

# BIOCHEMISTRY & MOLECULAR BIOLOGY TODAY

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**utmb** Health

**BMB**  
Biochemistry & Molecular Biology

## Chair's Message

"It was the best of times, it was the worst of times, it was the age of wisdom, it was the age of foolishness, it was the epoch of belief, it was the epoch of incredulity, it was the season of Light, it was the season of Darkness, it was the spring of hope, it was the winter of despair, . . ."  
Charles Dickens

Somehow this seems to describe present times. We all know that the next two years will be challenging given the large cuts in State funding and the sparseness of research funding. However, I also believe that given the quality of our BMB team, we will continue to succeed in performing our education

and research mission.

At our last faculty retreat, we outlined measures that will help in this pursuit, and we are putting many of these into action. But to be able to benefit from these we need your help. For example, we are asking our faculty to provide us with a one page layman's summary of research interests using a format available from Lisa Pipper or myself. These will form the basis of the "Basic Science Weekly" we will soon be distributing to all UTMB faculty in an effort to facilitate research interactions. Another initiative will be participation in Grand Rounds, initially with Internal Medicine, and once

we work out the details, with other clinical departments. These are small but useful steps to promote collaborations.

In the meantime, it is nice to see that the MRB elevators are being worked on as part of a campus-wide effort, and that there is a plethora of recovery efforts finally taking shape all across the campus.

I am sure that we will come through this difficult time strong and in a position to achieve more as the research atmosphere improves.

Regino

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### Special Items of Interest

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## Awards and Announcements



**Keerthi Gottipati**, student in Dr. Kay Choi's lab, presented a talk on Crystal structure of Npro; a novel cysteine autoprotease in classical swine fever virus at the American Society for Virology annual meeting, Minneapolis, MN (July 16-20). She received a graduate student travel award.

**Dr. Junji Iwahara** was awarded a grant from the United States – Israel Binational Science Foundation entitled "Optimizing DNA search efficiency" (Sep. 1, 2011 – Aug. 31, 2015)

**Levani Zandarashvili**, a graduate student in Dr. Iwahara's lab, won a student travel stipend at the 52nd Experimental Nuclear Magnetic Resonance conference .

**Alexandre Esadze**, also a graduate student in Dr. Iwahara's lab, was given an ISOTEC travel stipend award for attending the 52nd ENC conference.

**Dr. Werner Braun** received a grant from National Institute of Allergy & Infectious Diseases entitled "Predicting cross-reactivity of protein antigens using 3D motifs".

**Sai Hari Gandham**, graduate assistant in Dr. Gorenstein's lab, won a second place poster award for student category at the Institute of Molecular Medicine for Prevention of Human Diseases - IMM Trainees' Research Retreat in Houston.

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## BCSO News

Three graduate postdoctoral researchers have been named as Jeane B. Kempner Scholars at the University of Texas Medical Branch at Galveston. This year's scholars are

**Christopher Fry, Ph.D.**

**Erin Glynn, Ph.D.**

**Michal Szymanski, Ph.D.**

The one-year fellowships provide stipends for UTMB graduates to conduct postdoctoral training research projects. Fry was selected for his proposal to study the role of certain cells in the growth of skeletal muscles. Glynn's proposal focused on learning more about improved insulin sensitivity, and Szymanski's focused on the role of certain enzymes in the replication and repair of DNA.



## Publications

**Wiktorowicz, J.**, Stafford, S., Rea, H., Urvil, P., **Soman, K.**, **Kurosky, A.**, **Perez-Polo, J.**, and Savidge, T. Quantification of cysteinyl-S-nitrosylation by fluorescence in unbiased proteomic studies. *Biochemistry*; 50:5601–5614, 2011.

**Pazdrak, K.**, Young, T.W., Straub, C., Stafford, S., and **Kurosky, A.** Priming of eosinophil by granulocyte-macrophage colony stimulating factor is mediated by protein C kinase  $\beta$ II phosphorylated L-plastin. *J. Immunol*; 186, 6485-6496, 2011.

Hosakote, Y. M., Jantzi, P. D., Esham, D. L., **Spratt, H.**, **Kurosky, A.**, Casola, A. and Garofalo, R. P. Viral-mediated inhibition of antioxidant enzymes contributes to the pathogenesis of severe RSV bronchiolitis. *Am. J. Respir. Crit. Care Med.*; 36, 1199-1207, 2011.

Zandashvili, L, Li, DW, Wang, T, Brüscheweiler, R, **Iwahara, J** (2011) Signature of mobile hydrogen bonding of lysine side-chains from long range 15N-13C scalar J-couplings and computation. *J Am Chem Soc* 133, 9192-9195.

Tann AW, Boldogh I, Meiss G, Qian W, Van Houten B, **Mitra S**, **Szczesny B**. Apoptosis induced by persistent single-strand breaks in the mitochondrial genome: Critical role of EXOG (5' EXO/Endonuclease) in their repair. *J Biol Chem*. 2011 Jul 18. [Epub ahead of print] PMID: 21768646 (in press)

Soheila J. Maleki, Ph.D. Suzanne S. Teuber, M.D., Hsiaopo Cheng, M.S., Deliang Chen, Ph.D., Sarah S. Comstock, Ph.D., Sanbao Ruan, M.D., **Catherine H. Schein, Ph.D.** Computationally predicted IgE epitopes of walnut allergens contribute to cross-reactivity with peanuts. *Allergy*, 2011, in press

Bioinformatics Tools for Mass Spectrometry-Based High-Throughput Quantitative Proteomics Platforms, *Current Proteomics*, 2011:8(2):125-137, A. V. Nefedov, M. J. Gilski, **R. G. Sadygov**.

**Szymanski, M.R.**, Jezewska, M.J., Bujalowski, W. Binding of Two PriA-PriB Complexes to the Primosome Assembly Site Initiates the Primosome Formation. *J. Mol. Biol.* 2011 Aug 5; 411(1):123-142. Epub 2010 May 27.

Jezewska, M.J., **Szymanski, M.R.**, Bujalowski, W. Interactions of the DNA Polymerase X from African Swine Fever Virus with the ssDNA. Properties of the Total DNA-Binding Site and Strong DNA-Binfiging Subsite. *Biophysical Chemistry* 2011 Sep; 158(1):9-20. Epub 2011 Apr 28.

Jezewska, M.J., **Szymanski, M.R.**, Bujalowski, W. Kineic Mechanism of the ssDNA Recognition by the Polymerase X From African Swine Fever Virus. Dynamics and Energetics of Intermediate Formation. *Biophysical Chemistry* 2011 Sep; 158(1):26-37. Epub 2011 Apr 28.

## Faculty on the Road



**Dr. Kay Choi** attended the AAMC Early Career Woman Faculty Professional Development Seminar in Washington DC on July 9-12, 2011.

She also presented a talk on Structural study of the interaction between the methyltransferase and the polymerase domains of dengue virus NS5 at the American Society for Virology annual meeting, Minneapolis, MN on July 16-20, 2011.

**Dr. Alex Kurosky** attend the 7<sup>th</sup> symposium/International Eosinophil Society held in Quebec City, Canada along with lab members **Konrad Pazdrak**, and **Christof Straub** on June 19, 2011.

**Dr. Kurosky** chaired a U54 NIH/NCRR Scientific Review Panel entitled "Technology Development for New Affinity Reagents Against the Human Proteome", in Bethesda MD on June 15, 2011.

On July 13, 2011, **A. Kurosky, K. Pazdrak, J. Wiktorowicz**, Y. Hosaoate, I. Boldogh, and X. Zhao attended the 2<sup>nd</sup> NHLBI Proteomics Centers Meeting in Boston MA.

**Dr. J. Regino Perez-Polo** attended 2011 National Neurotrauma Symposium July 20, 13, 2011 and presented abstract entitled "Inflammatory Response to MTBI in Rat".

**Dr. Werner Braun** participated in the NIH BDMA study section panel on June 9-10 in Washington, DC.

He was also an International Expert in the review hearing of the Austrian FWF Science Foundation for the Special Research Program "Towards prevention and therapy of allergy" on July 5, 2011 in Vienna, Austria.

**Dr. Surendra Negi** attended Measles Virus Mini Symposium at Mayo Clinic, Rochester, MN on 14th July 2011.

## Featured Abstract by BMB Faculty

### Signature of Mobile Hydrogen Bonding of Lysine Side Chains from Long-Range $^{15}\text{N}$ - $^{13}\text{C}$ Scalar $J$ -Couplings and Computation

Zandashvili, L, Li, DW, Wang, T, Brüschweiler, R, **Iwahara, J** (2011) Signature of mobile hydrogen bonding of lysine side-chains from long range  $^{15}\text{N}$ - $^{13}\text{C}$  scalar  $J$ -couplings and computation. *J Am Chem Soc* 133, 9192-9195.

Amino acid side chains involved in hydrogen bonds and electrostatic interactions are crucial for protein function. However, detailed investigations of such side chains in solution are rare. Here, through the combination of long-range  $^{15}\text{N}$ - $^{13}\text{C}$  scalar  $J$ -coupling measurements and an atomic-detail molecular dynamics (MD) simulation, direct insight into the structural dynamic behavior of lysine side chains in human ubiquitin has been gained. On the basis of  $^1\text{H}/^{13}\text{C}/^{15}\text{N}$  heteronuclear correlation experiments selective for lysine  $\text{NH}_3^+$  groups, we analyzed two different types of long-range  $^{15}\text{N}$ - $^{13}\text{C}$   $J$ -coupling constants: one between intraresidue  $^{15}\text{N}\zeta$  and  $^{13}\text{C}\gamma$  nuclei ( $^3J_{\text{N}\zeta\text{C}\gamma}$ ) and the other between  $^{15}\text{N}\zeta$  and carbonyl  $^{13}\text{C}'$  nuclei across a hydrogen bond ( $^{\text{h}3}J_{\text{N}\zeta\text{C}'}$ ). The experimental  $^3J_{\text{N}\zeta\text{C}\gamma}$  data confirm the highly mobile nature of the  $\chi_4$  torsion angles of lysine side chains seen in the MD simulation. The  $\text{NH}_3^+$  groups of Lys29 and Lys33 exhibit measurable  $^{\text{h}3}J_{\text{N}\zeta\text{C}'}$  couplings arising from hydrogen bonds with backbone carbonyl groups of Glu16 and Thr14, respectively. When interpreted together with the  $^3J_{\text{N}\zeta\text{C}\gamma}$ -coupling constants and NMR-relaxation-derived  $S^2$  order parameters of the  $\text{NH}_3^+$  groups, they strongly suggest that hydrogen bonds involving  $\text{NH}_3^+$  groups are of a transient and highly dynamic nature, in remarkably good agreement with the MD simulation results.

