. He is also serving as a reviewer for research proposals submitted to the NIH, Robert Wood Johnson Foundation, and NERC, UK. Dr. Ramesh also serves on the editorial boards of *Toxicology Mechanisms & Methods*, *ISRN Toxicology*, and *Polycyclic Aromatic Compounds*.