ANNUAL REPORT: 2011-2012

May 1, 2011 to April 30, 2012

I. Officers/Committees:

Officers

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<td>Vice President</td>
<td>Ken Voss</td>
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<td>Vice President-Elect</td>
<td>James Griffiths</td>
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<td>Secretary/Treasurer</td>
<td>Timothy Phillips</td>
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<td>Past President</td>
<td>Jia Sheng Wang</td>
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<td>Councilors</td>
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PDA Representative: Natalie Johnson
GSLC Representative: Brenna Flannery

Committees: Committees within FS3 include: Awards and Membership

II. Activities:

2012 SOT Annual Meeting Reception was held in San Francisco on March 13, 2012, with approximately 50 people in attendance. With Dr. Voss’s inability to attend the Annual Meeting, Vice President, Dr. Griffiths called the meeting to order. Recommendations to attend FS3 Sponsored and Endorsed Workshops and Symposia was strongly encouraged (see below).

The results from the 2012-2013 election was reported with the following officers now in position:

Jim Griffiths, President, jg@usp.org, 301-998-65811
Dan Wilson, Vice President, ddwilson@dow.com, 989-636-0712
Nicola Stagg, Vice President Elect, njstagg@dow.com, 317-337-4548
Ken Voss, Past President, ken.voss@ars.usda.gov, 706-546-3315
Edwin Bisinger, Sec-Treas, Edwin.bisinger@akzonobel.com, 312-544-7191
Suzanne Hendrich, Councilor, shendric@mail.iastate.edu, 515-294-4272
Brent Kobielush, Councilor, brent.kobielush@genmills.com, 763-764-5752
Financials for FS3

Income for the 11 months ending May 31, 2012 was $1324.
Expenses for the 11 months ending May 31, 2012 was $3358.
Net Assets as of May 31, 2012 was $11,979

Student Awards:

Frank C Lu Outstanding Graduate Student Award went to Amanda Smolarek, details below:

Dietary administration of $\gamma$- and $\delta$-tocopherol inhibits mammary carcinogenesis
Amanda K. Smolarek, Jae Young So, Ah-Ng Tony Kong, Kenneth Reuhl, Yong Lin, Weichung
Joe Shih, Mao-Jung Lee, Chung S. Yang, and Nanjoo Suh
Departments of Pharmacology and Toxicology, Chemical Biology, 3Pharmaceutics, Rutgers, The
State University of New Jersey, Piscataway, NJ, Department of Biostatistics, School of Public
Health, University of Medicine and Dentistry of New Jersey, New Brunswick, NJ, The Cancer
Institute of New Jersey, New Brunswick, NJ

Burdock Group Travel Award went to Kristal Brown, details below:

Modified Hydra Bioassay to Evaluate Combined Effects of Aflatoxin B1 & Fumonisin B1
KA Brown, A Marroquin-Cardona, N Mitchell, T Mays, S Elmore, K Zychowski and TD
Phillips
Veterinary Integrative Biosciences Department, College of Veterinary Medicine, Texas A&M
University, College Station, TX

2012 SOT Annual Meeting Courses/Sessions Sponsored/Endorsed by FS3:

  (James Griffiths, Scott Jordan, Chairs)
- Wednesday 1:30 pm: “Advancing Food Safety in a Global Marketplace (Nicola Stagg
  and Michael Bolger, Chairs).
- Thursday 9:00 am: “Chemical standardization of botanical medicines for safe and
effective use as therapeutic agents” (Brinda Mahadevan and Madhu Soni, Chairs).
Food Safety Specialty Section Newsletter

APRIL 2012

Newsletters

One 5-page E-Newsletter was released on April 5, 2012 and is appended to this Report.
Importance of Toxicology in Food Safety

Food: it helps define cultures, brings us together as families, and provides energy for our daily activities. Because food plays such a role in our everyday lives, assuring its safety is critical. There are hundreds of thousands of chemicals that may contaminate foods. Chemicals form naturally and others are added to preserve quality and prevent harmful microbial growth. Yet, despite this knowledge and concerns about the safety of these additives and contaminants, food toxicologists are few and far between.

Analytically, science has seen an explosion in new technology in recent years and we have seen a growing number of studies that have identified natural chemical constituents within a food matrix by using many of the newly available analytical techniques. Paracelsus taught us that “dose makes the poison.” With this in mind, it is extremely important that toxicologists both critically examine the exposure to a contaminant, but also determine how these exposures relate to important questions. Do we apply precaution or is the exposure below the Threshold for Toxicological Concern (TTC) for that specific compound? Most importantly, is exposure safe? Food toxicologists play critical roles for answering many of these questions.

The growing interest in food safety is evident on several fronts. First, the number of food toxicology articles has nearly doubled in the scientific literature during the last ten years and increased attention to consumer safety is evident in the lay literature. Secondly, there have been a growing number of academic institutions that have been given grants to study the toxicity of a number of natural and artificial ingredients. Additionally, regulatory agencies worldwide continue to monitor, provide guidance, and update regulations as a result of these studies. In fact, many of the chemicals that are common in food are part of the initial Tox21 screen and the results provide insight into the effects that these chemicals have in vivo. Because of these new developments, food toxicology continues to growing an exciting field.

What we eat is critical to our daily life. As we continue to seek answers to important food-related toxicological questions, it is critical to apply these answers and “lessons learned” to everyday life. What we eat is critical to our daily life. As we seek to understand the nutritional value of our food intake, it is equally, if not more, important to understand the safety of the chemicals we are exposed through our daily diet. Therefore, food toxicologists are extremely important in evaluating and assuring the safety of food.
Wow...those that missed San Francisco...really missed a great Society of Toxicology Meeting. The energized Food Safety Specialty Section (FS3) was there in force and with plenty of symposia and posters to prove it. Check out some of the highlights below. One of the problems with an annual SOT meeting...is that as one wraps up...the window to influence the next is very very short. Due to the need for almost 11 months of planning and pre-planning to get the symposia, workshops, CE courses, roundtables through various approvals and scheduling the absolute final deadline for San Antonio 2013 is April 30, 2012.....just a few short weeks away. And the proposals need to be fleshed out to the point where speakers and abstracts are developed and Specialty Section sponsorships and endorsements can be garnered. Please feel free to approach or contact Dan Wilson (ddwilson@dow.com) or any of the other current (or past) FS3 leadership team (names and contact info is below) for bouncing off ideas, assistance in tracking down speakers, and of course “selling” the proposal to our section for sponsorship.

FS3 is dynamic and poised for bigger and better activities down the road. We’ve started to think about enlarging the pool of members by tapping into some tangential (and currently underserved) areas of our toxicology discipline. This came up for discussion at the officers’ meeting as well as during the general session at the FS3 meeting/reception. There is interest in expanding our specialty section to include several areas including but not limited to “nutrition”, “dietary supplements”, “botanicals”, “natural products (for oral consumption)”, “gastrointestinal tox”, etc. There are the “pros” of appealing to some current SOT members who do not feel like the current FS3 section is beneficial or inclusive, and there would also be opportunities to seek new SOT members who do not belong to our society because they do not feel their issues are of importance. The “cons” would include diluting our current membership and messages with issues that are not of relevance to the majority of the members. Please communicate your thoughts, if any on this activity....all comments are welcome and all comments can come to any of the current FS3 leaders listed below. The first of several “perspectives” on this activity can be found in this newsletter by Suzanne Hendrich.

We are also looking for ways to partner with like-minded scientists who may be active in sister societies. One immediate thought is to look for bridging opportunities with the Institute of Food Technologists (IFT) and their Toxicology and Safety Evaluation Division (TASED). Stay tuned....and keep reading newsletters as we will try and share this one with TASED and ask that they share theirs with FS3 members!
Please respond to this Newsletter via ToXchange...it is nice to get some feedback good or bad that the Newsletter was opened and read. Looking forward to seeing many of you in Texas in March, 2013, and of course hearing from you whenever you want to drop a line. Cheers....Jim

FS3 Officers, 2012-2013

Jim Griffiths, President, jg@usp.org, 301-998-65811
Dan Wilson, Vice President, d wilson@dow.com, 989-636-0712
Nicola Stagg, Vice President Elect, nistagg@dow.com, 317-337-4548
Ken Voss, Past President, ken.voss@ars.usda.gov, 706-546-3315
Edwin Bisinger, Sec-Treas, edwin.bisinger@akzonobel.com, 312-544-7191
Suzanne Hendrich, Councilor, shendric@mail.iastate.edu, 515-294-4272

FS3 Award Winners

AMANDA SMOLAREK – FRANK C LU OUTSTANDING GRADUATE STUDENT AWARD

Dietary administration of γ- and δ-tocopherol inhibits mammary carcinogenesis
Amanda K. Smolarek, Jae Young So, Ah-Ng Tony Kong, Kenneth Reuhl, Yong Lin, Weichung Joe Shih, Mao-Jung Lee, Chung S. Yang, and Nanjoo Suh
Departments of Pharmacology and Toxicology, Chemical Biology, Pharmaceutics, Rutgers, The State University of New Jersey, Piscataway, NJ, Department of Biostatistics, School of Public Health, University of Medicine and Dentistry of New Jersey, New Brunswick, NJ, The Cancer Institute of New Jersey, New Brunswick, NJ

Dietary intake of vitamin E has been suggested to reduce cancer risk due to its antioxidant properties. Tocopherol, a member of the vitamin E family, consists of four forms designated as α, β, γ, and δ. Several large cancer prevention studies which utilized α-tocopherol have reported no beneficial results, but recent studies have suggested that γ- and δ-tocopherol may be more effective. Using a mammary carcinogenesis model in female Sprague Dawley rats induced with N-methyl-N-nitrosourea, the chemopreventive activities of individual tocopherols were assessed using diets containing 0.3% α-, γ-, or δ-tocopherol. At 11 weeks, the average tumor burden of the control group was 10.6 ± 0.8 g, whereas dietary administration of γ- and δ-tocopherol significantly decreased tumor burden to 7.1 ± 0.7 g (p<0.01) and 7.2 ± 0.8 g (p<0.01), respectively. Tumor multiplicity was also reduced in γ- and δ-tocopherol treatment groups by 32% (p<0.005) and 42% (p<0.0001), respectively. In contrast, α-tocopherol did not decrease tumor burden nor multiplicity. Tocopherol supplementation increased the levels of its corresponding tocopherol and short-chain metabolites in the serum, mammary gland, and tumor. In mammary tumors, the levels of Nrf2 were increased by tocopherol administration (δ > γ > α). Immunohistochemical analysis of mammary tumors showed a decrease in levels of nitrotyrosine and 8-OHdG when treated with tocopherol diet, with γ- and δ-tocopherol more effective than α-tocopherol. Both γ- and δ-tocopherol, but not α-tocopherol, appear to be promising agents for breast cancer prevention.

(Kristal Brown – Burdock Group Travel Award

Modified Hydra Bioassay to Evaluate Combined Effects of Aflatoxin B1 & Fumonisn B1
Lack of national regulation systems and food security in developing countries often leads to chronic exposure of vulnerable populations to aflatoxin B1 (AFB1) and fumonisin B1 (FB1) with contamination levels of both mycotoxins often exceeding U.S. action limits. Montmorillonites (i.e. NovaSil, NS), have been suggested as natural enterosorbents for aflatoxins in animal feeds and recently in human food. NS and its refined form, Uniform Particle Size NovaSil or UPSN, have similar binding affinities for AFB1 and FB1, suggesting a potential dual sorption ability of the clay. Hence, our objectives in the present work were to develop a rapid in vivo assay to predict the combined toxicity of AFB1 and FB1 and to evaluate the protective effects of UPSN. The freshwater polyp, Hydra vulgaris, is a useful organism to utilize as an intermediate between in vitro and higher organism toxicity testing. A culture of cloned hydra were exposed to FB1 (100-400 ppm), AFB1 (5-30 ppm) and combinations of the two toxins with and without UPSN. Toxic response was documented over 92 hours with 11 toxicity ratings based on phenotype and mortality. Sorption assays were conducted to investigate competition of AFB1 and FB1 for binding sites to UPSN. Results showed that the minimum effective concentration (MEC) for AFB1 in hydra was 25 ppm, while the MEC for FB1 was not reached. When in combination, the MEC was 400 ppm FB1 + 10 ppm AFB1. UPSN protected the hydra from the toxic endpoint at all tested levels. Initial binding assays showed a possibility of site specific competition between AFB1 and FB1. When in combination, (10 ppm AFB1 + 400 ppm FB1 + 0.4 mg clay), UPSN bound 20% less aflatoxin, and 5% less fumonisin than when alone. This study demonstrates that the combination of aflatoxin and fumonisin results in a more toxic response to the hydra and that UPSN is able to confer protection by absorbing both mycotoxins. This research was supported by USAID LAG-G-00-96-90013-00 and NIH 1RO1MD005819-01.
Many different countries, and may go through many hands before being used in products, the adulteration can occur at any stage in the manufacturing process. The Governments in some countries have created regulations to help increase the quality of dietary supplements. Because of the global marketplace, some countries also issue communications which describe adulterated products found internationally, and which could be imported, or sold only high quality ingredients or products. The dietary supplement industry has also recognized that the adulteration of products is potentially harmful to consumers, and has initiated educational efforts to help prevent any possible adulteration. Quality standards that help determine the authenticity, identity of ingredients is an essential element for chemical standardization of an herbal formulation as safe and effective therapeutic agent for Parkinson’s disease. Overall, the use of state of the art technology to normalize natural plant based substances into food-contact materials, pesticide residues on food, and genetically modified foods.

Data sharing amongst countries is limited, and therefore manufacturers do monitor their supply chains and work diligently to manufacture and purchased over the internet. Some Governments have also taken action by sending letters to companies and even taking legal action against companies selling adulterated products. It is important to note that responsible manufacturers do monitor their supply chains and work diligently to manufacture and sell only high quality ingredients or products. The dietary supplement industry has also recognized that the adulteration of products is potentially harmful to consumers, and has initiated educational efforts to help prevent any possible adulteration. Quality standards that help determine the authenticity, identity and purity of ingredients can aid regulators, manufacturers and consumers by increasing the quality of products sold on the market. The quality of products can be increased by having regulations for quality control, and/or independent third party assessment that the ingredients and the final product are indeed manufactured properly. These efforts can help prevent adulteration as well as accidental contamination of products.

Wednesday 1:30 pm: “Advancing Food Safety in a Global Marketplace (Nicola Stagg and Michael Bolger, Chairs).

Advancements in packaging technology (extending food shelf-life), agricultural products (pesticides and genetically modified crops) and a more integrated and global marketplace have led to increased food quantity and quality, but as a consequence have also led to concerns about food safety and potential risks to public health. These global food safety concerns range from incidental or deliberate food contamination from microorganisms or toxic substances, chemicals migrating into food from food containers, pesticide residues on food, and genetically modified foods.

A panel of experts from across many sectors including academia, industry, government and international public health organizations highlighted the science-based approaches being used to regulate food safety in the food, chemical and agricultural industries across the world. Speakers included Michael Bolger (CFSAN, US FDA), Daniel Wilson (TERC, The Dow Chemical Company), Alan Boobis (Division of Integrative Science, Imperial College of London), Bruce Chassy (Food Science and Human Nutrition, University of Illinois), and Clark Carrington (CFSAN, US FDA). The specific topics addressed included:

- New Approaches to Assessing Safety/Risk of Chemical Contaminants in Food – Michael Bolger on behalf of Angelika Tritscher gave a World Health Organization perspective
- Evaluating the Safety of Materials Used in Food Contact Materials – Daniel Wilson
- Advances in Safety/Risk Assessments of Pesticide Residues on Foods – Alan Boobis
- Regulating the Safety of Foods and Feeds Derived from Genetically Modified Crops – Bruce Chassy
- Risk Assessment and Management Options for Chemical Contaminants in a Global Food Supply – Clark Carrington

Some of the science-based approaches being used are mode of action analysis in rodents to determine human relevance, exposure-based toxicology testing, reducing a source of contamination vs. setting an acceptable level. Challenges and opportunities were also identified for advancing technologies and science in food safety in different areas.

Thursday 9:00 am: “Chemical standardization of botanical medicines for safe and effective use as therapeutic agents” (Brinda Mahadevan and Madhu Soni, Chairs).

The workshop session that was chaired by Madhu Soni and Brinda Mahadevan on “Chemical standardization of botanical medicines for safe and effective use as therapeutic agents” drew an attentive audience of over 50 people on Thursday morning, the last day of the 2012 SOT meeting in San Francisco. Presenters covered a broad range of issues critical to the development and use of botanical medicines. Regulations, specifications concerning the use of plant based substances including dietary supplements were discussed. Cynthia Smith provided an overview on the analytical challenges involved in the characterization of herbal preparations as test articles in safety assessments. Nandakumara Sarma followed this with a presentation on pharmacopeial approaches to setting specifications for articles of botanical origin. Larry Walker provided a perspective on the integrity of a product of botanical origin and also discussed the use of validated methods in assessing the quality and safety of botanicals. The use of state of the art technology to normalize natural substances and achieve standardization in botanical medicines was given in Craig Hopp’s presentation. Bala Manyam presented a case study for the use of essential elements for chemical standardization of an herbal formulation as safe and effective therapeutic agent for Parkinson’s disease. Overall, the speakers addressed several aspects of the toxicity of botanical medicines and provided successful scientific strategies that are needed to ensure its safe and effective use.
**Representative Notes**

**Graduate Students:** It was great to see a few new faces this year at the annual FS3 meeting! Welcome! For those more seasoned students, FS3 hopes the 2012 SOT was valuable for your academic growth and your personal connections. Please continue to spread the word to other students (friends, graduate students, post-docs) about your positive experiences at SOT and the benefits of belonging to FS3. If you all have any suggestions of ways to improve the Student Post-doc Mixer or our interaction as graduate students with in the FS3 group, please let me know! Please feel free to contact me or any of the FS3 officers through ToXchange or my email (flanne12@msu.edu). FSA3 would like to continue to provide the scientific content and the camaraderie for which we are famous.

**Post-docs:** A major goal for us this year is to recruit other post-doc fellows into our specialty section so we may address the issues specifically facing post-docs in a small and focused setting. We would like to make it easier to find out about post-doctoral and career opportunities in the food safety area. If members know of opportunities for students or post-docs please contact me through ToXchange or e-mail (nmjohnso@jhsph.edu) so I can help circulate these opportunities. We look forward to another great year!

**Perspective - Gastrointestinal Toxicology—a focus for FS³?**

Suzanne Hendrich, PhD; Councilor, FSSS  
University Professor, Food Science and Human Nutrition  
Iowa State University, Ames, IA 50011  
shendric@iastate.edu

The Food Safety Specialty Section focused on food borne contaminants. Oral exposure is the route of interest, as I urge students to remember when they are investigating toxicants for term papers in my food toxicology course. Do we sufficiently appreciate the gastrointestinal (GI) tract as sites for toxicant action? What sites within the GI tract (mouth, esophagus, stomach, small intestine, large intestine) are most important as toxic targets? What toxicants and toxic mechanisms are most important to the GI tract? GI cancers have a long, site-specific history with relatively specific carcinogens and models known for each GI site (e.g., asymmetric nitrosamines and esophageal cancer, Mirvish 1997). Inflammation at various sites in the GI tract leads to major common diseases such as esophagitis, stomach ulcers and colitis and other inflammatory bowel diseases (IBD). Zhu and Li (2012) recently reviewed the role of oxidative stress in IBD, showing that modification of antioxidant defense enzymes such as superoxide dismutase, and regulators such as Nrf2 profoundly influence disease. Numerous studies support the role of phytochemical antioxidants in ameliorating IBD, as for example Ye et al. (2011) showed that caffeic acid, widely found in plant foods, may inhibit a mouse model of colitis. These studies also suggest that oxidative stressors, a designation which fits many if not most toxic substances, may exacerbate IBD. Gut inflammation is a trigger for carcinogenesis, as the review by Mirvish (1997) points out, with the example of acid reflux inflammation triggering esophageal cancer.

At the recent SOT meeting in San Francisco, the emergence of research on nanotoxicology was strongly evident, but most of that work dealt with in vitro, inhalation and dermal exposures. Fröhlich and Roblegg (2012) describe issues in modeling oral exposure to nanomaterials (NMs), such as metal and metal oxide NMs in toothpaste. Although major food companies in the US seem to have taken a wary stance toward using NMs, as seen in the statement on McDonald’s website that this company does not support the use of nano-engineered in any of its food products or toys (http://www.aboutmcdonalds.com/mcd/sustainability/library/policies_programs/sustainable_supply_chain/product_safety/Nanotechnology.html), some food packaging materials incorporate NMs. GI toxicology may be underappreciated within the field of nanotoxicology. My recent literature search of PubMed using the terms “gastrointestinal toxicology and review” uncovered only 318 references. This suggests than GI toxicology is relatively unexplored. The field of GI toxicology is highly relevant if not central to FSSS. I encourage us all to think about ways we can increase awareness, expand research and contribute to SOT’s scientific programming in this area.

**References:**


**From the Past President**

It has been an interesting and good year. FS3 membership is up over the previous year, we are financially sound, the meeting was well attended, FS3 was represented in the annual program, and our grad students and post docs have again demonstrated that the future of food safety research is in good hands. I want to take this opportunity to express my appreciation to all the continuing and "retiring" 2011-2012 officers, as well as the rest of you who donated significant time and effort to the activities of FS3.

Thank you all. Ken Voss.

PS. I second Jim’s request for program proposals. **Sponsoring symposia, workshops, etc. is one of the most important activities, if not the most important activity, of FS3.** And, it is the best way to get our interests not only represented on the program but also visible to SOT as a whole. So, please consider the specific issues and topics that are most important to you and see if they can be turned into a program session.