CARCINOGENESIS

Specialty Section | Society of Toxicology | Founded 1986

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Current CSS Officers

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Letter from the President

I hope you are all staying safe and well during this challenging time. It is my distinct honor and privilege to share with you the Summer 2020 newsletter from CSS. In this issue of the newsletter, you will find an introduction to our current officers, treasure report, recognition of award winners, member news and future events announcements.

I would like to congratulate our student and postdoc award recipients. Special thanks to those in particular Amy Wang (NTP) and Xuefeng Ren (The University at Buffalo) who reviewed their materials. Meanwhile, I am excited to share with you that our newly formed James A. Swenberg Endowment fund has reached permanent status. Starting 2021, we will set up "James A. Swenberg Carcinogenesis Merit Award" using this fund to recognize an outstanding junior faculty for his/her contribution to the advancements in understanding the mechanisms of environmental agent-associated carcinogenesis. Eligibility, application requirements and selection criteria will be announced later this summer. It's still early but please think about the abstracts for your students and post-docs for the Orlando meeting. Also, please encourage your students and post-docs to join the CSS and let them know about the opportunities and awards offered through CSS. Our leadership is always available to answer any questions from potential new members.

I would also like to congratulate Dr. James E. Klaunig, a life-time member and two-time CSS president (1998/1999 and 2015/2016) for receiving the 2020 SOT Education Award. Congratulations Jim! Congratulations also to Lora Arnold for her retirement from UNMC after an outstanding 43-year career. Lora has been active in the Society of Toxicology and served as CSS senior councilor. You will be sincerely missed, Lora. We wish you well and enjoy every minute of your retirement!

Many thanks to our members and officers who were involved in the CSS during the past year, especially those participated in organizing and presenting well-received webinars. We continue to provide our members with webinars and welcome ideas and proposals. If you have ideas for a webinar or webinar series or are interested in presenting, please contact the CSS leadership. Special thanks to Sumira Phatak our student volunteer who has been extremely helpful in generating our newsletters. We appreciated the submission of symposia and workshops from our members for the 60th annual meeting in Orlando, March 2021. I would like to encourage members to resubmit their symposia for the 2022 meeting or present webinars to CSS if the Program Committee does not accept your submission for the 2021 meeting.

In addition, I'd like to welcome our new CSS officers for the 2020-2021 year and extend my heartfelt thanks to those officers who rotated off for their service. This winter, we will have four positions open for 2021: VP-elect, Councilor, graduate student and postdoc representatives. Please consider nominating yourself or your colleagues who are interested in serving the CSS communities. Udayan will be leading the nomination committee.

I look forward to working with you throughout the year. Please do not hesitate to contact me or any members of the executive committee with any suggestions or items of interest you would like to be included in the next newsletter.

Zemin Wang, MD, PhD, DABT
President of CSS, 2020-2021

Officer Introduction

President

Zemin Wang, MD, PhD, DABT

Toxicologist

US Food and Drug Administration

Dr. Wang serves as toxicology subject matter expert in an advisory capacity for both regulatory and research projects and conducts research in supporting safety assessment of cosmetic ingredients regarding their human health risks, in particular cancers, within the FDA Cosmetics Division. Prior to joining FDA in November 2017, he was a research scientist at Indiana University studying the modes of action of chemical induced tumors in rodents and their relevance to human health risks. Dr. Wang received his medical training and master's degree in Pathology from China. He obtained his doctorate in Environmental Toxicology from Texas Tech University in 2007, and subsequently worked as postdoc fellow in chemical carcinogenesis at Indiana University School of Medicine, and cancer genetics and genomics at LSUHSC. Dr. Wang holds American Board of Toxicology certification since 2013 and has been a member of SOT since 2004. He authored over 45 peer reviewed articles in cancer and toxicology journals, 3 book chapters, and over 50 conference presentations. He has served SOT in a number of other capacities including vice president elect, councilor/chair of award committee for CSS, award committee for RASS, councilor/secretary for AACT-SIG and chair of the AACT award committee.

Sustained involvement with SOT, since the 2nd year of my graduate school in 2004, has kept me abreast of the latest development in the field, shaped my career path, and provided me with unmatched access to the world's largest toxicologist's own networking platform. An interesting paper I've read this year is "Cell proliferation analysis is a reliable predictor of lack of carcinogenicity: Case study using the pyrethroid imiprothrin on lung tumorigenesis in mice." *(PMID:32229244)*

Vice President

Chris Corton, PhD

Senior Research Biologist

US Environmental Protection Agency

Dr. Corton works in the Center for Computational Toxicology and Exposure in the Office of Research and Development of the US EPA. He received his doctorate in biochemistry from the University of Kansas Medical Center, followed by a post-doctoral research fellowship at Duke University. From 1989 to 2002, he was a staff scientist at CIIT in Research Triangle Park. He was a visiting scientist in the "Orphan Nuclear Receptor" group at Karolinska University, in Huddinge, Sweden from 1994 to 1995. He is on the editorial boards of 6 journals including as the Associate Editor for Toxicological Sciences and has been a reviewer and/or chair on over 30 peer review committees for NIH/NIEHS grants. Dr. Corton has been an active member of SOT since 1992, serving as Chair of the Continuing Education and Current Concepts in Toxicology Committees, in addition to past President of the Molecular Biology Specialty Section. He was the recipient of the SOT 2010 AstraZeneca Traveling Lectureship award. He has organized and co-chaired numerous symposia, roundtables, and CE courses held at SOT meetings. He has studied chemical carcinogenesis for almost 30 years focusing on the use of toxicogenomics to determine mechanisms of nongenotoxic carcinogens. Lately, his group has developed methods for the prediction of cancer using gene expression profiling after short-term exposures.

SOT is a wonderful organization that helped me to grow as a scientist and leader. First, the SOT has been and continues to be a way to develop connections with talented investigators across different disciplines allowing for exchange of ideas and building collaborations. Second, my various committee appointments have allowed me to gain valuable experience and skills as a contributor and leader on a number of efforts. Lastly, the Society has helped me to get out of my comfort zone of my particular research area and consider how to think about solving problems from a more systems biology perspective. An interesting paper I've read this year is "Quantitative Transcriptional Biomarkers of Xenobiotic Receptor Activation in Rat Liver for the Early Assessment of Drug Safety Liabilities." *(PMID:32119089) A group of gene expression biomarkers in rat liver identify chemical mechanism of action, including tumor induction, that could inform candidate selection prior to drug development and potentially link adverse effects in the liver and other tissues.*

Vice President Elect

Chad Brocker, PhD

Toxicologist

US Food and Drug Administration

I'm originally from Kansas City and moved to Colorado to attend Colorado College as an undergraduate. I graduated with a bachelor's degree in Biochemistry and joined the Toxicology graduate program at the University of Colorado. My graduate advisor was Dr. Vasilis Vasiliou and my primary research project focused on the protective role of aldehyde dehydrogenases during oxidative stress. After receiving my Ph.D. I moved to Bethesda, MD to work under Dr. Frank Gonzalez at the National Cancer Institute within the National Institutes of Health. In Dr. Gonzalez's laboratory, my work focused on how hepatic nuclear receptors influence metabolism and contribute to liver cancer progression. I left NCI in 2018 to work as a Toxicologist in the Office of Science at the Center for Tobacco Products at the U.S. Food and Drug Administration.

When I was in graduate school SOT really opened my eyes to the wide array of career paths that are available to Toxicologists. SOT meetings provided a great opportunity to learn about developing areas of toxicological research and helped me develop as a scientist. The annual SOT meeting continues to serve as an outstanding place to network and is a great way to meet new colleagues as well as catch up with old friends. An interesting paper I've read this year is "Electronic-cigarette smoke induces lung adenocarcinoma and bladder urothelial hyperplasia in mice." *(PMID:31591243)*

Past President

Udayan Apte, PhD, DABT

Associate Professor

University of Kansas Medical Center

Dr. Apte received his doctorate from the University of Louisiana at Monroe in 2003. He completed postdoctoral appointments at Texas A&M University from 2003 to 2004, as well as the University of Pittsburgh from 2004 to 2008. His research interests include understanding mechanisms of liver cancer pathogenesis, liver regeneration, and persistent organic pollutant-induced chemical carcinogenesis.

I became SOT member as a graduate student almost 20 years ago and it has essentially shaped my professional career. SOT provided me networking and leadership opportunities that are so critical for career advancement. Furthermore, it connected me with other likeminded scientists thinking about the same critical scientific issues, which was vital in shaping my own research. SOT has provided me a professional home and I look forward to a life-long association with this diverse and exciting scientific organization. An interesting paper I've read this year is "Alternatively activated macrophages promote resolution of necrosis following acute liver injury." *(PMID:32169610) Dr. Forbes and colleagues revealed the role of macrophage polarization in resolving acetaminophen-induced liver injury. This is the first clear demonstration of the immune system resolving injury induced by a chemical.*

Secretary/Treasurer

Gina Hilton, PhD

Advisor

PETA International Science Consortium Ltd.

Dr. Hilton is a toxicologist and science advisor to the PETA International Science Consortium Ltd. She received her MS in chemistry from Wake Forest University in 2013 and her PhD in toxicology from North Carolina State University in 2017. She then joined the Consortium, where she advises on the development and implementation of *in silico* and *in vitro* testing strategies for regulatory chemical assessment. Her work focuses on collaborations with academic, industry and regulatory agencies to review carcinogenicity testing data requirements, as well as facilitating international projects to modernize the cancer bioassay. Dr. Hilton has been an active leader in the Rethinking Carcinogenicity Assessment for Agrochemicals Project (ReCAAP), which has gained the interest of international regulatory agencies and cross-sector stakeholders. She has been a member of SOT since 2014, during which time she has been involved with the Carcinogenesis, Regulatory and Safety Evaluation, Computational Toxicology, and In Vitro and Alternative Methods Specialty Sections. This year, she moderated a series of webinars hosted by the SOT Carcinogenesis Specialty Section entitled, "New tools and approaches for carcinogenicity assessment". In her new role as Secretary for the Carcinogenesis Specialty Section, Dr. Hilton will promote opportunities for education, outreach, and engaging dialogue related to the future of carcinogenicity assessment.

*Involvement with SOT, especially with the specialty sections, has provided me a great supplemental education to graduate school and my early career. Specialty sections provide a platform to learn about emerging issues and new technologies, as well as facilitate networking opportunities to learn more about specific areas of interest. My involvement with SOT guided me to my career with an NGO, and provides continuous opportunity for education and outreach. An interesting paper I've read this year is "*Hazard identification, classification, and risk assessment of carcinogens: too much or too little?*" (PMID:32133908)*

Councilor

James Kim, PhD

Associate Vice President
American Cleaning Institute

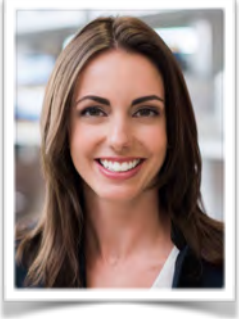
Dr. Kim graduated with a doctorate in 2001 from the Johns Hopkins School of Hygiene and Public Health, Department of Environmental Health Sciences, Division of Toxicological Sciences. His advisor was Thomas Sutter and he worked on the expression and metabolic activity of human cytochromes P450 of the 1 family (1A1, 1A2, and 1B1). He then spent 7 years working as a consultant for Sciences International and 5 years at the Health and Environmental Sciences Institute managing committees on Developmental and Reproductive Toxicology, Genetic Toxicology, and DNA Adducts. Dr. Kim went on to work as a Toxicologist in the Office of Information and Regulatory Affairs at the Office of Management and Budget, located within the Executive Office of the President in 2012. In 2018, he began working in Science and Regulatory Affairs for the ACI, a trade association for the cleaning products industry, on the safety and efficacy testing of active ingredients in hand sanitizers and soaps.

*SOT membership has had many positive impacts on my career path. Of course, attending SOT's Annual Meeting is important for networking and learning which hones one's scientific interests. Directly, two positions that I've held were posted in SOT's Job Bank, through which I applied. I think the Job Bank is a key resource for SOT members interested in a career in toxicology. An interesting paper I've read this year is "*Utility of In Vitro Bioactivity as a Lower Bound Estimate of In Vivo Adverse Effect Levels and in Risk-Based Prioritization.*" (PMID:31532525)*

Councilor

Jamie Bernard, PhD

Assistant Professor
Michigan State University



Dr. Bernard joined the Department of Pharmacology and Toxicology at MSU in March 2015 after receiving her doctorate in Toxicology at the University of Rochester and completing postdoctoral fellowships at the University of California San Diego and Rutgers University. The Bernard Laboratory aims to understand how excess adiposity interacts with environmental chemicals to increase cancer risk. The long-term goals are to discover strategies to prevent environmentally-initiated and promoted cancers and to identify individuals at risk for disease due to DNA damaging exposures. Dr. Bernard is highly involved in service to SOT and is a member of the American Association for Cancer Research, and the Society of Investigative Dermatology.

*SOT has served as a compass to help direct my research towards the study of environmental effects on carcinogenesis. This has been critical for developing my niche in the competitive area of cancer research. The Society also allows me to stay up-to-date on current impacts of toxicology. Most importantly, however, it connects me with other Toxicologists to facilitate collaborations, and further my knowledge. Through SOT I have acquired several amazing colleagues and friends. An interesting paper I've read this year is "*Gain Fat-Lose Metastasis: Converting Invasive Breast Cancer Cells into Adipocytes Inhibits Cancer Metastasis.*" (PMID:30645973)*

Postdoc Representative

Rance Nault, MS, PhD

Research Associate
Michigan State University

Dr. Nault's research efforts have focused on the role of environmental contaminants and food contaminants on liver metabolism and toxicity by leveraging novel high-throughput techniques and the availability of high-performance computing resources. He completed a master's in Physiology and Toxicology at the University of Ottawa, examining the energetic costs of AhR activation in rainbow trout primary hepatocytes. This was followed by pursuing a doctorate in Biochemistry and Molecular Biology and Toxicology and Integrative Toxicology at Michigan State University, leveraging high-throughput and computational techniques to further understanding of AhR-mediated disruption of hepatic metabolism in mammalian models. As a postdoctoral researcher, he is exploring how these technologies can be used to better inform formal regulatory decisions using the recently identified ubiquitous food contaminant and rat liver carcinogen acetamide.

*Being a member of SOT has allowed me to stay up to date on the most innovative research in toxicology, and the upcoming challenges that our community can address. Because of this, I have been able to implement this knowledge to help advance my career. Moreover, SOT membership has led to valuable networking opportunities with people from academia, government, and industry, opening new doors to unexpected career paths. An interesting paper I've read this year is "*Transcriptional dynamics of hepatic sinusoid–associated cells after liver injury. Hepatology.*" (PMID:32145072)*

Student Representative

Luma Melo, MS

PhD Student
Indiana University

Ms. Melo is currently pursuing her doctorate in the Environmental Health Department at Indiana University. Her research interests include carcinogenesis and exercise oncology.

*As a young toxicologist, the my SOT membership opened my eyes to the toxicology world and connected me with specialists from all over the world. An interesting paper I've read this year is "*The NTP 2-year bioassay: Controversies in counting rodent tumors to predict human cancer.*" (doi.org/10.1177/2397847319889535)*

Treasury Report

The CSS will enter 2020 with a balance of $6,318.29. We have 179 members with 43 members that have yet to renew for 2020. Please encourage your friends and colleagues to either join or renew their membership!

Dharm Singh Carcinogenesis Endowment Graduate Student Award Fund
2019 Net Assets: **$48,164**
2020 Net Assets: **$47,364**

Environmental Carcinogenesis Research Endowment Fellowship Fund
2019 Net Assets: **$8,293**
2020 Net Assets: **$8,293**

James Swenberg Endowment Fund
2020 Net Assets: **$55,600**

Member Spotlight: **Lora Arnold**

Lora Arnold, assistant professor, retired (04.30.2020) from the University of Nebraska Medical Center after 43 years of distinguished service. Lora, a native of Cozad NE, obtained her BA in biology from Hastings College and MS in pathology and microbiology from the UNMC. She studied medical technology at the Lincoln School of Medical Technology and is certified by the American Society for Clinical Pathology. In 1977, her career began as a medical technologist in the Department of Pathology's Division of Clinical Chemistry, rising to technical coordinator in 1987. She began research in chemical carcinogenesis and toxicology, initially as an instructor in 1993, and later as an assistant professor from 2007 onwards. In addition to being an outstanding researcher, Lora mentored and cared for countless graduate students, postdoctoral fellows, and guests who studied in our department and went on to prominent positions in academia, government, and industry within the states, Japan, and Brazil. All who worked with Lora appreciate her knowledge, skills, and especially her organizational abilities that kept complex programs well-coordinated: a distinct challenge when multiple institutions and nations are involved in the projects.

Lora has attained a prominent reputation in toxicology, publishing 90+ manuscripts and 5 book chapters related to a variety of chemicals, particularly inorganic and organic arsenicals. She has delivered numerous presentations at national and international meetings. She has been active within the Society of Toxicology, holding several leadership roles in the Regional Central States Chapter: 2004-2006 Secretary/Treasurer, 2008-2010 Counselor, and 2010-2013 Presidential track; she also served as the 2017-2018 Carcinogenesis Specialty Section Counselor. Lora is an exceptional individual and will be sincerely missed by the entire department after she leaves the UNMC campus. We wish her well in future pursuits.

Submitted by SM Cohen

James A. Swenberg Carcinogenesis Merit Award Fund

The goal of the James A. Swenberg Carcinogenesis Merit Award Fund is to encourage junior faculty members to conduct transformative mechanistic research in the field of carcinogenesis. This fund is used to recognize outstanding individuals for their cumulative contribution to advancements in understanding the mechanisms of environmental agent-associated carcinogenesis.

Applicants must hold an appointment as a tenure- or research-track assistant professor in an academic institution, in the United States or abroad. The applicant must also be within 15 years of obtaining the highest earned degree. Applicants can be self-nominated or nominated by their peers. We ask that applicants consider joining CSS if they are currently not a member. Award winners will be asked to join CSS at the time of the award.

To apply, please submit s cover letter briefly describing significant research and contributions to the field of carcinogenesis (2 page limit) and a CV to ***Chris Corton*** <corton.chris@epa.gov> by the deadline December 1, 2020.

The awardee will receive a cash award of $1,000.00, a plaque of recognition, and be asked to give a brief presentation (~10 minutes) of their work in chemical carcinogenesis during the Carcinogenesis Specialty Section Reception at the SOT annual meeting.

CSS Award Recipients

Dharm V. Singh Endowment Graduate Student Award

First Place

Abigail Bryson
University of Michigan
Mentor: Jamie Bernard

Abstract: *"Visceral adipose tissue increases the vulnerability of epithelial cells to carcinogenic effects of benzo[a]pyrene by inducing the aryl hydrocarbon receptor"*

My graduate work is investigating the evolution of terpene gene clusters in the mint family, Lamiacaea. Terpenoids are secondary metabolites with applications in pharmaceuticals, pesticides, fragrances, flavors, and biofuels. By tracing the evolution of these pathways and their tandem genetic affiliation, I hope to understand more about the their biochemical activity, their benefit in future biosynthetic application, and implications for their existence in evolutionary space. MSU is a plant biochemical hub, with many resources and people to allow for ideal conditions in studying the impacts of plant specialized metabolites and phytonutrients on human health. Harnessing the production pathways in plants and using compounds innate to plants to solve the world's problems is a sustainable and attractive option for future pursuits. I think plant synthetic engineering provides a powerful framework for the future of human health. I would like to continue studying genetics, genomics, and bioinformatics either in an industry or academic environment. I believe I am still early in my career and am eager to learn new skills. With that said my scientific studies are geared towards synthetic biology applications with an intent to focus in plants. During my first rotation, I had the pleasure to work with Dr. Jamie Bernard. She was excited to help me learn about cancer and toxicology and I was excited to work in a discipline outside of my expertise. I am grateful for the breakthroughs I was able to make during my time in her lab and the opportunities it has provided both her and me for the future. This award meant I would be able to travel with her to the annual SOT meeting, present my hard work, and learn about a field that was completely new to me. Although the meeting has been cancelled, the work I did in Dr. Bernard's lab is contained in a manuscript, and will continue to foster interdepartmental collaborations between Dr. Jamie Bernard and myself for the future.

Second Place

Jennifer Toyoda
University of Louisville
Mentor: John P. Wise, Sr.

Abstract: *"Prolonged particulate hexavalent chromium exposure disrupts centrosome regulation proteins and causes centrosome amplifi cation"*

As a member of the Wise Laboratory of Environmental and Genetic Toxicology, my work investigates cellular pathways central to lung carcinogenesis by inhaled metals and specifically hexavalent chromium [Cr(VI)]. Cr(VI) exposure induces high incidences of aneuploidy and centrosome amplification, both of which are hallmarks of lung cancer. The goal of my project is to identify the mechanism of Cr(VI)-induced centrosome amplification. Centrosome amplification is gaining recognition as not only a hallmark of many cancers, but also as a major driver of aneuploidy it is a potential key in carcinogenesis. How Cr(VI) causes aneuploidy and centrosome amplification is unclear, but our observations in Cr(VI)-exposed cells have revealed concurrent phenotypes that implicate the enzyme, separase, and its inhibitor, securin, as potential targets of Cr(VI). After graduation, I plan to continue training to be independent researcher in the field of environmental toxicology. The relevance of environmental and occupational exposures to human, animal, and ecosystem health is fuels my curiosity and I will pursue a career engaged in elucidating the effects of environmental toxicants. To me, this award not only recognizes my work but also supports and affirms the importance of research into metal-induced lung cancer. Lung cancer is the leading cause of cancer deaths yet is poorly recognized and funded as such. A significant portion of lung cancer patients are non-smokers and it is imperative to understand the non-tobacco-related causes of the disease.

Third Place

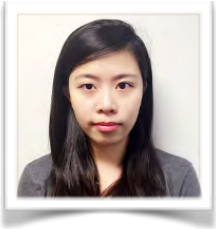
Md. Sanaullah Sajib
Texas Tech University
Mentor: Constantinos Mikelis

Abstract: *"Role of endothelial RhoA-ROCK pathway in cancer metastasis"*

Metastasis, the cause of over 90% of cancer-related deaths, is the principal complication during cancer therapy. An important step in the metastatic process is the migration of the cancer cells through the endothelial lining of the vasculature during intravasation and extravasation. The molecular mechanisms underlying transendothelial migration (TEM), is poorly understood. It has been shown that endothelial RhoA-Rho kinase (ROCK) pathway is involved in vascular permeability in various pathophysiological conditions. Therefore, we investigated the role of the endothelial RhoA-ROCK pathway in TEM and metastasis. Our results indicate that a variety of different cancer cell lines of both murine and human origin can potently activate endothelial RhoA. In vitro, treatment of endothelial cells with either Rho inhibitor, C3 toxin, or siRNA for RhoA decreased the TEM of all the cancer cells tested (MDA-MB-231, E0771, B16-F10, and LLC). Similar results were observed when Rho kinase (ROCK) was inhibited using Fasudil or Y-27632. In vivo, we observed a decreased number of metastatic foci in endothelial-specific RhoA-deficient mice compared to the littermate controls for the cancer cells mentioned above. Treatment with Fasudil significantly decreased the metastatic colonization of both human and murine cancer cells. Collectively, our findings highlight the role of endothelial RhoA-ROCK signaling in cancer cell TEM and metastasis. The blockade of this pathway showed a better outcome in cancer metastasis, highlighting the potential of Fasudil as an anti-metastatic drug candidate.

I choose this area of research because there is a big gap in our understanding of how endothelial cells participate in the metastatic process. Considering the vast evidence of tumor heterogeneity and relatively less altered endothelium provides a promise for new targets of anti-metastasic drugs. My career goal is to work in translational oncology to get direct involvement in the development of cancer therapeutics. This award recognition is a huge inspiration for my research and career.

Fourth Place



Qiran Chen
Indiana University Bloomington
Mentor: Kan Shao

Abstract: *"A novel dose-response framework with quantitatively integrated MOA information"*

My work focuses on the improvement of risk assessment through innovative statistical and analytical methodologies. My current research is to establish a new framework of dose-response assessment for carcinogens with the quantitative information of its mode of action. The risk assessment of chemicals plays an important role in environmental policy making and human health. The method to quantitatively estimate

the carcinogenic risk of chemicals has been discussed by many studies for its shortcomings. Therefore, a new framework of dose-response assessment for carcinogens will enhance the use of mechanistic information of carcinogenesis in chemical risk assessment, and support scientific research and chemical regulation in addressing the risk of chemical exposure. I would like to pursue a research-orientated career in relevant field in the future. I hope my research in chemical risk assessment and toxicology can support environmental policy making, which will benefits to both human health and chemical use in industry. I am extremely honored to have been recognized. This award is particularly meaningful to me because it is greatly beneficial for me to boost confidence and inspire me to achieve the career goal. It is also my pleasure to have such an opportunity to communicate with intelligent scholars in CSS.

Environmental Carcinogenesis Travel Award

Graduate Student

Tasha Thong
University of Michigan
Mentor: Justin Colacino

Abstract: *"Single-cell RNA sequencing reveals differences in transcriptomic profiles of normal mammary cells between African American and European American women"*

My research is focused on uncovering the biological basis for racial disparities in breast cancer by exploring the relationship between normal mammary stem cells, genetics, and environmental exposures. By using an interdisciplinary combination of ex vivo cell culture, single-cell transcriptomics, and population level biomarker analyses, we hope to achieve the long-term goals of reducing breast cancer disparities, incidence, and the development of better targeted therapies. Coming into graduate school I knew I wanted to work on a project involving cancer, health disparities, and the environment. After meeting Dr. Colacino I felt that our research interests really aligned and this project seemed to be the perfect incorporation of all my academic passions, it seemed almost too good to be true! I hope to be able to continue working at the intersection of cancer disparities, environmental health, and big data. Whether that is a career in academia, industry, or even something else, I ultimately hope to use my expertise to fill spaces where the need is the greatest. I believe that this is a pressing public health and environmental justice issue because the striking racial disparities in breast cancer have been known for decades, yet today there is still little known about their biological basis. It is exciting and encouraging to receive this award and to know that there are other like-minded researchers who find this work meaningful and find single-cell transcriptomics as cool as I do!

Postdoctoral Associate

Eric Uwimana
University of Arizona
Mentor: Xinxin Ding

Abstract: *"Metabolism of naphthalene by mouse liver microsomes: glutathione does not affect 1,2-Dihydrodiol formation"*

My work in the Ding lab investigates the metabolic mechanisms that influence Naphthalene-mediated lung carcinogenesis in experimental animals and humans. We use metabolomics and NA adductomics approaches to this study. Naphthalene is the most abundant polycyclic aromatic hydrocarbon (PAH) in ambient urban air and is released by combustion of wood, gasoline, diesel, and tobacco from both industrial and environmental sources. Naphthalene is lung carcinogen that requires metabolic activation to exert its toxicity. I chose this area of research due to my interest to use experience with analysis of xenobiotic metabolites to study their toxicity. Becoming an experienced researcher in toxicology and using of state-of-the art analytical instruments and metabolomics approaches to study the impact of environmental and industrial chemicals in causing toxicity to humans. This award is an encouragement in my current research and an opportunity to communicate my research. The recognition of my work through the inaugural environmental carcinogenesis award is a great honor and an increasing recognition of the role of metabolism in xenobiotic toxicity.

Postdoctoral Fellowship and Young Investigator Award

Sarah Carratt
Oregon Health & Science University
Mentor: Julia Maxson

Abstract: *"Mitigating toxicity through targeted therapy for SETBP1-mutant leukemia"*

The role that an individual gene mutation plays in carcinogenesis is influenced by cellular and genetic context. Even for leukemias with defining genetic abnormalities (such as BCR-ABL), the leukemic phenotype is modulated by co-occurring mutations. My research on the mechanisms of carcinogenesis aims to turn markers of poor prognosis into opportunities for targeted therapy. My postdoctoral work largely centers on SETBP1 mutations, which are associated with poor prognosis and relapse in a number of leukemias. I am actively investigating how SETBP1 drives gene expression changes, histone modification, cell cycle dysfunction, and alters of the hematopoietic differentiation hierarchy. In pursuit of these aims, I have developed murine models where SETBP1 mutations synergize with other oncogenic mutations to produce aggressive leukemias in vivo, and cell lines with constitutive and inducible SETBP1 expression. I have used these novel preclinical models to identify a well-tolerated therapeutic strategy for SETBP1-mutant disease that restores aberrant promotor activation and gene expression of SETBP1-targets. As a graduate student, I investigated the mechanisms of toxicity of chemicals and nanoparticles under the mentorship of Dr. Laura Van Winkle at UC Davis. My dissertation investigated the metabolism and inhalation toxicity of naphthalene. My work on naphthalene's carcinogenic potential sparked my interest in cancer initiation and progression, and I chose to pursue a postdoctoral fellowship at Oregon Health & Science University at the Knight Cancer Institute. Here, I have had the opportunity to work on translational projects and gain experience working with human samples under the mentorship of a molecular biologist Dr. Julia Maxson and oncologist Dr. Brian Druker. My current, short-term goal is to gain expertise in molecular biology and oncology. I am particularly interested in mechanistic investigations of oncogene cooperation, which I believe is the key to creating more efficacious and tolerable therapies for patients with aggressive, heterogeneous disease. My long-term goal is to be a leader at the intersection of cancer biology, pharmacology, and toxicology. In many ways, the choice to use my postdoctoral time to gain expertise in biomedical research has required me to take a step away from toxicology. However, I feel that a part of my identity is deeply rooted in toxicology, which is why I have continued to be involved through SOT committees and the Postdoctoral Assembly. It makes me proud to receive this CSS award in recognition of my work at the intersection of toxicology and cancer biology. It gives me hope that I will be able to find my niche in the next stage of my career.

CSS Awards

The deadline for all CSS awards is **December 1, 2020**. All application materials should be sent to ***Dr. Chris Corton*** <corton.chris@epa.gov>. Click **here** for info on how to apply or contact Chris if you have any questions or need any additional information.

Dharm V. Singh Carcinogenesis Graduate Student Endowment Award

CSS Officers encourage graduate students to submit abstracts related to the field of carcinogenesis for consideration. Applicants should submit a pdf document containing their submitted SOT abstract, a research narrative (2 page max describing research hypothesis, background and significance), and letter of recommendation from their advisor (2 page max). The due date for submission is December 1, 2020 and confirmation of receipt will be sent via email. While student abstracts may be submitted for multiple SOT awards, CSS student awards will not be given to a student receiving another award for the same abstract. Graduate students who have received a CSS first place award within the last 3 years are also not eligible. The first place recipient will receive the Dharm V. Singh Endowment Award, which consists of a plaque and monetary prize (amount TBD). Second, third, and fourth place recipients will receive certificates and monetary prizes (amount TBD). Awards will be announced during the CSS reception at the SOT Annual Meeting.

Postdoctoral Fellowship and Young Investigator Award

CSS Officers encourage postdoctoral fellows and young investigators (received PhD within the past 3 years) to submit their abstracts related to the field of carcinogenesis for consideration. Applicants should submit a pdf document containing their submitted SOT abstract, a research narrative (2 page max describing research hypothesis, background and significance), and letter of recommendation from their supervisor (not to exceed 2 pages). The due date for submission is December 1, 2020 and confirmation of receipt will be sent via email. One awardee will be selected to receive a plaque and $500 monetary prize. The award will be announced during the CSS reception at the SOT Annual Meeting.

Environmental Carcinogenesis Travel Award

CSS Officers invite graduate students and postdoctoral fellows (within first 3 years of training) to submit their abstracts for consideration. To qualify, your research 1) must be related to the field of environmental carcinogenesis; and 2) integrate emerging sciences such as genomics, transcriptomics, epigenetics, metabolomics, microbiomics, exposomics, etc. into studies that help define mechanisms of, susceptibility to, and prevention of carcinogenesis. Applicants should submit a pdf document containing their submitted SOT abstract, current CV, a research narrative including 1-2 figures (2 page max describing research hypothesis, background and significance), and letter of recommendation from their supervisor (2 page max). One graduate student and one postdoctoral fellow will be selected to receive plaques and $500 monetary prizes. Awards will be announced during the CSS reception at the SOT Annual Meeting.

Member News

CSS Papers:

Banerjee M, Ferragut Cardoso AP, Lykoudi A, Wilkey DW, Pan J, Watson WH, Garbett NC, Rai SN, Merchant ML, **States JC**. Arsenite Exposure Displaces Zinc from ZRANB2 Leading to Altered Splicing. Chem Res Toxicol. 2020 Jun 15;33(6):1403-1417. doi: 10.1021/acs.chemrestox.9b00515. Epub 2020 Apr 27. PMID: 32274925.

Corton JC, Hill T, Sutherland JJ, Stevens JL, Rooney J. A Set of Six Gene Expression Biomarkers Identify Rat Liver Tumorigens in Short-Term Assays. Toxicol Sci. 2020 Jun 30:kfaa101. doi: 10.1093/toxsci/kfaa101.

Hill T, Rooney J, Abedini J, El-Masri H, Wood CE, **Corton JC**. Gene Expression Thresholds Derived From Short-Term Exposures Identify Rat Liver Tumorigens. Toxicol Sci. 2020 Jun 30:kfaa102. doi: 10.1093/toxsci/kfaa102.

Karki K, Wright GA, Mohankumar K, Jin UH, Zhang XH, **Safe S**. A Bis-Indole-Derived NR4A1 Antagonist Induces PD-L1 Degradation and Enhances Antitumor Immunity. Cancer Res. 2020 Mar 1;80(5):1011-1023. doi: 10.1158/0008-5472.CAN-19-2314. Epub 2020 Jan 7. PMID: 31911554; PMCID: PMC7056589.

Klaunig JE, **Melo L**, Tilmant K. Mechanisms of Hepatic Cancer by Persistent Organic Pollutants (POPs). Curr Opin Toxicol. 2020. 19. 10.1016/j.cotox.2020.02.001.

Levy DD, **Zeiger E**, Escobar PA, Hakura A, van der Leede BM, Kato M, Moore MM, Sugiyama KI. Recommended criteria for the evaluation of bacterial mutagenicity data (Ames test). Mutat Res. 2019 Dec;848:403074. doi: 10.1016/j.mrgentox.2019.07.004. Epub 2019 Aug 5. PMID: 31708073.

Liu J, Gunewardena S, Yue Cui J, Klaassen CD, Chorley BN, **Corton JC**. Transplacental arsenic exposure produced 5-methylcytosine methylation changes and aberrant microRNA expressions in livers of male fetal mice. Toxicology. 2020 Apr 15;435:152409. doi: 10.1016/j.tox.2020.152409.

Schoeny R, Cross KP, DeMarini DM, Elespuru R, Hakura A, Levy DD, Williams RV, **Zeiger E**, Escobar PA, Howe JR, Kato M, Lott J, Moore MM, Simon S, Stankowski LF Jr, Sugiyama KI, van der Leede BM. Revisiting the bacterial mutagenicity assays: Report by a workgroup of the International Workshops on Genotoxicity Testing (IWGT). Mutat Res. 2020 Jan;849:503137. doi: 10.1016/j.mrgentox.2020.503137. Epub 2020 Jan 13. PMID: 32087853.

Smith MT, Guyton KZ, Kleinstreuer N, Borrel A, Cardenas A, Chiu WA, Felsher DW, Gibbons CF, Goodson WH, Houck KA, Kane A, La Merrill MA, Lebrec H, Lowe L, McHale CM, Minocherhomji S, Rieswijk L, Sandy MS, Sone H, **Wang A**, Zhang L, Zeise L, Fielden M. The Key Characteristics of Carcinogens: Relationship to the Hallmarks of Cancer, Relevant Biomarkers, and Assays to Measure Them. Cancer Epidemiol Biomarkers Prev. 2020 Mar 9:cebp.1346.2019. doi: 10.1158/1055-9965.EPI-19-1346. Epub ahead of print. PMID: 32152214.

Williams RV, DeMarini DM, Stankowski LF Jr, Escobar PA, **Zeiger E**, Howe J, Elespuru R, Cross KP. Are all bacterial strains required by OECD mutagenicity test guideline TG471 needed? Mutat Res. 2019 Dec;848:503081. doi: 10.1016/j.mrgentox.2019.503081. Epub 2019 Aug 9. PMID: 31708075.

Yauk CL, Harrill AH, Ellinger-Ziegelbauer H, **van der Laan JW**, Moggs J, Froetschl R, Sistare F, Pettit S. A cross-sector call to improve carcinogenicity risk assessment through use of genomic methodologies. Regul Toxicol Pharmacol. 2020 Feb;110:104526. doi: 10.1016/j.yrtph.2019.104526. Epub 2019 Nov 11. PMID: 31726190.

Zeiger E. The test that changed the world: The Ames test and the regulation of chemicals. Mutat Res. 2019 May;841:43-48. doi: 10.1016/j.mrgentox.2019.05.007. Epub 2019 May 15. PMID: 31138410.

Poster Presentations:

GM Hilton, G Akerman, J Baldassari, M Battalora, R Buesen, AJ Clippinger, A Lowit, S Melching-Kollmuss, T Kormos, S Papineni, RC Peffer, BW Riffle, N Ryan, MS da Rocha, N Visconti, DC Wolf. Rethinking Carcinogenicity Assessment for Agrochemicals. Society of Toxicology. 2020. Available online: https://files.abstractsonline.com/CTRL/BB/9/005/6DF/90D/459/B9E/E98/56B/3EB/287/28/a1681_1.pdf

CSS Accomplishments:

Cohen, Samuel M: 2019 American Association for the Advancement of Science (AAAS) Fellow, a lifetime distinction in honor of invaluable contributions to science and technology.

Goodman, Jay: 2019 American Association for the Advancement of Science (AAAS) Fellow, a lifetime distinction in honor of invaluable contributions to science and technology.

Klaunig, James E: 2019 American Association for the Advancement of Science (AAAS) Fellow, a lifetime distinction in honor of invaluable contributions to science and technology.

Melo, Luma: Dr. Anita Aldrich Research Fellowship Award 2000 from School of Public Health-Bloomington, Indiana University

Melo, Luma: Graduate Student Excellence Award from the Regulatory and Safety Evaluation Specialty Section, SOT 2020

Phatak, Sumira: Society of Toxicology Outstanding Graduate Student Leadership Award (top GSLC student), March 2020

Samuel, Ekundayo: Chemical Abstract Services Future Leaders Program (first Nigerian representative), American Chemical Society 2020

States, J Christopher: Received the Global Senior Scholar Exchange Program (GSSEP) award to host GSSEP scholar for four weeks at the University of Louisville School of Medicine and visit the scholar's home institution. This experience deepens both research and training capabilities, in addition to building international collaborations in toxicological research.

Webinars

CSS sponsored the recent two-part webinar: "*New tools and approaches for carcinogenicity assessment*" which was held on **January 24** and **February 19**.

The webinar series focussed on two key areas: mechanistic assessment of carcinogenicity, and modernization of cancer risk assessment. Speakers included Drs. Mirjam Luijten (RIVM), Chris Corton (US EPA), Warren Casey (NIEHS/NTP), and Sabitha Papineni (Corteva Agriscience). We addressed the relevant aspects of emerging technology, strategic and tactical issues, and regulatory guidance relevant to safety and risk assessment. The focus of these webinars was to demonstrate opportunities to modernize chemical carcinogenicity assessment to provide human health protection while reducing testing on animals.

For more details, please click **here** for the '*Mechanistic Assessment of Carcinogenicity*' webinar.

Member Spotlight: **James Klaunig**

James Klaunig, PhD, ATS, IATP, has received the 2020 SOT Education Award for his excellence, breadth, and depth as a toxicology educator.

Dr. Klaunig received his bachelor of science in biology from Ursinus College and his PhD in pathology from the University of Maryland School of Medicine in 1980 under the mentorship of Benjamin F. Trump. After postdoctoral studies at the Medical College of Ohio, he joined the faculty, first as an assistant professor and later as an associate professor in the Departments of Pathology and Pharmacology. During this time, Dr. Klaunig instituted the PhD and master's program in toxicology, establishing the curriculum, recruiting students, and securing support.

In 1991 after a sabbatical at CIIT, Dr. Klaunig was recruited to Indiana University's School of Medicine as Professor and Director of Toxicology. He revitalized the graduate program in toxicology first established by Robert B. Forney in the 1960s. In addition to teaching medical and graduate students in the Department of Pharmacology and Toxicology, Dr. Klaunig served as Associate Director of the IU Cancer Center. Concomitantly with his academic appointment, he served the state of Indiana as Director of the Department of Toxicology and State Toxicologist from 1991 to 2003, being responsible for the state's forensic toxicology program. In this role, he lectured and advised on toxicology-related issues to state officials, law enforcement, and the bar. These efforts earned him the *Sagamore of the Wabash*- the highest civilian honor in Indiana- from the Governor for his service to the state.

In 2010, he was recruited to the Indiana University Bloomington campus to serve as the founding chair of the Department of Environmental Health in the newly formed School of Public Health. In this role, he also planned, initiated, and developed the PhD program in Environmental Health within the school, the first in the IU system.

During his decorated career, Dr. Klaunig has mentored 25 doctoral students, 23 master's students, 27 postdoctoral fellows, and has served as a research advisor to over 20 undergraduate students. Most of these students have remained within toxicology or carcinogenesis disciplines. Dr. Klaunig received the IU Trustee's Teaching Award in 2005 in recognition of his distinction in education.

Dr. Klaunig first joined SOT in 1985. In addition to membership in the Carcinogenesis; Mechanisms; Regulatory and Safety Evaluation; and Comparative Toxicology, Pathology, and Veterinary Specialty Sections, he is currently a member of the Endowment Fund Board. He has served as Treasurer of the society as well as a member of the Nominating Committee and as President of the Carcinogenesis Specialty Section. Dr. Klaunig also is past member and Chair of the Education Committee. Further, he is a past recipient of the Kenneth P. DuBois Award from the Midwest Regional Chapter and the Ambassador Award from the Mid-Atlantic Regional Chapter. In addition to his service to SOT, Dr. Klaunig also is an elected Fellow in the Academy of Toxicology Sciences, the International Academy of Toxicologic Pathology, and the American Association for the Advancement of Science.

Click here to contact us and receive more information about a career in toxicology and carcinogenesis!

Click here to join the SOT Carcinogenesis Specialty Section!

If you are interested in volunteering or submitting a news worthy item for the next newsletter, please contact the CSS at chad.brocker@fda.hhs.gov

Early Career Trainee Opportunities in SOT

ToxScholar Outreach Grant:
to promote toxicology careers through the interaction of toxicologists with student audiences.

apply here

international deadline: October 9
domestic deadline: ongoing

STEP Award
Supplemental Training in Education Program: to pursue training in identifi ed areas of professional or scientifi c development that is necessary to achieve career goals, but outside immediate scope of research program.

apply here

deadline: May & October

GIFT Award
Graduate Intern Fellowship in Toxicology: to engage in internships within industry, government, and non-profit organizations

apply here

deadline: February 15

NEXT Award
New Experiences in Toxicology: to obtain training outside of their current sector with support from their postdoctoral mentor.

apply here

deadline: October 28

Save the date!

when: March 14-18, 2021
where: Orlando, FL

proposal deadline:
06.12.2020

site launches:
08.03.2020

awards deadline:
10.09.2020

abstract submission:
12.01.2020

late breaking abstract:
cancelled

early-bird registration:
01.22.2021

standard registration:
early february TBD

housing deadline:
mid february TBD

Carcinogenesis SOT Specialty Section
Society of Toxicology

Meetings of interest

The Toxicology Forum
Virtual Summer Meeting Sessions: virtual annual meeting.

register here

dates: 07.13, 08.11, 08.21.2020

Translational Advances in Cancer Prevention Agent Development
Sponsored by the NCI Division of Cancer Prevention and the NIH Office of Disease Prevention: virtual annual meeting with complimentary registration.

register here

dates: 08.27-28.2020
deadline: 08.17.2020

Environmental Mutagenesis & Genomics Society (EMGS)
Mechanisms & Approaches for Genomic Integrity: virtual annual meeting with complimentary registration.

register here

dates: 09.12-16.2020
late-breaking abstract deadline: 08.29.2020

Assessing Carcinogenicity: Hazard Identification, Classification, and Risk Assessment
A Toxicology Forum State-of-the-Science Workshop: to engage in internships within industry, government, and non-profit organizations

register here

dates: 12.07-10.2020

CSS members practice social distancing and work remotely!