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BioMET

Center for Biomedical Engineering and Technology - University of Maryland School of Medicine
in conjunction with the Fischell Department of Bioengineering, School of Engineering, University of Maryland, College Park

MyoTak Marketing Blitz

With the patenting of a new bioadhesive MyoTak (see *BioMET* NOW, Vol. 14 No. 4 and Vol. 14 No. 5), Dr. Lederer and his co-discoverers, Dr. Benjamin Prosser and School of Nursing's Dr. Chris Ward, are finding their work being highlighted in a marketing campaign by both Ionoptix and SI Heidelberg just in time for the annual Biophysical Society Meeting (see page 2). Both companies have licensed MyoTak, to be used with their own version of an apparatus to stretch individual muscle cells. The illustrations of stretching cells in both ads (Ionoptix's left and SI Heidelberg's page 3) come from the Lederer laboratory.

The work, published last fall in *Science*, is rapidly gaining momentum. A movie of the process of stretching a cell can be found on YouTube (<http://www.youtube.com/watch?v=scRoh3chzJU> and http://www.youtube.com/watch?v=WddHi5tbLPc&context=C4eb9455ADvjVQa1PpcFO4HK4wkdVLul_lb6xcSFge15mG31fwD0E=), uploaded by World Precision Instruments (WPI), the parent company of

SI Heidelberg.

SI Heidelberg also sent ads out before the Biophysical Society Meeting, including a Maryland appropriate blue crab stretching a cardiac myocyte (page 3, bottom right)!

The work has also been picked up in the European science literature

CONTINUED PAGE 3

Visit us at the 56th Annual Biophysical Society Meeting, Feb. 26-28 in San Diego

Booth #300

ION OPTIX

New IonOptix MyoTak

Photo courtesy of B. Prosser, UMD-Baltimore

Biocompatible Cell Adhesive Attach Myocytes for Stretch and Force Recording

New MyoStretcher

Measure Force in Isolated Cardiomyocytes

New FluoroHeart

Photo courtesy of R. Liao, Harvard U.

Whole Heart Quantitative Fluorescence

BIOMET SCIENTIFIC PROGRAMS

LABORATORY OF
MOLECULAR CARDIOLOGY

LABORATORY OF
NANOBIOLOGY

LABORATORY FOR
NEURODEGENERATIVE DISEASES

LABORATORY FOR
PRION DISEASES

PROGRAM IN
CANCER BIOLOGY

PROGRAM IN
CELL STRUCTURE AND
DEVELOPMENT

PROGRAM IN
MITOCHONDRIAL DYNAMICS

Jarrell to Head Strategic Alliance Push

As discussed in the last issue, the University of Maryland, the Founding Campus and the University of Maryland College Park are to form a Strategic Alliance. A joint committee will make a formal presentation in March to the Board of Regents. In that effort, Dr. Bruce Jarrell, MD, will function as the this institution's representative. This will be also part of his duties as he assumes a new position as Chief Academic and Research Officer, Dean of the Graduate School and Senior Vice President beginning on April 1. He is currently executive vice dean in the School of Medicine.

UM President Perman is just in his second year of leadership and continues to slowly rearrange his senior staff, expected in any change of leadership. Dr. Jarrell has been with the School of Medicine for 15 years, originally coming as the chair of the Department of Surgery.

BioMET is looking forward to working with Dr. Jarrell as the Strategic Alliance moves forward.



UNIVERSITY of MARYLAND
SCHOOL OF MEDICINE



The 10th Annual BioMET Retreat is scheduled for April 3 at the Mt. Washington Conference center.

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BioMET - Founded 2009

BioMET welcomes the appointment of Dr. Bruce Jarrell, see the story on page 1.

Silvia Muro's group in the Fischell Department of Bioengineering continues to make news. One of her undergraduate trainees won a Howard Hughes Fellowship. Dr. Muro's research on drug delivery systems continues to be well funded, with a new award just received. Dr. Muro is a former retreat speaker and had a joint appointment at UMBI. She also collaborates with BioMET professor, Joe Kao. Congratulations to Dr. Muro and her laboratory.

BioMET Summer Internship Program

The relationship between BioMET and the Fischell Department of Bioengineering is still developing. In an effort to strengthen those ties, BioMET began to formally recruit summer interns from the department. Beginning in January, a flyer was sent announcing the availability of internships. It had been clear from BioMET's visit to the Fischell Festival (BioMET NOW Vol. No.) that internships were an integral part of the bioengineering program. In February, a more detailed list of available internships was sent to College Park, including three paid internships and 4 unpaid positions. The response was heartening. As of the end of February, nearly 20 applications had been received. Because of the timing of NIH grant submissions (February 5 and March 5), decisions for some faculty members will be delayed. However, all positions should be filled by the end of March.

To date, faculty members have been very pleased with the quality of the applications. It will be up to each faculty member to select and interview potential candidates, while Pamela Wright is coordinating the application process.

While there has been other College Park undergraduates here, as well as a number of Towson students, this will be the first time that a formal internship program has been advertised targeting bioengineering students. BioMET, in its mandate to connect with the Fischell Department, is committed to increasing the number of programs involving both faculties. This program is expected to continue and grow as the two campuses begin implementing the Strategic Alliance.

BIOMET SUMMER INTERNSHIPS

THE CENTER FOR BIOMEDICAL ENGINEERING AND TECHNOLOGY

BioMET has both paid and unpaid internships as indicated below for each faculty member. Generally, internships are full-time for ten weeks, but other arrangements are possible upon discussion with the faculty member. Paid internships are highly competitive.

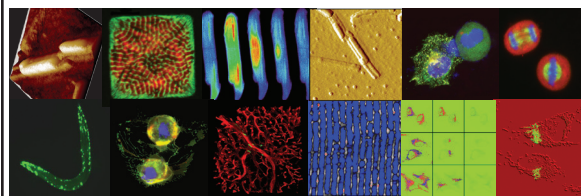
Paid Internships:

Dr. Iliia Baskakov: prions, protein folding
Dr. W. Jonathan Lederer: bioengineering and imaging
Dr. Saleet Jafri (work location at George Mason University, Manassas, VA, joint with BioMET, UMSOM): computational biology

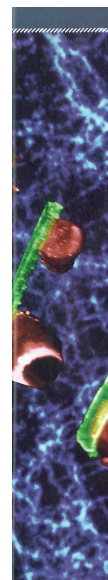
Unpaid Internships:

Dr. Shengyun Fang: protein cycling, endoplasmic reticulum associated degradation
Dr. Mariusz Karbowski: mitochondrial dynamics
Dr. Mervyn Monteiro: molecular biology of neurodegenerative diseases (Note: Dr. Monteiro will take up to 2 interns.)
Dr. Bruce Vogel: extracellular matrix proteins, C. elegans transgenic models

Please send CV to Pamela Wright, pbwright@umaryland.edu. Note: Please send a full CV, indicating course or send an unofficial transcript. One page resumes are not sufficient. All positions are expected to be filled by April.



Handout describing BioMET internships



MYOTAK CONTINUED

with an article in *Le Recherche* in February (left). Other honors include a Faculty of 1000 rating of FFa12 for the *Science* article, giving it an exceptional rating.

This is really the first time that any faculty member has had a product marketed so heavily. BioMET faculty members have a number of patents and some licensed materials, but nothing has been marketed like this. It will be very interesting to see how MyoTak does in the market place, as well as how the publication is cited. Dr.

Lederer has had other highly cited publications (1000+ citations), and this publication has the potential to reach that level as well. The work has already generated multiple speaking engagements for Dr. Lederer, and at least half a dozen more are scheduled. The work also resulted in a highly probable K99 grant for Dr. Prosser, who received a perfect score on his NIH proposal; however, the award has not been formally made.

While MyoTak is unlikely to be a cash cow, it is hoped that sufficient revenue is generated to support more research.



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- Tissue Baths

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PAID
MANASSA, VA
PERMIT 81

A single rat cardiac myocyte is held by MyoTak-coated glass rods on the Cell Tester.

Where Are They Now?

When BioMET was the Medical Biotechnology Center and part of UMBI, we had three sister centers: the Center for Marine Biotechnology at the Columbus Center (COMB), the Center for Biosystems Research (CBR) at College Park and the Center for Advanced Research in Biotechnology (CARB) at Shady Grove. In the process of disbanding UMBI, each UMBI center was handled separately with different outcomes. BioMET was actually the first formed and the easiest to finalize. We came into the University of Maryland, the Founding Campus in Baltimore as is, with only a name change and a new focus on bioengineering. COMB was split, with some faculty coming to the School of Medicine, some going to departments in UMBC and the rest going to the new Institute of Marine and Environmental Technology, operated jointly by UMBC and the University of Maryland Center for Environmental Science (UMCES). However, the Columbus Center facility is run primarily by UMBC, with input from the Founding Campus and UMCES. Former COMB Associate Director, Russell Hill, is Interim Director of IMET.

CBR, while centered at College Park, had faculty located in Shady Grove. Both CARB faculty and CBR faculty were merged into one entity called the Institute for Bioscience and Biotechnology Research (IBBR). However, IBBR is considered a partnership between College Park (particularly the Fischell Department of Bioengineering), the Founding Campus and the National Institute of Standards and Technology, originally a partner with CARB. Former CBR director, Donald Nuss, heads IBBR.

Despite the realignments, the name changes and the administrative shifts, the quality of research and the collaborative ethos of UMBI continues to thrive. Some things just work.

BIOMET HAPPENINGS

Publications

Brochet DX, Yang D, Cheng H, **Lederer WJ**. Elementary calcium release events from the sarcoplasmic reticulum in the heart. *Adv Exp Med Biol*. 2012;740:499-509.

Viswanathan S, Bandyopadhyay S, **Kao JP**, Kanold PO. Changing microcircuits in the subplate of the developing cortex. *J Neurosci*. 2012 Feb 1;32(5):1589-601.

Karbowski M, Neutzner A. Neurodegeneration as a consequence of failed mitochondrial maintenance. *Acta Neuropathol*. 2012 Feb;123(2):157-71.

Shen YX, Sun AM, **Fang S**, Feng LJ, Li Q, Hou HL, Liu C, Wang HP, Shen JL, Luo J, Zhou JN. Hrd1 Facilitates Tau Degradation and Promotes Neuron Survival. *CURR MOL MED* 2012 Feb 12:138-152.

Sobie EA, **Lederer W.J.** Dynamic local changes in sarcoplasmic reticulum calcium: Physiological and pathophysiological roles. *J MOL CELL CARDIOL* 2012 Feb 52:304-311.

Grants and Contracts

Awards

Dr. W. Jonathan Lederer, 1/1/2012, NIH-NHLBI, "Calcium Entrained Arrhythmias," \$968,034, yr 2 of 5.

Submissions

Dr. W. Jonathan Lederer, 1/25/2012, George Mason University (NIH), "Multiscale spatiotemporal modeling of cardiac mitochondria," Total Request (UM portion): \$2,222,375.

Dr. Bruce Vogel, 2/6/2012, NIH, "The Role of Cell-ECM Interactions in Cytokinesis," Total request: \$1,726,875.

Dr. Shengyun Fang, 2/6/2012, NIH, "Cytosolic dislocation of proteins from the endoplasmic reticulum," Total request: \$1,381,500.

Talks and Travels

Karbowski, M. retreat speaker, "Role of E3 Ubiquitin Ligases and Proteasome System in Mitochondria," Department of Biochemistry and Molecular Biology Retreat, University of Maryland School of Medicine, January 20, 2012.

Lederer, W. J. First Annual Kirby Lecture, "Novel Calcium Signaling in Heart - ROS, X-ROS and Sparks," Temple University, February 6, 2012.

Kao, J.P.Y., Seminar Speaker, "Electron Paramagnetic Resonance Imaging of Tumors: A Chemical Perspective," Department of Chemistry and Biochemistry, Arizona State University, February 10, 2012.

Lederer, W. J. Seminar Speaker, "Novel Calcium Signaling in Heart - ROS, X-ROS and Sparks," Cornell Medical College, February 16, 2012.

Karbowski, M., invited presentation, "Mitochondria-associated E3 Ubiquitin Ligases and USP30 Deubiquitinase Regulate Mitochondrial Membrane Dynamics and Mitochondrial Biogenesis," 2nd Ubiquitin Research and Drug Discovery, Las Vegas, Nevada, USA, February 27-28, 2012.

Power of Ten

The Annual Biophysical Society meeting, held in San Diego, is always the one scientific meeting that members of the Lederer laboratory attend en masse. This means that the number of presentations is substantial. This year again saw 10 presentations from the Lederer laboratory, four of which were oral, a new record. Generally, only one or two Lederer abstracts are selected for an oral presentation. This year three of the four were by UM researchers, while the fourth (Wagner *et al.*) was presented by German collaborators as part of a European Commission funded project in which Dr. Lederer has a part. This is the fourth year in a row that Dr. Lederer has had 10 or more abstracts at the Biophysical Society annual meeting.

Oral Presentations:

Hagen, B.M., Lederer, W.J. (2012) Calcium Spark and Wave Behavior in the Intact Rat Heart. *Biophysical Journal* 102, 227a.

Khairallah, R.J., Sbrana, F., Shi, G., Tedesco, M., Prosser, B.L., Raiteri, R., Lederer, W.J., Ward, C.W. (2012) Microtubule Dependent Mechano-Transduction Drives Oxidative Stress and Calcium Dysregulation in Dystrophic Skeletal Muscle. *Biophysical Journal* 102, 424a.

Prosser, B.L., Ward, C.W., Hagen, B.H., Khairallah, R.J., Lederer, W.J. (2012) Stretch Dependent XROS Signaling: Rapid Mechanotransduction in Heart. *Biophysical Journal* 102, 227a.

Wagner, E., Lauterbach, M., Kohl, T., Westphal, V., Williams, G.D.B., Steinbrecher, J.H., Streich, J.-H., Tuan, H.-T.M., Hagen, B., Luther, S., Parltz, U., Jafri, M.S., Hell, S.W., Lederer, W.J., Lehnart, S.E. (2012) Live Cell Super-Resolution Imaging of Transverse Membrane Tubules in Heart Failure. *Biophysical Journal* 102, 223a - 224a.

Poster Presentations

Boyman, L., Hagen, B.M., Khairallah, R.J., Chikando, A.C., Kettlewell, S., Smith, G.L., Lederer, W.J. (2012) Dynamics of Calcium Uptake and Release by the Mitochondria in the Heart. *Biophysical Journal* 102, 312a

Brochet, D.X.P., Lederer, W.J. (2012) Ca²⁺ Heterogeneity Within a Ca²⁺ Spark. *Biophysical Journal* 102, 100a.

Chikando, A.C., Boyman, L., Khairallah, R.J., Ward, C.W., Smith, G.L., Kao, J.P.Y., Lederer, W.J. (2012) ROS Dependent Modulation of Calcium Sparks in Cardiomyocytes. *Biophysical Journal* 102, 99a.

Greiser, B.M., Prosser, B.L., Khairallah, R.J., Ward, C.W., Lederer, W.J. (2012) Stretch-Dependent Sub-Cellular Ca²⁺ Signaling in Atrial Myocytes. *Biophysical Journal* 102, 306a.

Kohl, T., Parltz, U., Lauterbach, M., Tuan, H.-T. M., Williams, G.S.B., Westphal, V., Jafri, M.S., Lederer, W.J., Luther, S., Hell, S.W., Lehnart, S.E. (2012) STED Nanoscopy of Cardiac RyR2 Clusters and Sub-Structure Analysis After Myocardial Infarction. *Biophysical Journal* 102, 305a.

Tuan, H.-T.M., Williams, G.S.B., Lehnart, S.E., Lederer, W.J., Jafri, M.S. (2012) Stochastic Simulation Assessing the Functional Changes Occurring during Heart Failure. *Biophysical Journal* 102, 101a.

Did you know...

Just as you can donate to your *alma mater*, you can also donate to BioMET. BioMET has three foundation accounts already, one in support of Dr. Lederer's laboratory, one in support of Dr. Kao's and one for accepting donations via the Maryland Charities Campaign. By next year, we will show up in the Maryland Charity Campaign booklet. Donating to BioMET helps us attract other donors. After all, if we do not think enough of our Center to donate to it, why should anyone else? Many foundations actually use the percentage of internal donations as a gauge to make decisions as to where to donate. Next year consider donating to BioMET when the Maryland Charities Campaign comes around.