INSIDE MBC

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MEDICAL BIOTECHNOLOGY CENTER -UNIVERSITY OF MARYLAND BIOTECHNOLOGY INSTITUTE

Inside:



# Nano Scale Dominates Talks

"Nano" is the newest prefix to dominate popular science discussions. Scientifically it means 1/billionth ($10^{-9}$) of whatever measure was being used, but in pop culture it just means very small. In this year's retreat, the very small and hard to visualize dominated the talks. The first speaker was Dr. Leyla Teos, a postdoctoral fellow in Dr. W. J. Lederer's laboratory, who spoke on her work with cardiac atrial cells. From previous retreats, the audience was familiar with cardiac ventricular cells and calcium imaging. This was the first time work on atrial cells was discussed, which is a new area for the Institute of Molecular Cardiology. Dr. Teos was followed by the first guest speaker, Dr. Thomas Blanpied from the Department of Physiology at the University of Maryland Baltimore.

Dr. Blanpied discussed his work on neuronal spines using PALM imaging. In his work, he can literally follow individual molecules of actin as they polymerize and depolymerize! Nano, indeed! After a brief break, the next session started with Dr. Gerald Rosen discussing his work on the development of chemical sensors for use in whole organ imaging. Early work suggests that the current view that reduced blood flow to stroke affected brain regions indicates reduced oxygen is not correct. Dr. Rosen was followed by Dr. Mervyn Monteiro.

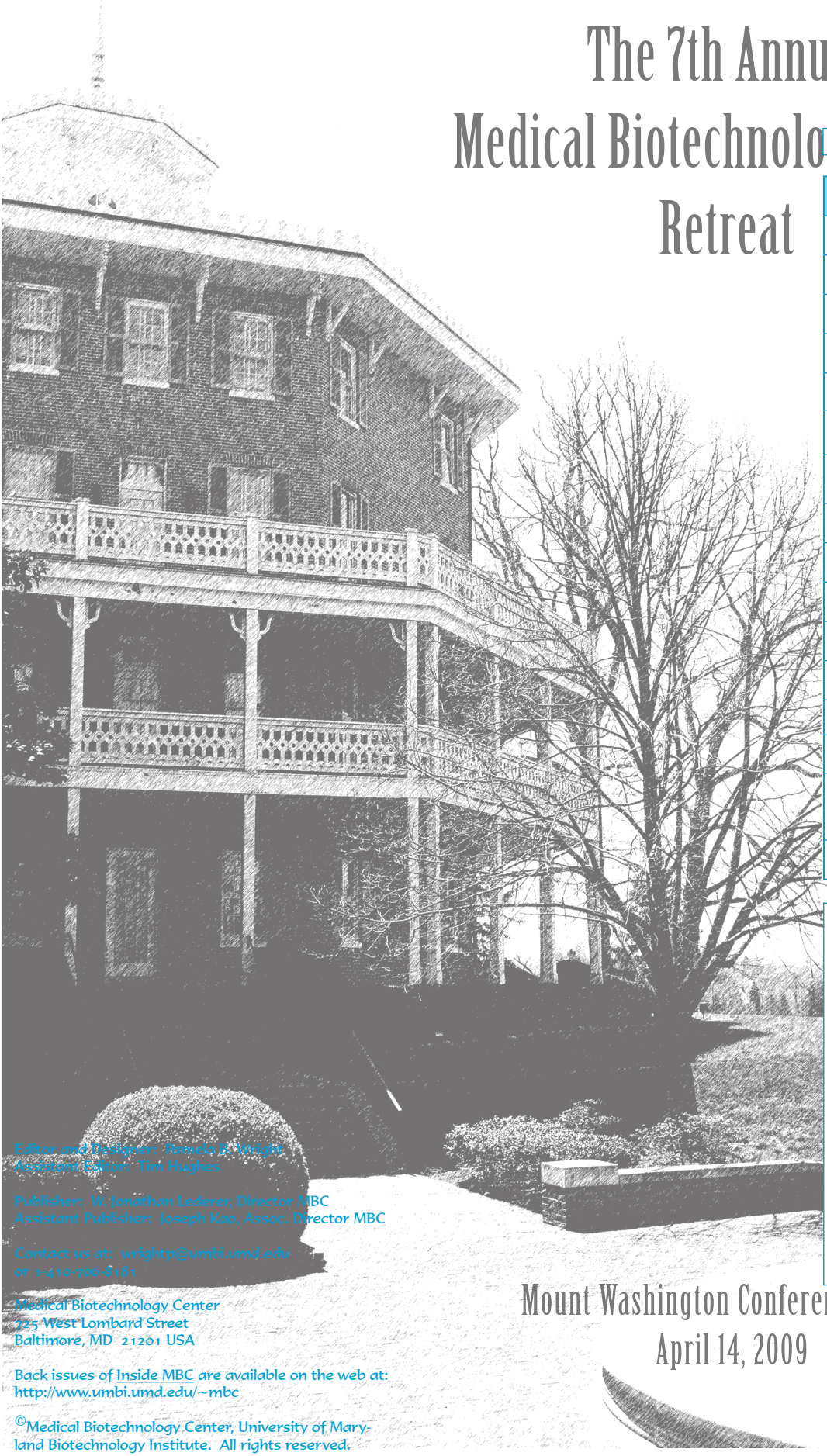
*Participants waiting for session to start.*

Dr. Monteiro's work is a great example of how one area of research can lead to others. Dr. Monteiro has been a leading researcher in Alzheimer's and has discovered a number of key proteins involved in that devastating disease. However, one of the latest, Erasin, has turned out to be a key player in Endoplasmic Reticulum Associated Degradation (ERAD), which is one of the main processes the cell uses to dispose of mis-folded proteins. ERAD is one of the primary areas of study of MBC's Shengyun Fang. While the link between Alzheimer's and ERAD has long been suspected, this work is now demonstrating a direct connection.

The second guest speaker was Dr. Michael Summers, a professor and Howard Hughes Investigator at the University of Maryland Baltimore County. He uses NMR spectroscopy to visualize changes in the structure of key HIV proteins, especially GAG, the "super" protein that eventually gets cleaved into several components of the final viral particle. GAG is highly conserved and the hope is to use it as a target for therapy. Differences between HIV I GAG and HIV II GAG indicate that

*continued page 4*

# The 7th Annual Medical Biotechnolo Retreat



| Time | P |
|---|---|
| 8:00-8:50am | |
| 8:50-9:00 | W. Jona |
| 9:00-9:20 | Le |
| 9:20-10:00 | Thomas |
| 10:00-10:45 | |
| 10:45-11:05 | Ger |
| 11:05-11:25 | Mervy |
| 11:25-12:05 | Michael S |
| 12:05-1:30 | |
| 1:30-1:55 | Ilia |
| 1:55-2:15 | Ther |
| 2:15-2:55 | Silvia |
| 2:55-3:40 | |
| 3:40-4:00 | Marius |
| 4:00-4:20 | Yongw |
| 4:20-4:40 | Joe Kao |

## Thomas Blanpied
### Assistant Professor, UMB

Research in my lab examines protein t
mechanisms at synapses, and seeks to
how these mechanisms are used to re
synaptic transmission. Improper regul
of synaptic transmission is implicated
pathophysiology of diseases ranging f
schizophrenia and autism to epilepsy
addiction, and maybe among the earli
of Alzheimer's Disease (AD). Synaptic r
has broad implications not only for un
the etiology of many diseases but mo
for defining the cellular basis of nervo
function and disorder.

Mount Washington Conference Center
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## Meeting Schedule

| resenter | Title |
|---|---|
| Arrival/Continental Breakfast | |
| than Lederer | Welcome |
| yla Teos | "Adaptive function of atrial myocytes: calcium signaling" |
| Blanpied, UMB | "Super-resolution imaging of the dynamic cytoskeleton within single neuronal spines" |
| Break (45 min) | |
| ald Rosen | "EPR imaging of oxygen in mouse brain" |
| n Monteiro | "Erasin binds ubiquilin and p97/VCP in a novel complex involved in ER-associated protein degradation" |
| ummers, UMBC | "New insights into the mechanism of HIV-1 assembly " |
| Lunch (85 min) | |
| Baskakov | "Sun-powered microbial fuel cells" |
| esa Huwar | "Bacillus anthracis, the problems and the approaches to environmental decontamination" |
| Muro, CBR | "Designing drug delivery carriers with zip code" |
| Break (45min) | |
| z Karbowski | "The physiological significance of mitochondrial fusion" |
| wang Zhong | " Importin beta, a nucleocytoplasmic transport factor, involved in the removal of misfolded proteins from the endoplasmic reticulum" |
| & Brian Hagen | "21st Century Imaging: New ways of seeing" |

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### Michael F. Summers
**Professor, HHMI Investigator UMBC**

Our research efforts are aimed at understanding how retroviruses assemble and how they specifically recognized and package their genetic material. We wish to understand how the 3D structures of several isolated protein components interact with each other and with cellular constituents. We are also interested in understanding how these intermolecular interactions change over time. In the long term, we would like to use the basic structural and functional information obtained to design new therapeutic approaches for the treatment of AIDS and other human diseases caused by retroviruses.

### Silvia Muro
**Assistant Professor, CBR**

The focus of my research program is the study of the mechanisms of endocytic vesicular transport, their role in physiology and disease, and their translational application for the controlled delivery of nano-scale therapeutics to precise targets at the sub-cellular level. Targeting of nano-scale carriers bearing therapeutic agents to cell surface molecules involved in endocytic vesicular transport may help improve delivery of therapeutic agents both intracellularly and across cell layers. Due to their design versatility, targeting carriers and nano-structure devices used for drug delivery can themselves be utilized to study the basic parameters governing endocytosis in cells.

virulence is significantly reduced by changing the protein's ability to bind membranes. The lunch room was buzzing after so many exciting talks.

The afternoon sessions started off with a totally new topic for MBC, microbial fuel cells. Dr. Ilia Baskakov, who usually studies prions, became interested in electrical production from sunlight. He has developed an algal/cyanobacterial fuel cell that may be the next big breakthrough in energy production.

The next talk was from Dr. Theresa Huwar, a member of the Institute of Biodefense Studies. She discussed work on how to kill anthrax. The work has led to the discovery of several interesting bacterial phages, some of which are quite promiscuous when it comes to bacillus bacteria. Since current strategies for anthrax decontamination are expensive, time-consuming and laborious, phages may prove to be an ecologically friendly way of getting rid of a particularly deadly organism.

The session ended with the third and final guest speaker, Dr. Silvia Muro from UMBI's Center for Biosystems Research and the University of Maryland College Park. Dr. Muro's work is definitely on the nano scale. She and her laboratory are perfecting ways to target nanocarriers to specific cells and subcellular locations. In the process, they may have discovered a new endocytic pathway.

After a quick break to take advantage of the delicious cookies and bars laid out in the foyer, the last session began. MBC's newest faculty member Dr. Mariusz Karbowski continued educating his colleagues on his work with mitochondria. Mitochondria are very dynamic organelles, constantly breaking apart and recombining. The purpose of this has yet to be elucidated, but highly fragmented mitochondria and overly elongated ones are both associated with diseases. Dr. Karbowski focused on some of the proteins known to be involved in fusion.

The next speaker was Research Associate Yongwang Zhong from Dr. Shengyun fang's laboratory. He talked about another protein found to be involved in ERAD, importin β. That this protein was found to be associated with other ERAD proteins was surprising, given that its previous role had been as a nuclear chaperone. The final speaker of the day was Dr. Brian Hagen. He recently returned from Germany where he was learning about a new imaging technique called STET. The technique allows researchers to refine confocal images nearly 5 fold, changing resolutions from roughly 250 nanometers to 50 nanometers! While the MBC does not yet have a STET set-up, Dr. Hagen and his colleagues in the Institute of Molecular Cardiology are exploring ways to acquire the necessary equipment.

Even though all the day was spent indoors, the excitement of the talks kept everyone from becoming dull. The format of short MBC talks mixed with longer talks from guest speakers continues to be a successful retreat formula.

*Top to bottom: Guest Speaker Dr. Summers (left) talks with Dr. Monteiro. Drs. Fang (center) and Baskakov (right) listen to Guest Speaker Dr. Blanpied. Guest Speaker Dr. Silvia Muro during her talk. Research Associates Drs. Lee, Zou and Pisciotta from Dr. Baskakov's laboratory waiting for the talks to begin.*