

UNDERGRADUATE RESEARCH Highlights

Novosel LM, Smialek SA. Nurse Practitioners Recognize, Address Depression-Cardiovascular Disease in Older Adults. *Circulation*. 2015; 132:A17979. (University of Pittsburgh)

Depression is a risk factor for cardiovascular disease (CVD) in older adults. This mixed-methods study examined nurse practitioner (NP) knowledge, screening, and risk-reduction behaviors related to depression and CVD in older adults based on a national sample of actively practicing NPs. NPs were confident of their ability to address classic CVD risks and stressed the importance of a quality patient relationship in the care of depression. As the fastest-growing segment of primary care providers, NPs felt prepared to incorporate care for depression into CVD risk-reduction practices but reported a lack of resources for depression counseling to optimize care for depression. Dr. Lorraine M. Novosel is a faculty member in the Department of Health Promotion and Development. Salina A. Smialek was a senior BSN student actively involved in the Undergraduate Research Mentorship Program (URMP) for four years. She actively participated in subject recruitment and data collection with Novosel at the AANP national conference and assisted in data entry and analysis. Smialek was awarded the 2015 Mary Opal Wolanin Scholarship (undergraduate) at the 2015 National Gerontological Nursing Association's Convention in Indianapolis. This study was funded by the Nurse Practitioner Healthcare Foundation/ Astellas Promoting Heart Health across the Age Span Award, and the University of Pittsburgh Provost Funds and the School of Nursing supported the URMP.

Akkurt M, Smolenski VA, Mohamed SK, Jasinski JP, Ahmed EK, Albayati MR. Crystal structure of ethyl 2-phenyl-4-(prop-2-yn-1-yloxy)-5,6,7,8-tetrahydropyrido[4,3-d]thieno[2,3-d]pyrimidine-7-carboxylate. *Acta Cryst*. 2015; 71:o836–o837. (Keene State College)

This is one of two papers that report the crystal structures of two new thiazole-containing compounds known to display biological activity. Jerry Jasinski is a professor of chemistry at Keene State College. Victoria Smolenski was a junior chemistry major who participated in this research project during the 2014-15 academic year for independent-study credit and in the summer of 2015 through funding from the Building Excellence in Science and Technology (Best) Program at Keene State College. Smolenski plans to apply to graduate programs after her senior year. This research was supported by the BEST program.

Iñiguez SD, Riggs LM, Nieto SJ, Wright KN, Zamora NN, Cruz B, Zavala AR, Robison AJ, Mazei-Robison MS. Fluoxetine Exposure During Adolescence Increases Preference for Cocaine in Adulthood. *Scientific Reports*. 2015; 5:15009. (California State University San Bernardino)

We examined whether exposure to the antidepressant Prozac (Fluoxetine) during adolescence would influence responses to drugs of abuse, such as cocaine, later in life. Using a preclinical model, we found that adolescent exposure to Fluoxetine increases sensitivity to the rewarding properties of cocaine in adulthood. Thus our findings indicate that juvenile exposure to antidepressant medications may result in enduring side effects that could potentially influence drug-seeking behavior in adulthood. Sergio Iñiguez is an associate professor of psychology. Lace M. Riggs, was a DIDARP (Diversity-promoting Institutions Drug Abuse Research Program) scholar in 2015 and is a master's student in the General Experimental psychology program. Seven J. Nieto (2014) is currently enrolled in a PhD program in developmental cognitive neuroscience at the University of Houston. Norma N. Zamora (2013) was an undergraduate research volunteer and is currently in a PhD program in pharmacology and toxicology at the University of Buffalo (SUNY). Bryan Cruz, a RISE (Research Initiative for Scientific Enhancement) scholar in 2014, is enrolled in a PhD program in neuroscience at the University of Texas at El Paso. The research was supported by the NIH-NIGMS Grant 1SC2GM109811.

Kong K, Kocen K, Cooley D. Being a wài guó rén in China: Reflection on a Study Abroad Project in China. *Teaching Chinese in International Contexts*. 2015; 7:25-34. (University of Wisconsin-Eau Claire)

This article reflects on a faculty-led community-service and research project in China. Three undergraduates studying Chinese at the University of Wisconsin-Eau Claire traveled to China to teach a three-week English summer camp for underserved children. This article documents the successes and lessons from the project from both the faculty and participants' perspectives, shares students' cultural experiences, and discusses significant implications. Kaishan Kong is an assistant professor of Chinese in the Department of Languages. Katherine Kocen was a freshman and Delaney Cooley was a sophomore at UW-Eau Claire. This research was based on a study-abroad program in the summer of 2015 that was sponsored by the UW-Eau Claire International Fellows Program.

Mila D, Calderon A, Baldwin AT, Moore KM, Watson M, Phillips BT, Putzke AP. Asymmetric Wnt Pathway Signaling Facilitates Stem Cell-Like Divisions via the Nonreceptor Tyrosine Kinase FRK-1 in *Caenorhabditis elegans*. *Genetics*. 2015; 201:3:1047-60. (Whitworth University)

This study examines how the development of two daughter cells is differentially controlled when a cell divides asymmetrically. Using a series of genomic mutants along with RNA interference, the results suggest a novel mechanism by which a non-receptor tyrosine kinase regulates asymmetric Wnt signaling during stem cell divisions in the nematode, *Caenorhabditis elegans*. In the absence of the non-receptor tyrosine kinase, asymmetric cell division is lost and cellular identity is compromised. Ultimately, the conclusions reveal the complex nature of Wnt signaling in individual cells to achieve two daughter cells with different identities. Aaron Putzke is an associate professor of biology. Danielle Mila worked on the project in 2013-2014 during the academic year and during the summer and is now a science educator at Disney Corporation. Adriana Calderon worked on the project in 2014-2015 and planned to attend medical school after graduating. Kelsey Moore worked on the project from 2011 to 2013 and is now a PhD student in neuroscience at the University of Minnesota. McLane Watson, who worked on the project in 2013-2014, is currently a laboratory technician and is interviewing for PhD graduate programs in cancer immunology. This work was supported by grants from the M. J. Murdock Charitable Trust (to Aaron Putzke).

Ngu-Schwemlein M, Chin SF, Hileman R, Drozdowski C, Upchurch C, Hargrove A. Carbon Nanodots as Molecular Scaffolds for Development of Antimicrobial Agents. *Bioorganic and Medicinal Chemistry Letters*. 2016; 26:1745-1749. (Winston-Salem State University)

This article examines the potential of carbon nanodots (CNDs) as a molecular scaffold for enhancing the antimicrobial activities of small dendritic poly(amidoamines) (PAMAM). Transmission electron microscopy and infrared and fluorescence spectroscopy analyses showed that starch-derived carbon nanodots are readily polyamidated. These PAMAM-coated carbon nanodots exhibit significant in vitro antimicrobial properties, and they show synergistic effect in combination with tetracycline or colistin against some resistant bacteria. Maria Ngu-Schwemlein is a professor of chemistry. Chris Drozdowski graduated as a chemistry major in May 2015 and participated in this research during his senior year as a research assistant. He is currently employed at OriginLab Corp. April Hargrove participated in this research study in 2014 under a summer undergraduate research experience (SURE) program. She is currently pursuing a master's degree at LSU-Shreveport. This research is supported

by an NIH SC3 grant (1SC3GM088134), an AAAS Women in International Research Collaboration grant, and an NSF HBCU-UP grant awarded to Ngu-Schwemlein.

Simpson EL, Fillmore DL, Szajna MJ, Bogner E, Malenda MG, Livingston KM, Hartline B. Enigmatic Spheres from the Late Triassic Lockatong Formation, Newark Basin of Eastern Pennsylvania: Evidence for Microbial Activity in Marginal-Lacustrine Strandline Deposits. *Palaeobiodiversity and Palaeoenvironments*. 2015; 95:521-529. (Kutztown University of Pennsylvania)

This study documents a new type of microbially produced structure from a 210-million-year-old lake system in eastern Pennsylvania. This new microbial structure aids in reconstruction of the paleoecosystem that was developed along the lake's shoreline. E. Bogner and M. Malenda are undergraduate geology majors who will graduate in 2016-2017. Both have summer internships lined up and plan to attend graduate school in fall 2017. K Livingston graduated in 2015 and is currently working for an environmental consulting firm.

Sanchez Zayas M, Gaitor JC, Nestor ST, Minkowicz S, Sheng Y, Mirjafari A. Bifunctional Hydrophobic Ionic Liquids: Facile Synthesis by Thiol-ene "Click" Chemistry. *Green Chemistry*. 2016. (Florida Gulf Coast University)

We describe the facile, robust, and orthogonal fabrication of a structurally comprehensive library of hydrophobic trimethoxysilyl-functionalized ionic liquids with C7-C15 thioether spacer, using thiol-ene "click" chemistry. The synthesized ionic liquids displayed very low glass transition temperatures, high thermal stability, and were hydrophobic in character. And the ability to serve as surface coating agents was tested by immobilizing them on the surface of iron oxide supermagnetic nanoparticles and the organic loading was quantified. Arsalan Mirjafari is assistant professor of chemistry at FGCU. Manuel Sanchez Zayas worked on this project for two years, received a Sheffield Scholarship, and will begin graduate school at the University of California Santa Barbara in fall 2016. Jamie Gaitor, Stephen Nestor, and Samuel Minkowicz are undergraduates who will graduate next year. This research was supported by the Alice and Karl Sheffield Scholarship.

Chartas G, Rhea C, Kochanek C, Dai X, Morgan C, Blackburne J, Chen B, Mosquera A, MacLeod C. Gravitational Lensing Size Scales for Quasars. *Astronomische Nachrichten*. 2016; 337:4: 356 - 361. (College of Charleston)

We present results from our observations of lensed quasars performed in the optical, UV, and X-ray bands. Modeling of the multi-wavelength light curves provides constraints on

the extent of the optical, UV, and X-ray emission regions. One of the important results of our analysis is that the optical sizes as inferred from the microlensing analysis are significantly larger than those predicted by the theoretical-thin-disk estimate. We also present the analysis of several strong microlensing events where we detect an evolution of the relativistic Fe line as the magnification caustic traverses the accretion disk. These caustic crossings are used to constrain the innermost stable circular orbit and the accretion disk inclination angle of the black hole in quasar RX J1131-1231. George Chartas is an associate professor of physics and astronomy at the College of Charleston. Carter Rhea, a senior math and astronomy major, participated in the research for independent-study credit and is applying to graduate programs. The research was supported by NASA via the Smithsonian Institution grant G03-14110B.

Ye H, Curcuru A. Vesicle Biomechanics in a Time-varying Magnetic Field. *BMC Biophysics*. 2015; 8:1. (Loyola University Chicago)

Biological cells deform in a strong electric field (electrodeformation), suggesting an interesting control of cellular biomechanics by the electric field. An alternative method used to generate an electric field is by a time-varying magnetic field. References reporting the magnetic control of cellular mechanics have recently emerged. However, theoretical analysis of the cellular mechanics under a time-varying magnetic field is inadequate. The present study developed an analytical theory to investigate the biomechanics of a modeled cell under a time-varying magnetic field. Hui Ye is an assistant professor of biology at Loyola University Chicago. Austen Curcuru, who participated in the research for undergraduate research credit as a senior biophysics major, is currently employed by Washington University in St. Louis and is applying to graduate programs in biomedical engineering. The research was supported by a research support grant from Loyola University Chicago.

Bleske-Rechek A, Morrison K, Heidtke L. Causal Inference from Descriptions of Experimental and Non-experimental Research: Public Understanding of Correlation-versus-Causation. *Journal of General Psychology*. 2015; 142:48-70. (University of Wisconsin-Eau Claire)

In three different studies, we presented people with one of four research vignettes generated from the combination of two independent variables: whether the vignette described an experimental or non-experimental design and whether the vignette revealed a positive or negative association. Upon reading their vignette, participants selected from a number of potential inferences that could be drawn from the findings. Participants drew causal inferences from non-experimental vignettes as often as they did from experimen-

tal vignettes, especially when inferences matched intuitive notions. Our findings imply that people in the community regularly conflate correlation with causation. We suggest that those who conduct research and present research to others need to explicitly address the conclusions that can and cannot be drawn from their findings. April Bleske-Rechek is a professor of psychology. Katelyn Morrison graduated from UWEC in 2014 and now works in health care administration. Luke Heidtke graduated in 2014 and is currently pursuing a master's degree in counseling at UW-Stout. The students were funded by summer research experience grants from the Office of Research and Sponsored Programs at the University of Wisconsin-Eau Claire.

Rohrbaugh Jr. TN, Doverspike JC, Geib SJ, Sawyer ED, Stibbard MR, Malosh TJ. Diruthenium Tetracarbonyl Sawhorse Complexes Bearing N-heterocyclic Carbene and Phosphine Ligands: Synthesis, Structural Characterization, and Catalytic Activity. *Journal of Organometallic Chemistry*. 2016; 802:1-8. (University of Pittsburgh Johnstown)

This article describes the synthesis and characterization of three novel, and two previously reported, diruthenium(I) organometallic complexes. The characterization of the new compounds includes their solid-state structures, which were obtained through a collaboration with the University of Pittsburgh X-Ray Diffraction Facility. All five diruthenium(I) compounds were assessed toward their ability to catalyze the isomerization of primary alkenes. One of the novel complexes was an exceptionally active catalyst. Correlations were found between catalytic activity and solid-state structural features. Additionally, the five complexes were modeled, using density functional theory, to elucidate their optimal gas phase geometries. Thomas J. Malosh is an assistant professor in the Department of Chemistry at the University of Pittsburgh Johnstown. Thomas N. Rohrbaugh, Jr., graduated from the university in 2013 with a BS in chemistry and now is pursuing a doctorate in chemistry at the Ohio State University. Joshua C. Doverspike, a 2015 BS chemistry graduate, is pursuing a doctorate in chemistry at the University of Michigan, Ann Arbor. Evan D. Sawyer, a 2014 chemistry graduate, is employed at Westmoreland Mechanical Testing and Research. Mitchell R. Stibbard graduated with a BS in chemistry in 2015 and is employed at PPG Industries, Inc. All student authors participated in this project for independent-study credit. This research was supported internally by the university's Mentorship Fund for Faculty-Student Scholarship, Research, and Creative Activity.