

# Integrative Biology & Pharmacology Newsletter

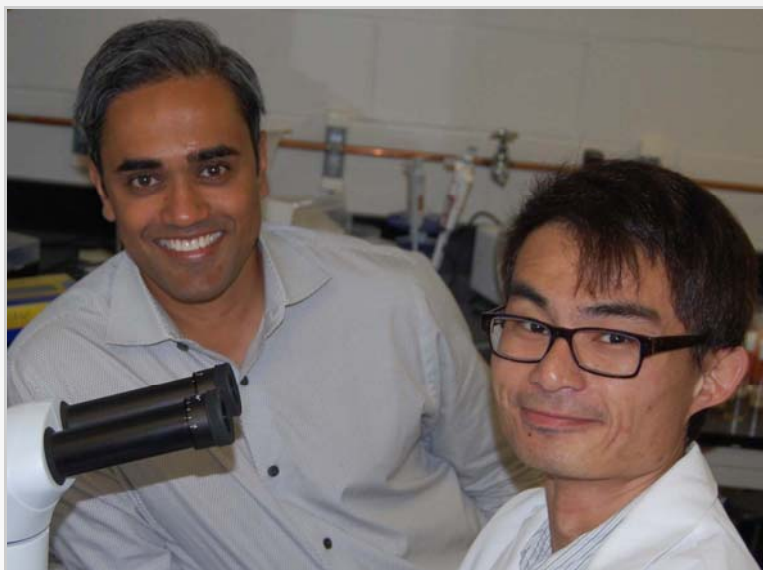
## Lab sheds new light on how brain cells work

Rob Cahill, UTHealth Media Relations

Human brains and computers have much in common. They both use electrical signals to relay information. But, brains are much more complex than a motherboard.

In the journal *Neuron*, Kartik Venkatachalam, Ph.D., assistant professor in the Department of Integrative Biology and Pharmacology (IBP) at UTHealth Medical School, provides new information on how brain cells process information. The study was featured on the cover of the journal.

Venkatachalam, who is also on the faculty of The University of Texas Graduate School of Biomedical Sciences at Houston, reports that the brain does much more than simply relay electrical charges among nerve cells or neurons.



“It also shapes the power of those transmissions along inter-cellular connections called synapses,” said Venkatachalam, the study’s senior author. “And, we have identified a molecular mechanism that does just that. It requires a TRPV channel that is involved in both synaptic development and neurotransmission.”

With the aid of cutting-edge genetic tools available to study synaptic function in fruit fly neurons, Venkatachalam and his colleagues observed how the TRPV channel allows brain cells to tune synaptic transmission.

Venkatachalam’s team showed that deleting the TRPV channel from fly neurons diminished synaptic development and neurotransmission; whereas, enhancing channel activity increased synaptic transmission. The scientists were also able to restore lost synaptic activity in the mutant flies by introducing human TRPV1, which points to remarkable conservation in the function of these channels between flies and humans.

Venkatachalam said a better understanding of synaptic function may aid efforts to develop treatments for neurodegenerative conditions such as amyotrophic lateral sclerosis (ALS) and Alzheimer’s disease.

Also contributing to the paper from UTHealth were Ching On-Wong, Ph.D., a postdoctoral research fellow and the paper’s lead author, and Yufang Chao, a senior research assistant.

<b>IN THIS ISSUE</b>	DEPARTMENTAL NEWS & EVENTS	2	FACULTY SPOTLIGHT	4	STUDENT AWARDS & ACTIVITIES	6	RESEARCH CORNER	8	CALENDAR	10
----------------------	----------------------------------	---	----------------------	---	-----------------------------------	---	--------------------	---	----------	----

# Departmental News & Events

## Dr. Dessauer appointed to NIGMS Council

Carmen Dessauer



Carmen Dessauer has recently been appointed to the National Advisory Council for the NIH Institute for General Medical Sciences. The appointment term is from January 1, 2015 to December 31, 2017. The Council serves to advise, assist, and make recommendations to the Secretary of Health and Human Services (Secretary Sylvia M. Burwell) and the Director of NIGMS (Dr. Jon R. Lorsch) on matters related to the activities and policies of NIGMS. Duties of the Council include review and approval of grant applications, contracts, and co-operative agreements for research and training; comment on the progress of the Institute in meeting goals and objectives; and provide recommendations on the future directions and program and policy emphasis of the Institute.

## Our Renal Team Returns with a Set of Top Notch Awards from the Experimental Biology 2015.

Mykola Mamenko

This year research in Dr. Pochynyuk lab has been recognized by 3 major awards from the American Physiological Society Renal Section at the Experimental Biology Meeting in Boston. Meritorious achievements of Dr. Oleg Zaika were recognized by the Renal Section Research Recognition Award. Dr. Zaika's unique expertise and stellar experimental skills allowed him to establish the role of chloride and potassium channels expressed on the basolateral side of the distal nephron. Dr. Zaika established the role of these channels in maintenance of ion transport in the distal nephron, identified distinct patterns regulating channel activity in different cell types making a real breakthrough in our understanding of electrolyte handling by the distal nephron. The superior quality of science, strong physiological relevance and outstanding presentation skills earned Nabila Boukelmoune the Renal Section Predoctoral Excellence in Renal Research Award. Nabila's project deciphers the role of TRPV4 channel in regulation of K<sup>+</sup> secretion in the kidney and determines the contribution of TRPV4 to the maintenance of systemic potassium homeostasis. A fruitful collaboration between Dr. Pochynyuk and Dr. Doris laboratories resulted in yet another exciting study honored with the Renal Section Postdoctoral Excellence in Research Award to Mykola Mamenko. This study demonstrates that store-operated Ca<sup>2+</sup> entry in collecting duct cells critically contributes to renal water handling, while uncovering the disruption of store-operated Ca<sup>2+</sup> entry in the collecting duct as a novel mechanism of nephrogenic diabetes insipidus pathology. Congratulations to Dr. Pochynyuk for his outstanding mentorship and his team members on their remarkable accomplishments!



# Departmental News & Events

## New Members of the Team



**Krishna, Saritha**  
Postdoctoral  
Research Fellow  
Dr. Berdeaux



**Li, Lin**  
Research Assistant  
Dr. Yang

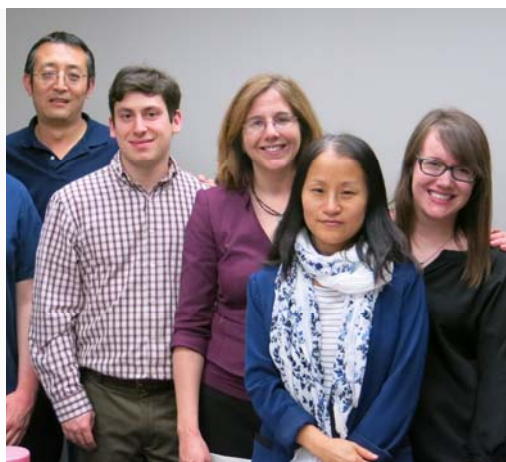


**Li, Yue**  
Research Associate  
Dr. O'Neil



**Nian, Weiqi**  
Visiting Scientist  
Dr. Du

## Congratulations!



Congratulations to Cameron Brand (Left) and Meredith Rees Rodriguez (Right) for successfully defending their thesis!



Melissa Rodriguez was a recipient of the Endocrine Scholars Award in Growth Hormone Research awarded by the Endocrine Society for her project: Elucidating biased agonist action at somatostatin receptors - potential for increasing responsiveness of pituitary tumors to somatostatin analogs. This award is a one-year postdoctoral fellowship for either basic/translational or clinical research to assist future endocrinologists in conducting growth hormone research. The aim of Melissa's project is to elucidate the underlying mechanisms of biased agonist response at the somatostatin receptor to further improve pituitary tumor therapeutic response to somatostatin analogs.





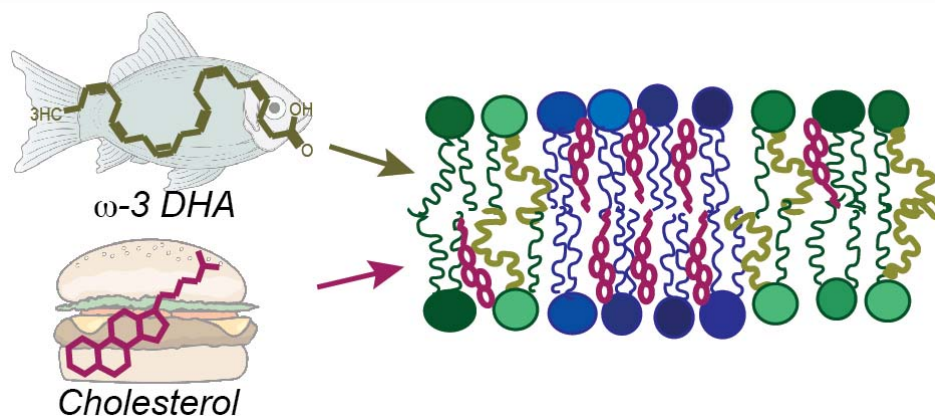
# Faculty Spotlight

## Levental Lab Receives R01 Grant

Ilya Levental

Is it true that you are what you eat? This is a question that Drs. Kandice and Ilya Levental will be investigating after receiving an R01 grant from NIGMS. The grant proposal was motivated by Kandice's observations that differentiation of Mesenchymal Stem Cells (MSCs) into osteoblasts (bone depositing cells) or adipocytes (fat storage cells) induces a broad remodeling of cellular plasma membranes. Consistent across many human donors, Kandice found dramatic differences in biophysical features of plasma membranes induced by MSC differentiation. Namely osteoblasts had more stable raft domains and more tightly packed plasma membranes than the progenitor MSCs, and vice versa in adipocytes. These differences could be accounted for by differentiation of the lipid profiles of the three different cell types. Among a variety of changes, the most significant one was an upregulation of a particular class of fatty acids in the membranes of osteoblasts –  $\omega$ -3 polyunsaturated fatty acids, like DHA, the major component of fish oil. Remarkably, the Levental lab finds that supplementing cell cultures with this dietary lipid component leads to its incorporation into cellular lipids and broad remodeling of the membrane lipidomes and biophysical properties. Most importantly, supplementation with DHA predisposed MSC for osteogenic differentiation, suggesting that lipid supplements can influence cell fate by changing membrane composition and properties.

Lipids are unique among other cellular macromolecules, in that cellular lipid phenotypes can be affected directly by dietary lipid abundance and composition. This property is intriguing in light of the many correlations between lipids and health. The most notable are the deleterious consequences associated with overconsumption of saturated and trans-unsaturated fats, and, conversely, the plethora of beneficial effects of  $\omega$ -3 fats in the form of fish oil. Remarkably, despite the clear impact of membrane phenotypes on health and disease, very little detailed information is available on the membrane lipids that define these phenotypes, or how they influence cell function. With this grant, the Levental lab will investigate the compositional complexity and plasticity of human cell membranes, and the regulation of these by dietary lipids. The long-term goals of these investigations are to define the differences between "healthy" and "unhealthy" membranes and identify drugs and dietary factors to inhibit deleterious membrane properties and/or promote desired cellular phenotypes, e.g. osteogenic differentiation of MSCs in osteoporosis.



The *IBP Newsletter* is published quarterly by the department and distributed to faculty, staff and students. An electronic copy is available on the IBP website at <http://ibp.med.uth.tmc.edu/>

**Chair, IBP**  
Dr. John Hancock

**Vice Chair, IBP**  
Dr. Roger O'Neil

**Director of Management Operations**  
Monica Gardner

**Editor**  
Catrina Stevens

Please contact any of our dedicated staff for whatever assistance you may require:

Catrina Stevens  
Administrative Coordinator  
[Catrina.M.Stevens@uth.tmc.edu](mailto:Catrina.M.Stevens@uth.tmc.edu)  
713.500.7536

Deborah Brougher  
Sr. Contracts & Grants Specialist  
[Deborah.Brougher@uth.tmc.edu](mailto:Deborah.Brougher@uth.tmc.edu)  
713.500.6322

Lisa Byrd  
Senior Administrative Coordinator  
[Lisa.Byrd@uth.tmc.edu](mailto:Lisa.Byrd@uth.tmc.edu)  
713.500.7508

Sandy Cegielski  
Senior Administrative Coordinator  
[Sandy.Cegielski@uth.tmc.edu](mailto:Sandy.Cegielski@uth.tmc.edu)  
713.500.7514

Cordelia Conley  
Administrative Assistant III  
[Cordelia.P.Conley@uth.tmc.edu](mailto:Cordelia.P.Conley@uth.tmc.edu)  
713.500.7459

Anne Dybala  
Administrative Services Officer III  
[Anne.L.Dybala@uth.tmc.edu](mailto:Anne.L.Dybala@uth.tmc.edu)  
713.500.7502

Monica Gardner  
Director, Management Operations  
[Monica.Gardner@uth.tmc.edu](mailto:Monica.Gardner@uth.tmc.edu)  
713.500.7516

Trish McFarland  
Coordinator I, Educational Programs  
[Patricia.McFarland@uth.tmc.edu](mailto:Patricia.McFarland@uth.tmc.edu)  
713.500.5470

Naomi Pinkney  
Sr. Executive Assistant  
[Naomi.Pinkney@uth.tmc.edu](mailto:Naomi.Pinkney@uth.tmc.edu)  
713.500.7547

  
**UTHealth**  
The University of Texas  
Health Science Center at Houston  
**Medical School**

# Faculty Spotlight

## Center for Advanced Microscopy

Kandice Levental

In February, I took over as the Director of the Center for Advanced Microscopy (formerly known as the Cytodynamic Imaging Facility), the IBP-driven core facility housing a variety of the most modern imaging platforms, including spectral resolution confocals, long-term time-lapse imaging, automated high-throughput imaging, *in vivo* bioluminescence, fluorescence, X-ray live animal imaging, and more. We have the following services and equipment available to aid in your research:

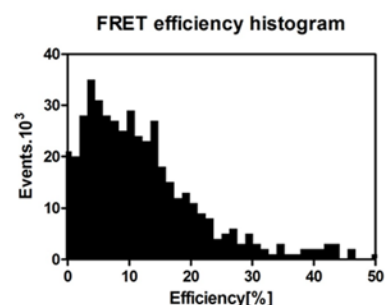
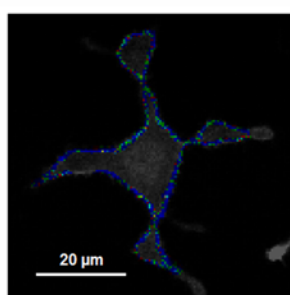
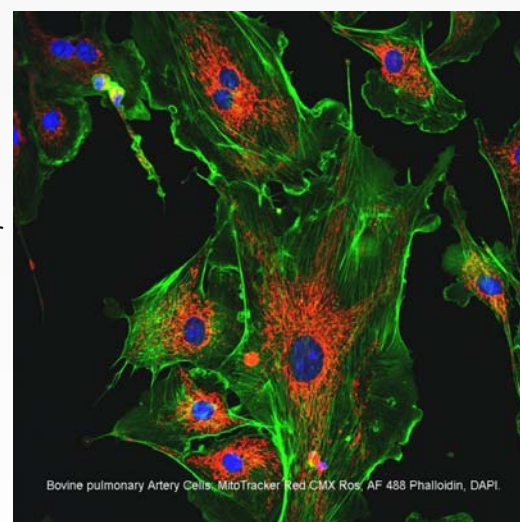
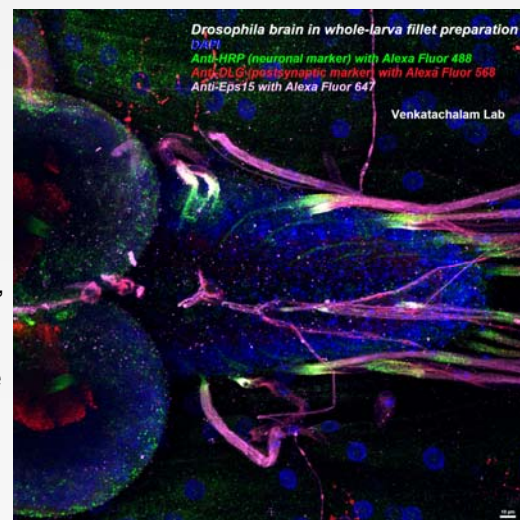
- IVIS Lumina XR - live whole animal imaging of longitudinal fluorescence, bioluminescence, and X-ray *in vivo* and *ex vivo*
- BD LSR Fortessa Cell Analyzer System - 5-laser flow cytometer that allows analysis of up to 13 different fluorochromes plus forward and side scatter
- Nikon TiE Wide-Field Fluorescence Imaging System - for imaging of small molecules in living cells
- Flexstation-3 - microplate reader for absorbance, fluorescence, fluorescence polarization, luminescence in high throughput mode
- Lambert LIFA Fluorescence Lifetime Imaging Microscope
- Nikon A1 Confocal Laser Microscope System + PicoQuant - confocal with a powerful platform for single-photon counting for a range of advanced microscopy applications including fluorescence lifetime imaging and fluorescence correlation spectroscopy
- Nikon A1R Confocal Laser Microscope System - has resonant and spectral detectors
- Olympus 3-line simultaneous TIRF system
- Zeiss 510 Meta Confocal Laser Scanning Microscope - has a module for structured illumination for optical sectioning
- Data Processing Computer which contains: NIS-Elements AR, LI-FLIM, Living Image, MetaMorph, SlideBook, SoftMaxPro, AutoQuant

Together with Olga Chumakova, the facility manager, I aim to ensure that our facility provides our users with the necessary capabilities and experience in light microscopy in a user-friendly manner, with an emphasis on minimizing user costs. Olga and myself are available for discussions on what capabilities our facility currently has and how these can be utilized to aid in your research needs. Furthermore, I am always open to comments, questions, and concerns.

More information can be found at <https://med.uth.edu/ibp/cytodynamic-imaging-facility/> or by contacting Olga ([Olga.Chumakova@uth.tmc.edu](mailto:Olga.Chumakova@uth.tmc.edu)) or myself ([Kandice.R.Levental@uth.tmc.edu](mailto:Kandice.R.Levental@uth.tmc.edu)).

We hope to see in the Center soon!

Kandice Levental



PicoQuant FLIM: FRET efficiency between tgLATwt and trLATwt in the plasma membrane of RBL cells  
J. Lorent (Levental lab)



# Student Awards & Activities

## CRB Retreat-Camp Allen 2015



The following students received awards for their Oral Presentations at the 2015 CRB Retreat at Camp Allen.

**1st Place**

**Casey Schultz**

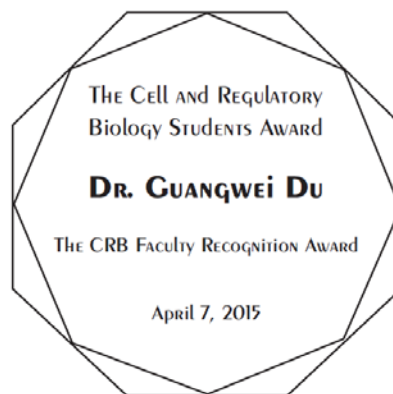
**2nd Place**

**Tanya Baldwin  
Andrew Peters  
Lingxiao Tan**

**3rd Place**

**Barbara Diaz-Aguilar  
Kelsey Maxwell  
Courtney Olsen**

**Dr. Guangwei Du awarded Faculty of the Year!**



Almahariq, M., Mei, F. C., Wang, H., Cao, A. T., Yao, S., Soong, L., Sun, J., Cong, Y., Chen, J., and **Cheng, X.** Exchange Protein Directly Activated by cAMP (EPAC1) Modulates Regulatory T Cell-Mediated Immune Suppression. *Biochem. J.* 465:295-303, 2015.

Almahariq, M., Chao, C., Mei, F. C., Hellmich, M. R., Patrikeev, I., Motamedi, M., and **Cheng, X.** Pharmacological Inhibition and Genetic Knockdown of EPAC1 Reduce Pancreatic Cancer Metastasis in vivo. *Molecular Pharmacology.* 87:142-149, 2015. [Faculty1000 recommended paper] <http://f1000.com/prime/725232154>.

Beck-García K, Beck-García E, Bohler S, Zorzin C, Sezgin E, **Levental I**, Alarcón B, Schamel WW. Nanoclusters of the resting T cell antigen receptor (TCR) localize to non-raft domains. *Biochim Biophys Acta.* 2015 Apr;1853(4):802-9.

Ennequin G, Boisseau N, Caillaud K, Chavanelle V, Gerbaix M, Metz L, Etienne M, Walrand S, Masgrau A, Guillet C, Courteix D, Niu A, **Li YP**, Capel F, Sirvent P. Exercise training and return to a well-balanced diet activate the neuregulin 1/ErbB pathway in skeletal muscle of obese rats. *J Physiol.* 2015 Mar 27. doi: 10.1113/JP270026. [Epub ahead of print] PMID: 258205510.

Gimenez, Luis E., Baameur, Faiza, Vayttaden, Sharat J., **Clark, Richard B.** [Salmeterol Efficacy and Bias in the Activation and Kinase-Mediated Desensitization of  \$\beta\_2\$ -Adrenergic Receptors \(2015\)](#); *Molecular Pharmacology*, 87: 1-12.

Ji-an Chen, Andres Splenser, Bobby Guillory, Jiaohua Luo, Meenal Mendiratta, Blaga Belinova, Tripti Halder, Guohua Zhang, **Yi-Ping Li** & Jose M. Garcia. Ghrelin prevents tumour- and cisplatin-induced muscle wasting: characterization of multiple mechanisms involved. *Journal of Cachexia Sarcopenia Muscle*, in press.

Levental KR, Levental I. Isolation of giant plasma membrane vesicles for evaluation of plasma membrane structure and protein partitioning. *Methods Mol Biol.* 2015;1232:65-77.

Levental KR, Levental I. Giant Plasma Membrane Vesicles: Models for Understanding Membrane Organization. *Current Topics in membranes.* 2015.

Song, E.H., Carr, H.S., Zuo, Y. and **Frost, J.A.** (2015) Acetylation dependent regulation of the subcellular localization and activity of the RhoGEF Net1A. *J. Cell. Sci.*, 128(5):913-22.

Taylor-Teeple M, Lin L, de Lucas M, Turco G, Toal TW, Gaudinier A, Young NF, Trabucco GM, Veling MT, Lamothe R, Handakumbura PP, Xiong G, Wang C, Corwin J, Tsoukalas A, Zhang L, Ware D, Pauly M, Kliebenstein DJ, Dehesh K, Tagkopoulos I, **Breton G**, Pruneda-Paz JL, Ahnert SE, Kay SA, Hazen SP, Brady SM (2014) An Arabidopsis gene regulatory network for secondary cell wall synthesis *Nature.* 517, 571-575.

Zhu, Y., Chen, H., Boulton, S., Mei, F., Ye, N., Melacini, G., Zhou, J., and **Cheng, X.** Biochemical and Pharmacological Characterizations of ESI-09 Based EPAC Inhibitors: Defining the ESI-09 "Therapeutic Window" *Scientific Reports.* 5:9344, 2015.



# Proposals & Awards

Deborah Brougher & Catrina Stevens

Thirty proposals were submitted by the Department of Integrative Biology & Pharmacology in the second quarter of Fiscal Year 2015 by Drs. Gorfe, Berdeaux, Chang, Cheng, Denicourt, Du, Frost, Levental, Li, Lichtenberger, Loose, Mamenko, Schonbrunn, Venkatachalam, Walters, and Yang.

Nine proposals were awarded this quarter. Faculty receiving new awards include Drs. Gorfe, Hancock, Lichtenberger, Loose, Pochynyuk, Schonbrunn, Tian, Venkatachalam, and Zhu. This brings the total number of proposals this year to 50 and awards to 25, a success rate of about 50%.

~Data provided by Deborah Brougher, Sr. Grants and Contracts Specialist

## Proposals Submitted FY2015 2nd QTR

# Submitted	Federal	Private	State	Total
20	12,545,777.00			<b>12,545,777.00</b>
10		1,455,917.00		<b>1,455,917.00</b>
<b>30</b>	<b>12,545,777.00</b>	<b>1,455,917.00</b>	<b>0.00</b>	<b>14,001,694.00</b>

## Awards Received FY2015 2nd QTR

# Rec'd	Federal	Private	State	Total
8	1,580,239.00			<b>1,580,239.00</b>
4		208,704.00		<b>208,704.00</b>
4			1,216,973.00	<b>1,216,973.00</b>
<b>16</b>	<b>1,580,239.00</b>	<b>208,704.00</b>	<b>1,216,973.00</b>	<b>3,005,916.00</b>

# New Awards

New Awards received during the second quarter of Fiscal Year 2015 include:

**Dr. Gorfe.** CPRIT. *Targeting an Elusive Foe: Development of K-RAS Inhibitors.*

**Dr. Hancock.** CPRIT. *Development of a Novel K-RAS Therapeutic.*

**Dr. Lichtenberger.** MDACC. *Use of Aspirin-PC Alone and in Combination with Chemotherapeutic Agents to Treat Ovarian Cancer.*

**Dr. Lichtenberger.** MDACC. *Evaluation of the Chemopreventative Activity of Aspirin-PC, Using In Vitro and In Vivo Models of Colorectal Cancer.*

**Dr. Lichtenberger.** PLX Pharma LLC. *GI-Safer Formulation of Indomethacin for use in Preterm Neonates.*

**Dr. Pochynyuk.** Tulane University. *Pleiotropic Effects of Prorennin Receptor in Collecting Duct and Intrarenal RAS Activation.*

**Dr. Schonbrunn.** Endocrine Society. *Elucidating Biased Agonist Action at Somatostatin Receptors: Potential for Increasing Responsiveness of Pituitary Tumors to Somatostatin Analogs.*

**Dr. Tian.** Algomedix, Inc. *Development of TRPA1 Antagonists for Chronic Pain.*

**Dr. Venkatachalam.** NIH. *Alterations in Synaptic Growth and Lipid-Raft Organization in a Fly MLIV Model.*

**Dr. Zhu.** AHA. *Mechanism of ASIC1A-Mediated Acidosis Brain Damage in Stroke.*

**Dr. Zhu.** AHA. *The Role of TRPC Channels in Ischemic Nerve Damage.*

**Dr. Zhu.** NIH. *MechExcitatory Neurotransmission by PTX-Sensitive G Proteins.*

**Dr. Zhu.** Proctor & Gamble Co. *Electrophysiological Examination of Select Personal Health Care Actives on TRPA1.*



# IBP Seminar Series

~Directed by Drs. Shane Cunba and Kartik Venkatachalam



**March 9, 2015**

**Karl-Dimiter Bissig, M.D., Ph.D.**  
Molecular and Cellular Biology  
Baylor College of Medicine

**Title of Talk:** "Novel Applications of Human Liver Chimeric Mice"

**Host:** Rebecca Berdeaux, Ph.D.



**March 16, 2015**

**Swathi Arur, Ph.D.**  
Department of Genetics  
MD Anderson Cancer Center

**Title of Talk:** "Toggling Dicer Localization and Function by ERK Signaling"

**Host:** Kartik Venkatachalam, Ph.D.



**March 23, 2015**

**Alan Daugherty, Ph.D., D.SC.**  
Medicine and Physiology  
University of Kentucky College of Medicine

**Title of Talk:** "The Renin-Angiotensin System in Health and Disease"

**Host:** Cell and Regulatory Biology Graduate Students



**April 6, 2014**

**George Holz, Ph.D.**  
Medicine and Pharmacology  
SUNY Upstate Medical University

**Title of Talk:** "New TRPA1 Calcium Channel Activators as Novel GLP-1 Secretagogues"

**Host:** Xiaodong Cheng, Ph.D.



**April 13, 2015**

**George Rodney, Ph.D.**  
Molecular Physiology & Biophysics  
Baylor College of Medicine

**Title of Talk:** "An NADPH Oxidase Src Kinase Redox Cycle Controls Autophagy in Duchenne Muscular Dystrophy"

**Host:** Rebecca Berdeaux, Ph.D.



**April 20, 2015**

**Melinda Sheffield-Moore, Ph.D.**  
Neuroscience and Cell Biology  
University of Texas Medical Branch

**Title of Talk:** "Skeletal muscle's mid-life crisis: metabolic mayhem or controlled chaos in cancer and aging?"

**Host:** Yi-Ping Li, Ph.D.



**May 4, 2015**

**Agnes Schonbrunn, Ph.D.**  
Integrative Biology and Pharmacology  
University of Texas Health Science Center at Houston

**Title of Talk:** "Exploiting mechanistic insights into somatostatin action to develop better drugs for neuroendocrine tumors"

**Host:** Kartik Venkatachalam, Ph.D.



**May 11, 2015**

**Zheng (Jake) Chen, Ph.D.**  
Biochemistry & Molecular Biology  
University of Texas Health Science Center at Houston

**Title of Talk:** "Small molecule modulators of circadian rhythm and energy metabolism"

**Host:** Yi-Ping Li, Ph.D.



**May 18, 2015**

**Damian W. Young, Ph.D.**  
Center for Drug Discovery  
Baylor College of Medicine

**Title of Talk:** "Expanding Chemical Diversity for Developing Novel Therapeutics"

**NOTE**

Seminars are held on Mondays at 4:00 PM in MSB 2.135, unless otherwise noted. For information and questions, please contact Catrina Stevens at [catrina.m.stevens@uth.tmc.edu](mailto:catrina.m.stevens@uth.tmc.edu) or 713-500-7536.

# IBP Calendar of Events



**Administrative Staff Meetings, 3:00-4:00 PM, MSB 4.136**

May 20, June 17, July 15, August 19, September 16

**CRB Meetings, 12-1 PM, Room 4.100**

June 4, July 2, August 6, September 3



**Faculty Coffee/Tea, 10-11 AM, MSB 4.100**

May 13, 20, 27  
June 3, 10, 17, 24

July 1, 8, 15, 22, 29  
August 5, 12, 19, 26  
September 2, 9, 16, 23, 30

**STG Seminar, 4-5 PM, MSB 4.100**

May 14, 27



## Dates to Remember:

**May 25:** Memorial Day—*The University will be closed for Official Business*

**June 14:** Flag Day

**June 21:** Father's Day

**June 21:** First Day of Summer

**July 4:** Independence Day—*The University will be closed for Official Business on July 3, 2015*

**September 7:** Labor Day—*The University will be closed for Official Business*

**September 23:** First Day of Autumn