Medical Pharmacology Spring 2013 / Fall 2013 Graduate Program Newsletter

Welcome From Dr. Greg Dussor Director of Graduate Studies

Dear Colleagues,

As the 2013-2014 academic year is now upon us, I would like to welcome you back and also to highlight some of the successes over the last year. First, we should continue to highlight our top 5 ranking by the National Research Council. This is a great achievement and places us among the best Pharmacology programs in the country. Second, the Academic Program Review was a great success with a panel of reviewers both inside and outside the University noting many strengths in our Program, including our excellent track record of graduating students at or below the national average and placing these students in highly-regarded positions in academia and industry. Along these lines, 3 students have graduated with a PhD since the beginning of last academic year (Lucy Sanchez-Covarrubias, Alysia Ondoua, Supannikar Tawinwung) and 2 with an MS degree (Benjamin Mills and Seana Hall) and all of them were at or below national averages for time-to-degree. There are several more PhD defenses scheduled for Fall 2013 so this trend will continue into the next year. Finally, our students continue to maintain high levels of productivity through publications, presentations at national/international meetings, and travel awards to meetings.

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Welcome From Dr. Greg Dussor (Cont'd)

I would also like to thank everyone for their hard work during the recruiting season earlier this year. I would especially like to mention the work of Vickie Healey for coordinating all the travel arrangements for interviewees and the recruiting dinner, and Ashley Symons-Liguori and Beenish Majeed for coordinating all of the student-led activities. Thanks to the Faculty for meeting with students and providing constructive feedback. We are all very excited about the outcome of our efforts and welcome two outstanding new PhD students to the Program, Karissa Cottier and Lusine Gomtsian, and an outstanding MS student Marlon Taylor. And thanks to Doug Larson and the Perfusion Program for their work recruiting three excellent MS students, Jennifer Arriola, Kayla Gardner, and Jessica Ortiz. Welcome to all of you and we wish you great success.

These students will be the first to enter the program under the revised curriculum that will allow students to complete coursework in one year. This will move students full time into laboratories one year earlier than in the past and we anticipate this will shorten graduation times. The biggest hurdle in this process was the reorganization of the former PHCL 520, 501A, and 501B courses into the current PHCL 601, a 6-credit course led by Drs. Frank Porreca, Ed French, and Tom Davis. Thanks to all of you for your efforts in the redesign. This new course encompasses the material covered by the 3 prior courses and is contained within one semester allowing the accelerated curriculum to be possible. Compared to past years, this new design also requires a larger number of credit hours per semester. This may impact the time availability of the new students for rotations so I ask that potential advisors keep this in mind when evaluating students. However, I believe that the payoff, joining a laboratory full-time at the beginning of year 2, is easily worth the effort. This is a big change but I'm confident the incoming students are up to the task.

I look forward to another exciting year and wish the faculty, postdocs, students (new and returning), and staff the best for all of their endeavors.

Regards,

Greg Dussor

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Med Pharm Graduate Reps

Each Fall, graduate students nominate and vote for two fellow 3rd/4th year students to serve as Representatives of the Graduate Program in Medical Pharmacology.

This year Ashley Symons and Beenish Majeed were elected as the Graduate Reps.

A call for nominations will be going out in December, so start thinking now for who you would like to nominate.

2013 Graduate Recruitment

Graduate Recruitment was held January 25-27, 2013. A big thank you to all involved and made it another successful recruitment.

Dates for 2014 will be announced soon.

Graduate Student Reminders

- Please see Vickie Healey, Graduate Coordinator, to **reserve a room**. Students can either email Vickie at vhealey@email.arizona.edu or call 626-7218.
- Graduate student **mailboxes** are located in front of the Admin Office located on the 5th Floor. Please check at least once a week.
- If you will be **travelling on University Business**, you **MUST** notify the Pharmacology Admin Office in an email, the dates you will leave/return, reason why. Should this not be done, you risk the chance of not having insurance should something happen and / or not getting reimbursed.
- Receipts for **reimbursements NEED** to be filed with the Pharmacology Admin Office with in 10 days of your return. Should this not be done, you risk the chance of not getting reimbursed.

2012 INCOMING CLASS

<u>PhD.</u>



Karissa Cottier received her undergraduate degree from the University of Toledo. Karissa is also the recipient of the Yamamura Award and the 2013-14 Science Foundation

Arizona Graduate Research Fellowship.

PERFUSION PROGRAM



Jennifer Arriola received her undergraduate degree from the University of Texas Pan American.



Lusine Gomtsian received her undergraduate degree from the University of Illinois at Chicago. Lusine is also the recipient of the Yamamura Fellowship Award.



Kayla Gardner received her undergraduate degree from the University of Arizona.

<u>MS</u>



Marlon Taylor received his undergraduate degree from the University of Arizona.



Jessica Ortiz received her undergraduate degree from the University of Arizona

Fall 2013-Graduation Exam Deadlines

Masters

•	2nd Semester in Residence	Submit Masters/Specialist Plan of Study form through UAccess			
•	December 11, 2013	Degree Requirements (All degree requirements must be met by this date (including defense/revision of thesis, coursework and			
Doctoral					
•	3rd Semester in Residence	Submit Doctoral Plan of Study form through UAccess			
•	As soon as course work is completed.	Schedule the Oral Comprehensive Examination. The Results of Oral Comprehensive Exam for Doctoral Candidacy form must e returned to the Grad College. There are fees associated with this form			
•	As soon as Comps Passed	Submit Committee Appointment Form			
•	November 18, 2013	Last day to TAKE the Final Oral Examination/Defense. The Announcement of Final Oral Defense form, is due at least seven (7) working days prior to the date of the examination.			
•	December 2, 2013	Deadline to submit dissertation to Degree Certification.			

Spring 2014 - Graduation Exam Deadlines

Masters

•	2nd Semester in Residence	Submit Masters/Specialist Plan of Study form through UAccess		
•	May 15, 2014	Degree Requirements (All degree requirements must be met by this date (including defense/revision of thesis, coursework and		
Doctoral				
•	3rd Semester in Residence	Submit Doctoral Plan of Study form through UAccess		
•	As soon as course work is completed.	Schedule the Oral Comprehensive Examination. The Results of Oral Comprehensive Exam for Doctoral Candidacy form must e returned to the Grad College. There are fees associated with this form		
•	As soon as Comps Passed	Submit Committee Appointment Form		
•	April 21, 2014	Last day to TAKE the Final Oral Examination/Defense. The Announcement of Final Oral Defense form, is due at least seven (7) working days prior to the date of the examination.		
•	May 5, 2014	Deadline to submit dissertation to Degree Certification.		

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NEW Graduate College- GradPath

Monday, October 1, 2012, GradPath (new online degree certification forms system) went live.

What this means to you, ALL required forms for M.S. and Ph.D students, will be done online.

- Students will be submitting forms through UAccess Student Center GRADPATH
- Advisors will be approving forms on-line when notified by email, the email will take you directly to the site for approval.
- Students should notify advisors when a particular form has been submitted. This is to prevent your form from possibly being heldup.
- Students "Chair" means "Advisor" not the Chair of your Comp Committee.

Should you have any questions/concerns, please see or call me as we will all have to work through this together.

Congratulations To Our Spring 2013 and Summer 2013 Graduates

Spring 2013

Alysia Ondoua, PhD.

"Novel mechanisms and therapeutics in the treatment for cancer-Induced bone pain "

Lucy Sanchez Covarrubias, Ph.D.

"NSAIDs Modulate Morphine Transport at the Blood-Brain Barrier: A Role for P-glycoprotein"

Seana Hall, M.S. (Perfusion)

"Reliability of the Thoratec HeartMate II Flow Measurements and Alarms in the Presence of Reduced or Non-Existent Flow"

Ben Mills, M.S. (Perfusion)

"Regional Cerebral Oxygen Desaturations in Coronary Artery Bypass Surgery: A Minimally Invasive Approach"

Summer 2012

Supannikar Tawinwung Ph.D.

"Role of the adaptive immune system in Angiotensin II induced vascular remodeling and stiffening"



Spring 2013 Graduates



Perfusion Students: Seana Hall and Ben Mills

Pharmacology Students: Alysia Ondoua, Supannikar Tawinwung and Lucy Sanchez-Covrrubias (L-R)





Lucy Sanchez-Covarrubias with her parents



Seana Hall, Ben Mills and Supannikar Tawinwung with their Advisor Doug Larson

Graduate Student Publications

Boros, D., Thompson, Jl., Larson, DF. "Immunomodulatory Effects and Adenosine." Perfusion, Jan. 2013.

Taylor-Piliac, RE., **Boros, D.,** Coul, BM. "Strategies to Improve Recruitment and Retention of Older Stroke Survivors to a Randomized Clinical Exercise Trial." Journal of Stroke and Cerebrovascular Diseases, May 2, 2013.

Madigan, B., **Boros, D.,** Poston, R. "Subramanian S. Myocardial Protection with Custodiol Cardioplegia in Adult Cardiac Surgery." American Association for Thoracic Surgery, May 8, 2013.

Craft RM., Kandasamy R., Davis, SM. "Sex differences in anti-alodynic, antihyperalgesic and antiedema effects of Δ^9 -tetrahydrocannabinol in the rat." PAIN, doi: http://dx.doi.org/10/1016/ j.pain.2013.05.017.

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Lozano-Ondoua, AN., **Symons-Liguori, AM**., and Vanderah. TW. "Mechanisms of cancer-induced bone pain". Neurosci. Letters. Submitted. 2013

Symons-Liguori, AM. and Vanderah, TW. "The Delta Opioid Receptor," in H. Ko and S. M. Husbands (Eds.), Research and Development of Opioid-Related Analgesics. Washington, DC: American Chemical Society Books. 2013

Ondoua-Lozano, AN.*, Hanlon, KE.*, **Symons-Liguori, AM**., Largent-Milnes, TM., Havelin, J., Chandramouli, A., Owusu-Ankomah, M., Nikolich-Zugich, T., Bloom, AP., Jimenez-Andrade, JM., King, T., Porreca, F., Nelson, MA., Mantyh, PW. and Vanderah, TW. "Disease modification of breast cancerinduced bone remodeling by cannabinoid 2 receptor agonists." 2013 JBMR 28(1):92-107. (* = coauthorship).

Melemedjian OK, Yassine HN, **Shy A**, Price TJ. "Proteomic and functional annotation analysis of injured peripheral nerves reveals ApoE as a protein upregulated by injury that is modulated by metformin treatment." *Mol Pain*. 2013 Mar 26;9:14.

Aguilar, D., **Strom, J.,** Xu, B., Lee, D., Kappeler, K. and Chen, QM. "Expression of Glucocorticoid-Induced Leucine Zipper (GILZ) in *Cardiomyocytes*. 2013.

Flynn AN, Hoffman J, **Tillu DV**, Sherwood CL, Zhang Z, Patek R, Asiedu MH, Vagner J, Price TJ, Boitano S. "Development of highly potent protease-activated receptor 2 agonists via synthetic lipid tethering." *FASEB* Journal, April 2013.

Xu, H., Radabaugh, T., Lu, Z., Billheimer, D., Vercelli, D., Halonen, M., Lau, S.S. "Validation of an Early Life Candidate Biomarker for Childhood Asthma." *FASEB J*, 27:1107.2

Medical Pharmacology Graduate Student Award



Congratulations to **Dipti Tillu** for receiving the Arizona Board of Regents Graduate Research Grant!! A huge, and well deserved honor for one of our outstanding graduate students

2013 SCIENCE FOUNDATION RECIPIENT



Congratulations to 1st year Karissa Cottier, for receiving the 2013-14 Science Foundation Arizona Graduate Research Fellowship Award.

2013 YAMAMURA FELLOWSHIP RECIPIENTS

L-R: Karissa Cottier Susan Yamamura Lusine Gomtsian



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Pharmacology Faculty Awards/ Honors

The College of Medicine held the 33rd Annual Faculty Teaching Awards November 14, 2012.



Todd Vanderah, PhD received the Outstanding Teaching in a Block Award - Year I Outstanding Achievement in Teaching by a Block—Nervouse System

John Bloom, MD received the Outstanding Teaching in a Block—Year II and the Excellence in Clinical Science Teaching for Medical Students





Ted Price received the Excellence in Graduate Student Education

Gregory O. Dussor, Ph.D. and Theodore J. Price, Ph.D. awarded a 4 year, \$1.1 Million RO1 grant from the National Institute of General Medical Sciences, NIH to study AMPK activators for the treatment of post-surgical pain







Dr. Frank Porreca awarded a 5 year, \$2.5 Million RO1 grant from the National Institute on Drug Abuse, NIH to study Brain Reward Circuits and Relief of Ongoing Pain.

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Pharmacology Faculty Publications

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Slosky, L., Thompson, B. J., Sanchez-Covarubias, J. Finch, K. DeMarco, M. Laracuente , Davis, T.P. and P.T. Ronaldson. Acetaminophen modulates functional expression of p-glycoprotein at the blood-brain barrier via constitutive androstane receptor signaling. *Molecular Pharmacology. In Press.* 2013.

Sanchez-Covarubias, L., **T.P. Davis** and P.T. Ronaldson. Drug transporters at CNS Barrier Sites: Obstacle or Opportunity for drug delivery ? *Current Pharmaceutical Design. In Press.* 2013.

Guo, H., R.D. Bell, S. Wang, A. Sagare, N. Chow, **T.P. Davis**, J.H. Griffin, S.A. Goldman and B.V. Zlokovic. An activated protein C analog stimulates neuronal production by human neuronal progenitor cells via PAR1-PAR3-S1P-Akt pathway. *J. Neuroscience. In Press.* 2013.

Fernandez, J. A., L.O. Mosnier, **T.P. Davis,** B.V. Zlokovic and J.H. Griffin. Influence of the 3K3A-activated protein C variant on the *in vitro* fibrinolytic activity of tPA. *J Thrombos Haemost. In Press.* 2013.

Sanchez-Covarrubias, L., Ronaldson P.T., DeMarco, K.M., and **T.P. Davis**. Diclofenac modulates morphine uptake into the CNS: a role for P-glycoprotein. *J. Pharmacology Experimental Therapeutics*. *In Press.* 2013.

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Remers WA, **Dorr RT**. Chemistry and pharmacology of imexon and related cyanoaziridines. Current Medicinal Chemistry, 19: 2012.

Edelmayer RM, Le LN, Yan J, Wei, X, Nassini R, Materazzi S, Preti D, Appendino G, Geppetti P, Dodick D, Vanderah TW, Porreca F, **Dussor G**. (2012) Activation of TRPA1 on Dural Afferents: A Potential Mechanism of Headache Pain. *Pain*. 153(9):1549-58.

Patwardhan A, Edelmayer R, Annabi E, Price T, Malan P, **Dussor G.** (2012) Receptor Specificity Defines Algogenic Properties of Propofol and Fospropofol. *Anesth Analg.* 115(4):837-40.

Yan J, Melemedjian OK, Price TJ, **Dussor G**. (2012) Sensitization of dural afferents underlies migrainerelated behavior following meningeal application of interleukin-6 (IL-6). *Mol Pain.* Jan 24;8:6.

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Pharmacology Faculty Publication(s) Cont'd

King T, Qu C, Okun A, Melemedjian OK, Mandell EK, Maskaykina IY, Navratilova E, **Dussor GO**, Ghosh S, Price TJ, Porreca F. (2012) Contribution of PKMζ-dependent and independent amplification to components of experimental neuropathic pain. Pain. Jun;153(6):1263-73.

Okun A, Liu P, Davis P, Ren J, Remeniuk B, Brion T, Ossipov MH, Xie J, **Dussor GO**, King T, Porreca F. (2012) Afferent drive elicits ongoing pain in a model of advanced osteoarthritis. *Pain*. Apr;153(4):924-33.

Tillu DV, Melemedjian OK, Asiedu MN, Qu N, De Felice M, **Dussor G**, Price TJ (2012) Resveratrol engages AMPK to attenuate ERK and mTOR signaling in sensory neurons and inhibits incision-induced acute and chronic pain. *Mol Pain*. Jan 23;8:5.

Chapurlat RD, Gensburger D, Jimenez-Andrade JM, Ghilardi JR, Kelly M, **Mantyh P**.Pathophysiology and medical treatment of pain in fibrous dysplasia of bone. Orphanet J Rare Dis. 2012 May 24;7 Suppl 1:S3. Epub 2012 May 24.

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Annedi, S.C., Maddaford, S.P., Ramnauth, J., Renton, P., Rybak, T., Silverman, S., Rakhit, S., Mladenova, G., Dove, P., Andrews, J.S., Zhang, D., **Porreca, F.** Discovery of a potent, orally bioavailable and highly selective human neuronal nitric oxide synthase (nNOS) inhibitor, N-(1-(piperidin-4-yl)indolin-5-yl)thiophene-2-carboximidamide as a pre-clinical development candidate for the treatment of migraine. <u>Eur J Med Chem</u> 55:94-107, 2012.

Navratilova, E., Xie, J.Y., Okun, A., Qu, C., Eyde, N., Ci, S., .H. Ossipov, M.H., King, T., Fields, H.L., and **Porreca, F.** Pain relief produces negative reinforcement through activation of mesolimbic reward-valuation circuitry. Proc Natl Acad Sci U S A. 109:20709-13, 2012. PMC3528534.

Mladenova, G., Annedi, S.C., Ramnauth, J., Maddaford, S.P., Rakhit, S., Andrews, J.S., Zhang, D., **Porreca, F.** First-in-class, dual-action, 3,5-disubstituted indole derivatives having human nitric oxide synthase (nNOS) and norepinephrine reuptake inhibitory (NERI) activity for the treatment of neuropathic pain. <u>J Med Chem</u> 55 :3488-501, 2012.

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Pharmacology Faculty Publication(s) Cont'd

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Okun, A., Liu, P., Davis, P., Ren, J., Remeniuk, B., Brion, T., Ossipov, M.H., Xie, J., Dussor, G.O., King, T., **Porreca, F.** Afferent drive elicits ongoing pain in a model of advanced osteoarthritis. <u>Pain</u>, 153:924 -33, 2012. PMC3313555.

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King T, Qu C, Okun A, Melemedjian OK, Mandell E, Maskaykina I, Navratilova E, Dussor G, Ghosh S, **Price TJ**[#], Porreca F[#]. (2012) Contribution of PKMz dependent and independent amplification to components of experimental neuropathic pain. *Pain*. 153(6) 1263-73 #co-corresponding authors Asiedu MN, Mejia G, Ossipov MK, Malan TP, Kaila K, **Price TJ**. (2012) Modulation of spinal GABAergic analgesia by inhibition of chloride extrusion capacity in mice. *Journal of Pain*. 13(6) 546-54.

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Pharmacology Faculty Publication(s) Cont'd

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