

Department of Pathology, Microbiology and Immunology

USC School of Medicine

The Communication Source for PMI Faculty, Staff & Students

Department Chair: Dr. Mitzi Nagarkatti

Editors: Nicki Holt & Dr. Angela Murphy



News & Updates:

Our departmental ranking for 2014 was 15th among all Pathology Departments in the nation. This ranking is based on NIH funding. Our department attracted ~\$9.2million in 2014. Our department was also ranked #1 at USC in total funding for the last fiscal year.

Dr. Carole Oskeritzian was nominated to be one of the November 2014 Featured Scholars on the USC Vice President for Research page and in the @UofSC Today on December 10, 2014. http://sc.edu/about/offices_and_divisions/research/faculty_expertise/featured_scholars/recentscholars.php http://www.sc.edu/uofsc/stories/2014/carole_oskeritzian_asthma.php#.VJSbH5Ccc

Dr. Udai Singh served on the National Institutes of Health (NIH) "Innate immunity and Inflammation (III)" study section in October 2014.

In November, Dr. Elizabeth Zumbrun was invited to give a talk for the American College of Veterinary Pathologists Meeting in Atlanta titled "Animal models and countermeasures for Ebolavirus infections."

Dr. Swapan Ray served as a member of the USC Breakthrough Leadership Awards Committee in September.

Dr. Narendra Singh was invited to give a talk at the Center for NanoBiotechnology and Life Sciences Research at Alabama State University in Montgomery, AL on September 30, 2014. The title of his talk was "Complementary and alternative medicine and its perspective."

Dr. Jennifer Nyland served as Chair of the Scientific Committee for the Carolina Women's Health Research Forum in October.

Dr. Dev Karen served as a scientific reviewer for the Department of Defense 2014 Prostate Research Program (PCRP) in August and November.

Dr. Carole Oskeritzian was invited by the Department of Genetics and Biochemistry at Clemson University to visit and meet Faculty, post-doctoral fellows and students on November 21, 2014. In addition, she gave a talk entitled "Inflammation chemoprevention: mast cells and sphingosine-1-phosphate in the line of fire?"

Dr. Angela Murphy served as a reviewer of 'Training, Educational and AREA grants' for NIH's National Center for Complementary and Alternative Medicine (NCCAM) in November.

Dr. Udai Singh served as an ad-hoc member on the National Institutes of Health 'Immunity in Disease and Autoimmune States' study section in November 2014.

In October, Dr. Swapan Ray served as an international peer reviewer for grants awarded by the FWF-Austrian Science Fund, Vienna, Austria.

Dr. Udai Singh is currently serving on the editorial board of "Journal of Antibiotics Research".

Dr. Philip Brandon Busbee joined the laboratory of Dr. Mitzi Nagarkatti as a Post-doctoral Fellow in December.

Dr. Carole Oskeritzian was selected to serve as a member of the Advisory Board for the South Eastern Regional Lipid Conference (SERLC) which will celebrate its 50th annual edition in 2015.

Dr. Ray served as the Academic Editor for the paper 'Role of Melatonin in Traumatic Brain Injury and Spinal Cord Injury' recently published in *The Scientific World Journal*, Volume 2014 (2014), Article ID 586270, 13 pages.

News & Updates continued:

Dr. Mitzi Nagarkatti served as an External Reviewer for Western Association for Schools and Colleges Accreditation for Loma Linda University in December 2014.

Dr. Narendra Singh visited Dr. Rath Research Institute in Santa Clara, CA on December 29, 2014 on the invitation of Dr. Waheed Roomi, founder member and Senior Scientist at the institute.

Drs. Carole Oskeritjian, Dev Karen and Angela Murphy were part of the organizing committee for the Cancer Immunology Retreat that took place in Charleston on January 22-23rd.

Dr. Udai Singh served as a reviewer of Investigator Initiated Grants on Interstitial Cystitis for the Congressionally Directed Medical Research Program (CDMRP) Department of Defense study section in December 2014.

Dr. Prakash Nagarkatti chaired NIH Centers for Advancing Natural Products Innovation and Technology Centers in Dec 2014.

Dr. Prakash Nagarkatti also chaired NIH Botanical Dietary Supplements Research Centers in Dec 2014.

Dr. James Catroppo is faculty advisor to the newly-launched Medical Student Interest Group (MSIG) for Pathology for the Academic Year 2014-2015. Such a group has not been active at USCSOM for quite a few years, and yet such an interest group is a useful mechanism to encourage outstanding medical students to consider a career in pathology, at a time of predicted pathologist workforce shortfall and plummeting medical student interest in pursuing a residency in pathology. Class of 2017 M2 medical students Leila Kutob and Jessie Ulmer Ray composed an abstract, essay and project details in support of their commitment to establishing and maintaining an MSIG program at our medical school, submitting them with their application for grant funds to the Intersociety Council for Pathology Information (ICPI) Medical Student Interest Group (MSIG) 2014 Grant Program. They were selected as recipients of a \$1000 grant, and although the ICPI has recently waived the requirement for departments to provide matching funds, our Department Chair, Dr. Mitzi Nagarkatti, graciously agreed to do so. Our first MSIG event was held in early November, where brochures on pathology as a career in medicine provided by the ICPI as well as the American Society for Clinical Pathology (ASCP) were distributed as 80 interested students enjoyed a lunch catered by Carolina Cafe and a presentation on "food analogies in pathology", entitled "Welcome To... Autopsy Kitchen", by Dr. Catroppo. At the close of the semester, long-sleeved tee-shirts (designed by Ms. Kutob and Ms. Ray, in USC garnet and bearing fictional detective Sherlock Holmes's aphorism "It is a capital mistake to theorize before you have all the evidence... It biases the judgment") were offered for sale to further advertise and encourage participation in the MSIG's activities. The tee-shirts were distributed in a package together with ICPI and ASCP brochures, as well as an entertaining news release on "Pathologists: Detectives of Medicine". Stay tuned... as further activities of our MSIG aimed at promoting a "passion for pathology" as a medical career are in the works for next semester, because... "path rules!", "pathologists are groovy!", and, after all... pathologists have "the last word"!

Traci Testerman, Ph.D. joined the department in October. Dr. Testerman brings much-needed bacteriology research and teaching experience to the department. She did her thesis work on *Salmonella* virulence and gene regulation before switching to *Helicobacter pylori* during her postdoctoral training. Dr. Testerman seeks to determine how *H. pylori* manipulates the host immune response and contributes to both gastric damage and diseases outside the stomach, such as cardiovascular disease. She is also investigating the roles of *H. pylori* and other bacteria in causing a rare form of colorectal cancer. She plans to join in the search for alternative medicines by determining whether a broccoli-derived compound can reduce gastric inflammation and prevent gastric cancer in a rodent model. Dr. Testerman enjoys collaborating with both research and clinical faculty. She loves the mild South Carolina weather and looks forward to getting to know her new colleagues. Welcome Dr. Testerman!

Dr Ioulia Chatzistamou joined the department in August. She graduated from the Department of Biology, Faculty of Sciences, University of Athens, and obtained her MD in 1998 and her PhD in 2003, both from the School of Medicine of the University of Athens, Greece. From 1998 to 2000 Dr Chatzistamou was a Research Instructor in the laboratory of the Nobel laureate and Professor of Medicine, AV Schally, at Tulane University and a Research Associate at the Institute of Endocrinology, Polypeptide and Cancer, Veterans Affairs Medical Center, New Orleans, LA. During her residency in Pathology, she visited as Research Fellow (2001-2002) the Department of Pathology of the Massachusetts General Hospital (MGH) and Medical School at Harvard University in Boston. In 2009 Dr. Chatzistamou joined the Faculty of the University of Athens initially as Lecturer and subsequently as Assistant Professor. Dr Chatzistamou served as Surgical Pathologist for over 8 years in the Laboratory of Histology-Embryology, Medical School (2006-2009), and the Dental School of the

News & Updates continued:

University of Athens (2009-2014) with expertise in Oral and Maxillofacial Pathology. Dr Chatzistamou has taught in several undergraduate and graduate courses in the area of Pathology including Molecular Pathology. Her research interests focus especially in the development of head and neck and female genital tract tumors, with particular emphasis in the pathology of neoplastic stroma. She is also interested in the pathology of mouse tumors and of other diseases in experimental animals and how they relate to the human prototypes. Welcome Dr. Chatzistamou!

Graduations:

Dr. Philip Brandon Busbee (Nagarkatti Lab) successfully defended his dissertation on November 6th and graduated on December 12th. The title of his defense was 'Natural indoles, indole-3-carbinol and 3,3'-diindolylmethane, counteract the effects of staphylococcal enterotoxin B-induced inflammation through epigenetic regulation and modulation of miRNA'.

Jamie McClellan (Dr. Murphy's laboratory) successfully defended her dissertation on November 5th titled 'MCP-1 in Colorectal Cancer: Benefits of Exercise', and graduated in December.

Dr. Sunil Tomar (Nagarkatti Lab) successfully defended his dissertation on November 4th and graduated on December 12th. The title of his defense was 'Novel therapeutic approaches to ameliorate Acute Liver Failure: Mechanistic role of micro-RNAs'.

Nadia Al-Sammarraie from Dr. Ugra Singh's lab successfully defended her Master (M.S.) thesis titled 'Metformin Arrests Growth and Induces Apoptosis of Neuroblastoma Cells'.

Publications:

Penta, KL, Fairweather D, Shirley DL, Rose NR, Silbergeld EK, and Nyland JF. Low-dose mercury heightens early innate response to coxsackievirus infection in female mice. *Inflamm. Res.* 2015 64: 31-40.

Graves CA, Jones A, Reynolds J, Stuart J, Pirisi L, Botrous P, Wells J. Neuroendocrine Merkel Cell Carcinoma is Associated with Mutations in Key DNA Repair, Epigenetic and Apoptosis Pathways: A Case-Based Study using Targeted Massively Parallel Sequencing. *Neuroendocrinology.* 2014 Dec 11 (In Press).

Xu H, Pirisi L, Creek KE. Six1 overexpression at early stages of HPV16-mediated transformation of human keratinocytes promotes differentiation resistance and EMT. *Virology.* 2015 Jan 1;474:144-53.

Banister CE, Messersmith AR, Cai B, Spiryda LB, Glover SH, Pirisi L, Creek KE. Disparity in the persistence of high-risk human papillomavirus genotypes between african american and European american women of college age. *J Infect Dis.* 2015 Jan 1;211(1):100-8.

Zhou J, Chaudhry H, Zhong Y, Ali MM, Perkins LA, Owens WB, Morales JE, McGuire FR, Zumbun EE, Zhang J, Nagarkatti PS, Nagarkatti M.

Dysregulation in microRNA expression in peripheral blood mononuclear cells of sepsis patients is associated with immunopathology. *Cytokine* 2015; 71(1): 89-100.

Zumbun EE. Mission critical: mobilization of essential animal models for ebola, nipah, and machupo virus infections. *Vet Pathol* 2015; 52(1): 18-20.

Tomar S, Nagarkatti M, Nagarkatti PS. 3,3'-Diindolylmethane Attenuates LPS-mediated Acute Liver Failure by Upregulating miRNAs-106a and

miRNA-20b that target IRAK4 to Suppress Toll-like Receptor Signaling. *Br J Pharmacol.* 2014 Dec 17 (In Press).



Publications continued:

Rao R, Nagarkatti PS, Nagarkatti M. Δ^9 Tetrahydrocannabinol attenuates Staphylococcal enterotoxin B-induced inflammatory lung injury and prevents mortality in mice by modulation of miR-17-92 cluster and induction of T-regulatory cells. *Br J Pharmacol*. 2014 Nov 26 (In Press).

Rao R, Nagarkatti P, Nagarkatti M. Role of miRNA in the Regulation of Inflammatory Genes in Staphylococcal enterotoxin B-Induced Acute Inflammatory Lung Injury and Mortality. *Toxicol Sci*. 2015 Jan 5 (In Press).

Dattaroy D, Pourhoseini S, Das S, Alhasson F, Seth RK, Nagarkatti M, Michelotti GA, Diehl AM, Chatterjee S. Micro RNA 21 inhibition of SMAD 7 enhances fibrogenesis via leptin mediated NADPH oxidase in experimental and human nonalcoholic steatohepatitis. *Am J Physiol Gastrointest Liver Physiol*. 2014 Dec 11 (In Press).

Singh UP, Murphy AE, Enos RT, Shamran HA, Singh NP, Guan H, Hegde VL, Fan D, Price RL, Taub DD, Mishra MK, Nagarkatti M, Nagarkatti PS. miR-155 deficiency protects mice from experimental colitis by reducing Th1/Th17 responses. *Immunology* 2014 Nov;143(3):478-89.

Kumar A, Al-Sammarraie N, DiPette DJ, Singh US. Metformin impairs Rho GTPase signaling to induce apoptosis in neuroblastoma cells and inhibits growth of tumors in the xenograft mouse model of neuroblastoma. *Oncotarget* 2014 Nov 30; 5(22):11709-22.

Chakrabarti M, Haque A, Banik NL, Nagarkatti P, Nagarkatti M, Ray SK. Estrogen receptor agonists for attenuation of neuroinflammation and neurodegeneration. *Brain Res. Bull.* 2014 Sep 20; 109: 22-31.

Hossain MM, Ray SK. EWS knockdown and taxifolin treatment induced differentiation and removed DNA methylation from p53 promoter to promote expression of Puma and Noxa for apoptosis in Ewing's sarcoma. *J. Cancer Ther.* 2014 Oct 28; 5: 1092-1113.

Oskeritzian CA, Hait NC, Wedman P, Chumanevich A, Kolawole EM, Price MM, Falanga YT, Harikumar KB, Ryan JJ, Milstien S, Sabbadini RA, Spiegel S. The sphingosine-1-phosphate/sphingosine-1-phosphate receptor 2 axis regulates early airway T-cell infiltration in murine mast cell-dependent acute allergic responses. *The Journal of Allergy and Clinical Immunology* (In Press).

Shamran HA, Hamza SJ, Yaseen NY, Al-Juboory AA, Taub DD, Price RL, Nagarkatti M, Nagarkatti PS, Singh UP. Impact of single nucleotide polymorphism in IL-4, IL-4R genes and systemic concentration of IL-4 on the incidence of glioma in Iraqi patients. *Int J Med Sci.* 2014 11(11): 1147-53.

Wang J, Yu F, Jia X, Iwanowycz S, Wang Y, Huang S, Ai W, and Fan D. microRNA-155 deficiency enhances the recruitment and functions of myeloid-derived suppressor cells in tumor microenvironment and promotes solid tumor growth. *Int. J. Cancer.* 2015 Mar 15;136(6):E602-13.

Shi Y, L Ou, S Han, M Li, M Pena, EA Pena, C Liu, M Nagarkatti, D Fan, W Ai. Deficiency of Kruppel-like factor KLF4 in myeloid-derived suppressor cells inhibits tumor pulmonary metastasis in mice accompanied by decreased fibrocytes. *Oncogenesis.* 2014 Nov 24; 3: e129.

Ou L, Shi Y, Dong W, Liu C, Schmidt TJ, Nagarkatti P, Nagarkatti M, Fan D, W Ai. Kruppel like factor KLF4 facilitates cutaneous wound healing by promoting fibrocyte generation from myeloid-derived suppressor cells. *J Invest Dermatol* (In Press).

Narsale AA, Enos RT, Puppa MJ, Chatterjee S, Murphy EA, Fayad R, Pena MM, Durstine JL, Carson JA. Role of Cachexia Progression on Liver Function in the ApcMin/+ mice. *PLOS ONE* (In Press).

Steiner JL, Davis JM, McClellan JL, Enos RT, Carson JA, Fayad R, Nagarkatti M, Nagarkatti PS, Altomare D, Creek KE, Murphy EA. Dose-dependent benefits of quercetin on tumorigenesis in the C3(1)/SV40Tag transgenic mouse model of breast cancer. *Cancer Biology & Therapy* 2014 Nov 2;15(11):1456-67.

Mahoney SE, Davis JM, Murphy EA, McClellan JL, Pena MM. Dietary quercetin reduces chemotherapy-induced fatigue in mice. *Integrative Cancer Therapies* 2014 Sep;13(5):417-24.

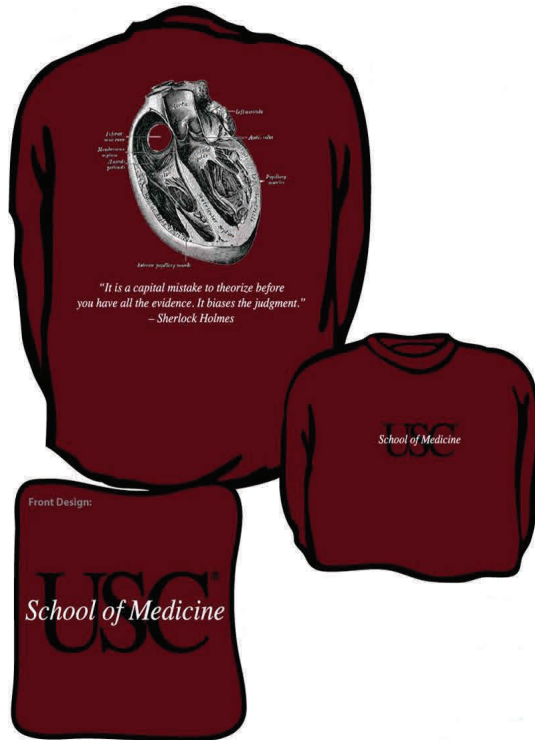
McClellan JL, Steiner JL, Day SD, Enos RT, Davis JM, Singh UP, Murphy EA. Exercise effects on polyp burden and immune markers in the ApcMin/+ mouse model of intestinal tumorigenesis. *Int J Oncol* 2014 Aug;45(2):861-8.

Awards & Honors:

Dr. Angela Murphy received pilot funding from the Center for Colon Cancer Research to investigate the impact of gut microbiota in linking obesity to colon cancer. Co-investigators on the grant include Dr. Udai Singh (PMI), Dr. Edsel Pena (Dept of Statistics) and Dr. Cory Robinson (WVSOM).

Taryn Cranford (Murphy Lab) has been selected as a finalist for the American Society of Nutrition's Emerging Leaders in Nutrition Science Poster Competition that will take place at the Experimental Biology Annual Meeting in Boston this coming April. Taryn will present her work on "Influence of High Fat Diet on Macrophage Behavior and Metabolic Processes in Obesity Sensitive and Resistant Mice: Role of Monocyte hemoattractant Protein 1". Co-authors are RT Enos, KT Velazquez, JL McClellan, M Nagarkatti, and EA Murphy.

Kayla Penta won first prize in the Basic Science category for her poster titled "Female immune system is protected from effects of prenatal exposure to mercury" at the Carolina Women's Health Research Forum on October 24, 2014.



Presentations:

Dr. Venkatesh Hegde was invited to present at the Southeastern Regional Chapter of the Society of Toxicology Fall Meeting held on Oct 23-24, 2014 at R.B. Russell USDA Agricultural Research Center, Athens, GA. His talk was titled "Marijuana Cannabinoids and immune suppression: Mechanisms involving microRNA and myeloid-derived suppressor cells (MDSC)". The co-authors were Dr. Mitzi Nagarkatti and Dr. Prakash Nagarkatti.

Pegah Mehrpooya presented at the 2nd SEC Symposium 'Focus on Obesity Prevention' in Atlanta. Her presentation was titled "Blocking cannabinoid CB1 receptor ameliorates inflammation in an experimental model of diet-induced obesity". She received a travel award from the Office of Research to attend the meeting.

Kumar A, Al-Sammarraie N, DiPette DJ, Singh US. Metformin targets Rho GTPases to inhibit neuroblastoma cell growth; implications in the treatment of neuroblastoma" at "AACR International Conference on Frontiers in Cancer Prevention Research" held in New Orleans, Louisiana, USA (Sept 28, 2014 - Oct 01, 2014).

Wedman P, Chumanovich A, Zumbun E, Nagarkatti P, Nagarkatti M, Oskeritzian CA. MicroRNA expression profile in atopic dermatitis links cytokine/chemokine expression to sphingosine-1-phosphate/Stat3 signaling. 49th Annual Southeastern Regional Lipid Conference (SERLC), November 5-7, 2014, Cashiers, NC.

Katsoulas N, Michaelidou V, Panagiotou E, Farmaki E, Sklavounou A, Kiaris H, Chatzistamou I. A Possible Role of Endoplasmic Reticulum Stress in the Pathogenesis of Pemphigus Vulgaris. Oral Health Symposium MUSC, Center for Oral Health Research, November 21, Charleston SC 2014.

Dr. Venkatesh Hegde presented a paper (Hegde VL, Nagarkatti P & Nagarkatti M. Marijuana and Immunity: New mechanisms of immunomodulation involving chemokines, microRNA and myeloid-derived suppressor cells) at the Annual Carolina Cannabinoid meeting held at Wake Forest University, Winston-Salem, NC (Nov 7-9, 2014).

Presentations Continued:

Cranford TL, Enos RT, Velazquez KT, McClellan JL, Nagarkatti M, Murphy EA. Role of MCP-1 in Obesity: Implications for Cancer. American Institute for Cancer Research Annual Meeting, Washington DC, 2014.

Velázquez KT, Enos RT, McClellan JL, Cranford TL, Nagarkatti M, Murphy EA. Prolonged high-fat-diet-induced obesity promotes liver cancer in wildtype mice. American Institute for Cancer Research Annual Meeting, Washington DC, 2014.

Enos RT, Velázquez KT, McClellan JL, Cranford TL, Walla MD, Murphy EA. The Role of the Dietary Omega-6:Omega-3 in Non-Alcoholic Fatty-Liver Disease Development. SEC Symposium-Obesity Prevention, Atlanta Georgia, 2014.

Velázquez KT, Enos RT, McClellan JL, Cranford T, Jung JY, Robinson CM, Nagarkatti M, Murphy EA. Prolong high-fat-diet-induced obesity promotes colitis and liver tumorigenesis in C57BL/6 wild type mice. SEC Symposium-Obesity Prevention, Atlanta Georgia, 2014.

Cranford TL, Enos RT, Velazquez KT, McClellan JL, Nagarkatti M, Murphy EA. Role of MCP-1 on Macrophage Behavior in Obesity. SEC Symposium-Obesity Prevention, Atlanta Georgia, 2014.

Vazquez M, Macht, VA, Bumgardner AL, Grillo CA, Kaigler KF, Enos RT, McClellan JL, Cranford TL, Murphy EA, Wilson MA, Gertler A, Reagan LP. Leptin receptor antagonist administration elicits obesity phenotype in the absence of neurobehavioral changes. Neuroscience Annual Meeting, Washington DC, 2014.

Other Announcements:

Dr. Alexa Gandy (PDF from Dr. Nagarkatti's lab) gave birth to Adalyn Grae Gandy on December 29th, 2014. Congratulations to the new mom of a beautiful baby girl!

David Elliot (Graduate Student from Dr. Nagarkatti's lab) and Brittany Law were married on September 28th, 2014. Congratulations to the newlyweds!



