



The PMI Times

Department of Pathology, Microbiology & Immunology
University of South Carolina ~ School of Medicine
The Communication Source for PMI Faculty, Staff & Students
Department Chair: Dr. Mitzi Nagarkatti, PhD
Editors: Dr. Angela Murphy, PhD & Nicki Holt

May 2019 - August 2019

P Honors & Awards

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The Sloan Scholars Mentoring Network of the Social Science Research Council and the Alfred P. Sloan Foundation has awarded Dr. Kandy Velázquez a seed grant of \$10,000 for the purchase of equipment for her research project entitled "Characterization of spontaneous pain in colorectal cancer".

We are proud to recognize and congratulate our recent Ph.D. graduates:

- Dr. Fadi Abboodi (Pirisi-Creek lab) successfully defended his dissertation titled "*Molecular Mechanisms of Loss of E7 Expression in HPV16 Transformed Human Keratinocytes*" on June 19, 2019.
- Dr. Zinah Al-Ghezi (Nagarkatti lab) successfully defended her dissertation, "*The Role of Epigenome and Microbiome in Cannabinoid and Aryl Hydrocarbon*" on July 10, 2019.
- Dr. Jackie Bader (Murphy Lab) defended her dissertation titled "*Macrophages and Associated Inflammation Differentially Impact Obesity, Colorectal Cancer and Obesity-Enhanced Colorectal Cancer*" on May 5, 2019. Jackie is now pursuing a post-doctoral fellowship at Vanderbilt University.
- Dr. William Becker (Nagarkatti lab) defended his dissertation on Thursday, July 11, 2019. His dissertation was titled "*The Role of Epigenetic, Molecular and Cellular Pathways in the Regulation of Inflammation*".
- Dr. Kathryn Miranda (Nagarkatti lab) defended her dissertation titled "*Role of Epigenome and Microbiome in Endocannabinoid-Mediated Regulation of Inflammation During Diet-Induced Obesity*" on July 9, 2019. Dr. Miranda has been hired as a post-doctoral fellow in Dr. Mitzi Nagarkatti's lab.
- Dr. Zahraa Mohammed (Gomez lab) successfully defended her dissertation, July 8, 2019. It was titled "*Epigenetic and Purinergic Regulation of Mast Cell Mediator Release*".
- Dr. Wurud Neamah (Nagarkatti lab) defended her dissertation, "*The Effect of TCDD, an Environmental Contaminant on Activation of AhR Leading to Induction of Myeloid Derived Suppressor Cells (MDSCs) and The Ability of Resveratrol, a Botanical to Neutralize This Effect*" on July 10, 2019.

Our Ph.D. students and post-doctoral fellows were the recipients of travel awards to present their research as follows:

- Dr. Kathryn Miranda (currently a post-doctoral fellow in Nagarkatti lab) won the International Cannabinoid Research Society ***Predoctoral Scientific Achievement Award*** for her research on "Endocannabinoid signaling mediates susceptibility to high fat diet-induced intestinal dysbiosis and regulates metabolic health" at the International Cannabinoid Research Society Annual Meeting, Bethesda, MD, June 29-July 4, 2019.

- Dr. Brandon Busbee (former post-doctoral fellow in Nagarkatti lab) received an *American Association of Immunologists Trainee Travel Award* to present his work on "Indole-3-carbinol prevents murine colitis development via an IL-22-dependent mechanism that regulates anti-microbial peptides and mucus production" at the American Association of Immunologists Annual Meeting in San Diego, CA, May 9-13, 2019.
- Dr. Kathryn Miranda (currently a post-doctoral fellow in Nagarkatti lab) received an *American Association of Immunologists Trainee Abstract Award* to present her work on "Cannabinoid receptor 1 blockade attenuates obesity and adipose tissue type 1 inflammation through miR-30e-5p regulation of Delta-like-4" at the American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019.
- Alkeiver Cannon (doctoral student in Nagarkatti lab) received an *American Association of Immunologists Travel Award* to attend the American Association of Immunologists Annual Meeting in San Diego, CA, May 9-13, 2019.
- Amira Mohammed (doctoral student in Nagarkatti lab) received an *International Cannabinoid Research Society Travel Award* to attend the International Cannabinoid Research Society Annual Meeting, Baltimore, MD, June 29-July 4, 2019.
- Kathryn Miranda (currently a post-doctoral fellow in Nagarkatti lab) received an *International Cannabinoid Research Society Travel Award* to attend the International Cannabinoid Research Society Annual Meeting, Baltimore, MD, June 29-July 4, 2019.
- Amira Mohammed (doctoral student in Nagarkatti lab) received an *IUTOX 15th International Congress of Toxicology Travel Award* to attend the International Congress of Toxicology Annual Meeting in Honolulu, Hawaii, July 15–18, 2019.

News & Updates

Our department is delighted to welcome four new faculty to the PMI team:

- Dr. Reilly Enos, PhD, is a newly hired tenure-track Assistant Professor. Dr. Enos grew up in the Bay Area of California. He received a BA in Spanish from the College of Wooster (Wooster, Ohio) and a BS from the University of Northern Colorado in Dietetics. Dr. Enos then proceeded to pursue a Master's Degree in Exercise Physiology at Baylor University (Waco, Texas). Upon completion of his Master's Degree, Dr. Enos received his PhD in Exercise Science – Applied Physiology at the University of South Carolina in the laboratory of Dr. Mark Davis. Upon graduation, Dr. Enos pursued a post-doctoral fellowship in the Laboratory of Dr. Angela Murphy in the PMI Department.
- Dr. Philip Brandon Busbee, Ph.D. joined the PMI department as a tenure-track Assistant Professor on July 1st, 2019. He received his undergraduate degree in Biological Sciences at the University of South Carolina Aiken, in Aiken SC. He received his Ph.D. from the University of South Carolina in Biomedical Sciences and did a Postdoctoral Fellow with Dr. Mitzi Nagarkatti, Ph.D., before being hired in the current position. While in graduate school, he was the recipient of the Dean C. Barnhart Graduate Student Award. Dr. Busbee has been also been awarded both American Association of Immunologists (AAI) Trainee Abstract Awards, as well as the Society of Toxicology (SOT) Student Travel Award to present his work at these national conferences. He was a 1st place winner at Discover USC for a Postdoctoral Scholar in 2019. Dr. Busbee was also awarded a Target Faculty position in the NIGMS COBRE Center for Dietary Supplements and Inflammation (CDSI) with a start date of June 1st, 2019 on a project titled "Role and regulation of the AhR-IL22 axis in

IL-22-mediated protection against colitis". His current research focus is on investigating the role of IL-22 in regulating host immune response to disease, such as colitis and colon cancer.

- Dr. Kandy T. Velázquez joins our PMI faculty as a newly hired tenure-track Assistant Professor. Dr. Velázquez is from Isabela, Puerto Rico. She received her Bachelor's degree in Biology at the University of Puerto Rico (UPR)-Mayagüez. Then, she pursued her Master's degree in Medical Physiology at the Medical Sciences Campus-UPR under the tutelage of Dr. Juan Carlos Jorge. She received her PhD in Exercise Science (Applied Physiology Division) from the University of South Carolina under the mentorship of Dr. James A. Carson. Dr. Velázquez joined the laboratory of Dr. Angela Murphy to pursue postdoctoral training. Her training was funded by RISE-program (UPR-MS), PREP-Program (USC), SLOAN Scholarship (USC), SEAGEP (USC), Diversity supplement (NIH-NCI), ASPIRE (USC), Mentor/Mentee grant (SSMN), and a K99/R00 Pathway to Independence Award (NIH-NCCIH).
- Dr. Juhua Zhou joined Dr. Nagarkatti's Lab in the PMI Department as a Research Associate Professor on June 1, 2019. Dr. Zhou obtained his Ph. D. degree in molecular biology from the University of Louisiana at Lafayette in December, 1999. After graduation, Dr. Zhou joined the Center for Cell and Gene Therapy at Baylor College of Medicine as a postdoctoral fellow. He then joined the Surgery Branch at National Cancer Institute, NIH in 2002 as a Research Fellow and took part in the basic research and clinical trials in cancer immunotherapy. Dr. Zhou joined the PMI Department at the University of South Carolina in 2006 as a Research Assistant Professor. In March, 2013, Dr. Zhou joined Ludong University in China as Distinguished Professor (Taishan Scholar) to lead a research team in tumor immunology, cancer immunotherapy, and biopharmaceutics.

We also are happy to welcome several new post-doctoral fellows to the PMI family:

- Joining Dr. Kandy Velázquez's lab is Dr. Sahar Pourhoseini. Dr. Pourhoseini was awarded her Ph.D. in June 2019 from the Environmental Health Sciences department of the University of South Carolina, Arnold School of Public Health.
- Dr. Brandon VanderVeen joined the Murphy Laboratory. Brandon received his Ph.D. from the Department of Exercise Science at the University of South Carolina where he worked under the tutelage of Dr. Jim Carson.
- Dr. Kathryn Miranda has begun a post-doctoral fellowship in the Nagarkatti lab. Kathryn received her PhD in August 2019 from the PMI department.
- Dr. Kiesha Wilson has joined the lab of Dr. Mitzi Nagarkatti as a post-doctoral fellow. Dr. Wilson was awarded her Ph.D. in July 2019 from the Department of Biological Sciences at the University of South Carolina.

Dr. Carole Oskeritzian was invited to serve as a Session Chair and give an invited talk at the 9th International Mast Cell and Basophil Meeting held in June 17-19 in Uppsala, Sweden.

Dr. Mitzi Nagarkatti served as a reviewer for the P42 Superfund grant review in Raleigh NC on July 22 – 24, 2019.

Dr. Catroppo attended the University of South Carolina Center for Teaching Excellence (CTE) workshop "Incorporating Effective Active Learning Assessments in Any Classroom" on 25 July 2019.

Dr. Angela Murphy served as a reviewer for NIH/NCI Transition to Independence awards (K99 and K22) in Washington DC on June 12-13.

Dr. Prakash Nagarkatti serves on the Fred Taylor Award Committee for National EPSCoR/IDeA Coalition Board.

Dr. Ioulia Chatzistamou was invited to give a talk at the Department of Biology, Illinois Institute of Technology, Chicago, IL, on June 13, 2019. The title of her presentation was "Deer mice as a model for human breast cancer studies".

Angelica Toro-Cora, B. S., joined the Oskeritzian Lab in June, as a Post-baccalaureate Research Education Program (PREP) scholar. Angelica will study the molecular alterations occurring in human skin explants upon *ex vivo* antigenic stimulation.

Dr. Catroppo was appointed to the Appointment and Promotion Committee for Non-Tenure-Track Basic Science Faculty, Faculty Representation Committee, University of South Carolina School of Medicine – Columbia for a three-year term (July 2019-June 2022).

Dr. Mitzi Nagarkatti reviewed grants for the NIH Systemic Injury by Environmental Exposure (SIEE) Study Section review in Alexandria, VA, on June 20-21, 2019.

Dr. Swapan Ray served as a reviewer for the Patton Trust Research Grants (Kansas City) in June 2019.

Dr. Catroppo attended the International Association of Medical Science Educators (IAMSE) 23th Annual Meeting, hosted by the Virginia Tech Carilion School of Medicine, Roanoke, VA, and participated as well in all-day pre-conference collaborative Aquifer Sciences/IAMSE-sponsored workshop "Integration In Action!" from 8-11 June 2019.

Dr. Testerman was invited to speak at the South Carolina Infectious Disease Society summer meeting, held in Charleston, SC on June 20, 2019. The title of her presentation was "The roles of enterohepatic *Helicobacter* species in modulating colitis in mice".

Dr. Murphy served as a reviewer and co-chair for NIH/NCI Clinical and Translational Exploratory/Developmental Studies on Cancer Immunology and Immunotherapy on June 6th and 7th.

Dr. Prakash Nagarkatti chaired the NIH/NIGMS COBRE Grant Review Panel - ZGM1 RCB-4 (C1)

Dr. Hasan Alghetaa, Dr. Amira Mohammed, and Dr. Wurood Neamah, three members from Dr. Nagarkatti's lab with another 150+ scientists from different worldwide regions have established and founded an Arab Toxicologists Association Special Interest Group (ATA-SIG) <https://toxchange.toxicology.org/p/bl/et/blogaid=3099>, under the umbrella of Society of Toxicology. Among 160 nominees, SOT has approved the executive board officers' election of this ATA-SIG on June 18, 2019, to have Dr. Hasan Alghetaa as Vice President-elect, Dr. Amira Mohammed as two-year-term Counselor and Dr. Wurood Neamah as a Graduate student representative.

Dr. Swapan Ray served as a reviewer for a book proposal from Springer Nature in May 2019.

Many have asked the question: "Can I get a minor in horticulture at the same time I am getting my M.D. degree?" The answer is yes! Dr. Startz is the advisor for the medical student garden (located outside Building 3). He is assisted by Sonya Joseph (M3) and Neha Malhotra (M2). The garden this year has been exceptional with corn, green peppers, okra, and eggplant. The herb garden has graced the table of many faculty, staff, and students with its bountiful harvest of basil, rosemary, chives, lemongrass, and lemon thyme. The produce was featured by the student interest group HEAL (Healthy Eating and Lifestyles) at the August interest group fair. The horticulture degree is a hands on degree which you assist Dr. Startz in both the fall and spring plantings. The next session will be at the end of September when we will be planting a winter crop of peas, broccoli, mustard greens, and carrots. Those interested can contact the Farmer in the Dell at B33 in Building #1. The capital for the garden is provided by the university in the form of a \$300 annual grant.



Publications

Alrafas HR, Busbee PB, Nagarkatti M, Nagarkatti PS. Resveratrol modulates the gut microbiota to prevent murine colitis development through induction of Tregs and suppression of Th17 cells. *J Leukoc Biol.* 2019 Aug;106(2):467-480.

Chitrala KN, Yang X, Busbee B, Singh NP, Bonati L, Xing Y, Nagarkatti P, Nagarkatti M. Computational prediction and in vitro validation of VEGFR1 as a novel protein target for 2,3,7,8-tetrachlorodibenzo-p-dioxin. *Sci Rep.* 2019 May 2;9(1):6810.

Miranda K, Mehrpouya-Bahrami P, Nagarkatti PS, Nagarkatti M. Cannabinoid Receptor 1 Blockade Attenuates Obesity and Adipose Tissue Type 1 Inflammation Through miR-30e-5p Regulation of Delta-Like-4 in Macrophages and Consequently Downregulation of Th1 Cells. *Front Immunol.* 2019 May 10;10:1049.

Al-Ghezi ZZ, Busbee PB, Alghetaa H, Nagarkatti PS, Nagarkatti M. Combination of cannabinoids, delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD), mitigates experimental autoimmune encephalomyelitis (EAE) by altering the gut microbiome. *Brain Behav Immun.* 2019 Jul 26. [Epub ahead of print]

Sarkar S, Kimono D, Albadrani M, Seth RK, Busbee P, Alghetaa H, Porter DE, Scott GI, Brooks B, Nagarkatti M, Nagarkatti P, Chatterjee S. Environmental microcystin targets the microbiome and increases the risk of intestinal inflammatory pathology via NOX2 in underlying murine model of Nonalcoholic Fatty Liver Disease. *Sci Rep.* 2019 Jun 19;9(1):8742.

Testerman TL, Semino-Mora C, Cann JA, Qiang B, Peña EA, Liu H, Olsen CH, Chen H, Appt SE, Kaplan JR, Register TC, Merrell DS, Dubois A. Both diet and Helicobacter pylori infection contribute to atherosclerosis in pre- and postmenopausal cynomolgus monkeys. *PLoS One.* 2019 Sep 6;14(9):e0222001.

Ababayehu D, Spence AJ, Caslin HL, Taruselli M, Haque TT, Kiwanuka KN, Kolawole EM, Chumanevich AP, Sell SA, Oskeritzian CA, Ryan JJ, Kee SA. Lactic acid suppresses IgE-mediated mast cell function *in vitro* and *in vivo*. *Cell Immunol.* 2019 Jul;341:103918.

Sougiannis AT, VanderVeen BN, Enos RT, Velazquez KT, Bader JE, Carson M, Chatzistamou I, Walla M, Pena MM, Kubinak JL, Nagarkatti M, Carson JA, Murphy EA. Impact of 5 fluorouracil chemotherapy on gut inflammation, functional parameters, and gut microbiota. *Brain Behav Immun*. 2019 Aug;80:44-55.

Murphy EA, Jenkins TJ. A Ketogenic Diet for Reducing Obesity and Maintaining Capacity for Physical Activity: Hype or Hope? *Curr Opin Clin Nutr Metab Care*. 2019 Jul;22(4):314-319.

Wirth MD, Robinson CM, Murphy EA, Shivappa N, Hebert JR. The Dietary Inflammatory Index is Associated with Gastrointestinal Infection Symptoms in the National Health and Nutrition Examination Survey. *International Journal of Food Sciences and Nutrition*. 2019 May 20:1-10.

Velázquez KT, Enos RT, Bader JE, Sougiannis AT, Carson MS, Chatzistamou I, Carson JA, Nagarkatti PS, Nagarkatti M, Murphy EA. Prolonged high-fat-diet feeding promotes non-alcoholic fatty liver disease and alters gut microbiota in mice. *World J Hepatol*. 2019 Aug 27;11(8):619-637.

Zhang Y, Lucius M, Altomare D, Havighorst A, Farmaki E, Chatzistamou I, Shtutman M, Kiaris H. Coordination analysis of gene expression points to the relative impact of different regulators during endoplasmic reticulum stress. *DNA Cell Biol*. 2019 Sep;38(9):969-981.

Taylor MA, Khathayer F, Ray SK. Quercetin and sodium butyrate synergistically increase apoptosis in rat C6 and human T98G glioblastoma cells through inhibition of autophagy. *Neurochem Res*. 2019 Jul;44(7):1715-1725.

Das BC, Dasgupta S, Ray SK. Potential therapeutic roles of retinoids for prevention of neuroinflammation and neurodegeneration in Alzheimer's disease. Retinoids for anti-inflammatory and neuroprotective effects in Alzheimer's disease. *Neural Regen Res*. 2019 Nov;14(11):1880-1892.

Merritt CH, Taylor MA, Yelton CJ, Ray SK (2019) Economic impact of traumatic spinal cord injuries in the United States. *Neuroimmunol Neuroinflammation* 6:9.

Presentations

Miranda K, Mehrpooya-Bahrami P, Nagarkatti P, Nagarkatti M. Cannabinoid receptor 1 blockade attenuates obesity and adipose tissue type 1 inflammation through miR-30e-5p regulation of Delta-like-4. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019. **AAI Trainee Abstract Award.**

Alghetaa H, Mohammed A, Nagarkatti M Nagarkatti, P.S. Lactobacillus reuteri induced by resveratrol ameliorates SEB-mediated acute lung injury. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019.

Bam M, Yang X, Nagarkatti P, Nagarkatti M. Inflammation in PTSD is a consequence of dysregulated WNT signaling orchestrated by long non-coding RNA LINC00926 and lysine methyltransferase MLL1. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019.

Busbee PB, Alrafas H, Dopkins N, Nagarkatti M, Nagarkatti PS. Indole-3-carbinol prevents murine colitis development via an IL-22-dependent mechanism that regulates anti-microbial peptides and mucus production. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019. **AAI Trainee Travel Award.**

Alghetaa H, Mohammed A, Nagarkatti M, Nagarkatti PS. Lactobacillus reuteri induced by resveratrol ameliorates SEB-mediated acute lung injury. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019.

Khathayer F, Ray SK. miR-34a upregulation enhanced therapeutic efficacy of combination of 4HPR and SAHA for induction of apoptosis in glioblastoma. Neuroscience Community Retreat, South Carolina State Museum, Columbia, SC, May 17, 2019.

Turner-McGrievy GM, Wilson M, Davey M, Crimarco A, Botchway M, Hutto B, Frongillo EA, Murphy EA, Wilcox S. The Nutritious Eating with Soul Study: 6-month changes in body weight and blood pressure comparing a vegan vs. low-fat soul food dietary intervention. International Society of Behavioral Nutrition and Physical Activity Annual Meeting, Prague, Czech Republic, June 4-7, 2019.

Fuseler JW, Kumte NI, Wedman PA, Aladhami A, Chumanevich AP, Oskeritzian CA. Newly uncovered angiogenic remodeling in asymptomatic eczema requires mast cells and sphingosine kinase. The International Mast Cell and Basophil Conference, Uppsala, Sweden, June 17-19, 2019.

Miranda K, Becker W, Busbee PB, Dopkins D, Zhong Y, Nagarkatti PS, Nagarkatti M. Endocannabinoid signaling mediates susceptibility to high fat diet-induced intestinal dysbiosis and regulates metabolic health. International Cannabinoid Research Society Annual Meeting, Bethesda, MD, June 29 – July 4, 2019. **ICRS Predoctoral Scientific Achievement Award.**

Mohammed A, Alghetaa H, Kaul M, Nagarkatti P, Nagarkatti M. THC treatment improved neurological effects of gp120 by altering the gut dysbiosis and induction of myeloid-derived suppressor cells. International Cannabinoid Research Society Annual Meeting, Bethesda, MD, June 29 – July 4, 2019. **ICRS Travel Award.**

Alghetaa H, Mohammed A, Nagarkatti M, Nagarkatti, P.S. Protective effect of resveratrol on the integrity of alveolar and intestinal epithelial barrier in SEB-induced acute lung injury. IUTOX 15th International Congress of Toxicology, Honolulu, HI, July 15 - 18, 2019.

Mohammed A, Alghetaa H, Kaul M, Nagarkatti P, Nagarkatti M. THC-treatment improved neuronal functions by decreasing HIV gp120-mediated neuroinflammation. IUTOX 15th International Congress of Toxicology, Honolulu, HI, July 15–18, 2019. **IUTOX Travel Award.**

Singh NP, Jackson D, Sumpter S, Miranda K, Singh UP, Nagarkatti M, Nagarkatti P. AhR ligands affect thymus and lymphoid organs (spleen) by targeting T cells and their functions leading to immune suppression or inflammation. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019.

Dopkins N, Nagarkatti P, Nagarkatti M. Tryptamine treatment results in the amelioration of EAE by inducing an anti-inflammatory shift in the Th17/Treg balance mediated by regulation of miRNA expression profile. American Association of Immunologists Annual Meeting, San Diego, CA, May 9-13, 2019.