

Office of Education
Division of Intramural Research**FELLOWS NEWSLETTER**

The Fellows Newsletter is published monthly by the Office of Education, Division of Intramural Research, National Heart, Lung, and Blood Institute and distributed to NHLBI DIR members to promote the interest of DIR Fellows.

Office of Education, DIR, NHLBI

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From the Director of the Office of Education

As I write this, we are finally experiencing Spring weather. With Spring, comes the NHLBI DIR Scientific Retreat, to be held on May 20th. We'll have a full range of scientific activities, including poster sessions and talks by NHLBI fellows and Staff Scientists selected from the submitted posters. We will give awards for the best poster and also award the NHLBI DIR Fellows Award for Research Mentoring selected from your nominations. Lunch is being sponsored by the Foundation for the Advanced Education in the Sciences, and we hope to see you all at a Happy Hour following the conclusion of the Retreat. Having the retreat on the mall will allow all NHLBI scientific staff to participate, and we hope to see you all there. Registration is open!

All NHLBI fellows received an e-mail asking about your participation in the workshops sponsored by the NIH Office of Intramural Training and Education. This survey is going to help the Office of Education in letting us know the areas in which we can help your career progress. We assume that if you don't answer, that you have not been to any of the OITE workshops or courses. Check out the article by Dr. Cynthia St Hilaire on her experience. So please take some time to go to the Survey Monkey web site and answer the short list of questions.

The late spring has delayed the Cherry Blossoms, but the current increase in temperature means that this is the week to see them. For those that are new to the area, the best place to see a magnificent canopy of cherry blossoms is the Kenwood section of Chevy Chase, just minutes from the campus. Plan on making a stop there this week!

Expanding Your Skill Set

By Cynthia St. Hilaire, Ph.D.

The strange thing, or one of the many strange things, about undertaking an education for a career in the sciences is that you are only formally trained in one broad skill: experimenting. From the time when you worked as a genotyping and media-prep peon during your undergraduate studies, to your rise through graduate school and onto the position of senior postdoc, pump-

ing out data to analyze and publish has been the sole goal. As you complete your postdoc and successfully and seamlessly move to your next dream career stage (well done!), it's likely that your accumulated cell-culture genius will no longer be quite so relevant. Whether you land in or out of academia, you'll gravitate away from the bench and instead be called upon primarily to lead, train, and manage others. It's at this point that you'll realize that you've had no train-

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<http://dir-intranet.nhlbi.nih.gov/oe/>

Recent Publications by NHLBI Fellows

- Bandettini W. P., Kellman P., Mancini C., Booker O. J., Vasu S., **Leung S. W.**, Wilson J. R., Shanbhag S. M., Chen M. Y. and Arai A. E. (2012) MultiContrast Delayed Enhancement (MCOE) improves detection of subendocardial myocardial infarction by late gadolinium enhancement cardiovascular magnetic resonance: a clinical validation study. *Journal of Cardiovascular Magnetic Resonance* **14**.
- Barthwal M. K., **Anzinger J. J.**, Xu Q., Bohnacker T., Wymann M. P. and Kruth H. S. (2013) Fluid-Phase Pinocytosis of Native Low Density Lipoprotein Promotes Murine M-CSF Differentiated Macrophage Foam Cell Formation. *PLoS One*. **8**, e58054.
- Chen M. Y., Steigner M. L., **Leung S. W.**, Kumamaru K. K., Schultz K., Mather R. T., Arai A. E. and Rybicki F. J. (2013) Simulated 50 % radiation dose reduction in coronary CT angiography using adaptive iterative dose reduction in three-dimensions (AIDR3D). *Int J Cardiovasc. Imaging*.
- Dey R., **Dagur P. K.**, Selvapandiyan A., Mccoy J. P., Salotra P., Duncan R. and Nakhasi H. L. (2013) Live Attenuated *Leishmania donovani* p27 Gene Knockout Parasites Are Nonpathogenic and Elicit Long-Term Protective Immunity in BALB/c Mice. *Journal of Immunology* **190**, 2138-2149.
- Dutta D.** and Donaldson J. G. (2012) Search for inhibitors of endocytosis: Intended specificity and unintended consequences. *Cell Logist.* **2**, 203-208.
- Guzik-Lendrum S.**, **Heissler S. M.**, **Billington N.**, Takagi Y., Yang Y., Knight P. J., Homsher E. and Sellers J. R. (2013) Mammalian Myosin-I8A: A Highly Divergent Myosin. *J Biol. Chem.*
- Halabi M.**, Ratnayaka K., Faranesh A. Z., Chen M. Y., Schenke W. H. and Lederman R. J. (2013) Aortic access from the vena cava for large caliber transcatheter cardiovascular interventions: preclinical validation. *J Am Coll Cardiol*. **10**.
- Herman S. E.**, Barr P. M., McAuley E. M., Liu D., Wiestner A. and Friedberg J. W. (2013) Fostamatinib inhibits B-cell receptor signaling, cellular activation and tumor proliferation in patients with relapsed and refractory chronic lymphocytic leukemia. *Leukemia*. **10**.
- Joehanes R.**, Ying S., Huan T., Johnson A. D., Raghavachari N., Wang R., Liu P., Woodhouse K. A., Sen S. K., Tanriverdi K., Courchesne P., Freedman J. E., O'Donnell C. J., Levy D. and Munson P. J. (2013) Gene Expression Signatures of Coronary Heart Disease. *Arterioscler. Thromb. Vasc. Biol.*
- Kim K. K.**, **Nam J.**, Mukoyama Y. S. and Kawamoto S. (2013) Rbfox3-regulated alternative splicing of Numb promotes neuronal differentiation during development. *Journal of Cell Biology* **200**, 443-458.
- Li W. L.**, Kohara H., **Uchida Y.**, **James J. M.**, Soneji K., Cronshaw D. G., Zou Y. R., Nagasawa T. and Mukoyama Y. S. (2013) Peripheral Nerve-Derived CXCL12 and VEGF-A Regulate the Patterning of Arterial Vessel Branching in Developing Limb Skin. *Developmental Cell* **24**, 359-371.
- Menazza S.**, Wong R., **Nguyen T.**, Wang G. H., Gucek M. and Murphy E. (2013) CypD(-/-) hearts have altered levels of proteins involved in Krebs cycle, branch chain amino acid degradation and pyruvate metabolism. *Journal of Molecular and Cellular Cardiology* **56**, 81-90.
- Nam J.**, **Onitsuka I.**, **Hatch J.**, **Uchida Y.**, Ray S., Huang S., Li W., Zang H., Ruiz-Lozano P. and Mukoyama Y. S. (2013) Coronary veins determine the pattern of sympathetic innervation in the developing heart. *Development*. **140**, 1475-1485.
- Okur A.**, **Miller B. T.**, Joo K., **Lee J.** and Brooks B. R. (2013) Generating Reservoir Conformations for Replica Exchange through the Use of the Conformational Space Annealing Method. *Journal of Chemical Theory and Computation* **9**, 1115-1124.
- Oubrahim H., **Wong A.**, Wilson B. A. and Chock P. B. (2013) Pasteurella multocida toxin (PMT) upregulates CTGF which leads to mTORC1 activation in Swiss 3T3 cells. *Cell Signal*. **25**, 1136-1148.
- Ratnayaka K., Faranesh A. Z., Hansen M. S., Stine A. M., **Halabi M.**, **Barbash I. M.**, Schenke W. H., Wright V. J., Grant L. P., Kellman P., Kocaturk O. and Lederman R. J. (2013) Real-time MRI-guided right heart catheterization in adults using passive catheters. *European Heart Journal* **34**, 380-389.

New NHLBI Fellows

Tomoko Yamazaki, Ph.D., is a Visiting Fellow in the Genetics and Developmental Biology Center under the mentorship of Dr. Yosuke Mukoyama. Dr. Yamazaki graduated from the University of Tokyo with a doctorate degree of Medical Science. Prior to the NIH she was a Postdoctoral fellow in the Department of Molecular Pathology at the University of Tokyo. Her initial project at the NHLBI is the analysis of neuro-vascular wiring in adult mice skin.

Recent Publications by NHLBI Fellows Continued

- Saeed F.**, Pisitkun T., Hoffert J. D., Wang G., Gucek M. and Knepper M. A. (2012) An Efficient Dynamic Programming Algorithm for Phosphorylation Site Assignment of Large-Scale Mass Spectrometry Data. *Proceedings (IEEE Int Conf. Bioinformatics Biomed.)*. 618-625.
- Saeed F.**, Pisitkun T., Knepper M. A. and Hoffert J. D. (2012) An Efficient Algorithm for Clustering of Large-Scale Mass Spectrometry Data. *Proceedings (IEEE Int Conf. Bioinformatics Biomed.)*. 1-4.
- Sodt A. J.** and Pastor R. W. (2012) The tension of a curved surface from simulation. *Journal of Chemical Physics* **137**.
- Therkelsen K. E.**, Pedley A., Speliotes E. K., Massaro J. M., Murabito J., Hoffmann U. and Fox C. S. (2013) Intramuscular fat and associations with metabolic risk factors in the framingham heart study. *Arterioscler. Thromb. Vasc. Biol.* **33**, 863-870.
- van Beers E. J.** and Kato G. J. (2012) Comment on "The influence of hydroxyurea on oxidative stress in sickle cell anemia". *Rev. Bras. Hematol. Hemoter.* **34**, 405-406.
- Wan C. K.**, Oh J., Li P., **West E. E.**, Wong E. A., **Andraski A. B.**, Spolski R., Yu Z. X., He J., Kelsall B. L. and Leonard W. J. (2013) The Cytokines IL-21 and GM-CSF Have Opposing Regulatory Roles in the Apoptosis of Conventional Dendritic Cells. *Immunity*. **38**, 514-527.
- Wang P. Y., **Ma W. Z.**, Park J. Y., Celi F. S., Arena R., Choi J. W., Ali Q. A., Tripodi D. J., Zhuang J., **Lago C. U.**, Strong L. C., Talagala S. L., Balaban R. S., Kang J. G. and Hwang P. M. (2013) Increased Oxidative Metabolism in the Li-Fraumeni Syndrome. *New England Journal of Medicine* **368**, 1027-1032.
- Wei L., Liu B. Y., Tuo J. S., Shen D. F., Chen P., Li Z. Y., Liu X. X., Ni J., **Dagur P.**, Sen H. N., Jawad S., Ling D., Park S., Chakrabarty S., Meyerle C., Agron E., Ferris F. L., Chew E. Y., Mccoy J. P., Blum E., Francis P. J., Klein M. L., Guymer R. H., Baird P. N., Chan C. C. and Nussenblatt R. B. (2012) Hypomethylation of the IL17RC Promoter Associates with Age-Related Macular Degeneration. *Cell Reports* **2**, 1151-1158.
- Yao Y. G.**, Kajigaya S., **Feng X.**, Samsel L., McCoy J. P., Jr., Torelli G. and Young N. S. (2013) Accumulation of mtDNA variations in human single CD34 cells from maternally related individuals: Effects of aging and family genetic background. *Stem Cell Res.* **10**, 361-370.
- Yu P.**, Pisitkun T., Wang G., Wang R., Katagiri Y., Gucek M., Knepper M. A. and Geller H. M. (2013) Global analysis of neuronal phosphoproteome regulation by chondroitin sulfate proteoglycans. *PLoS One.* **8**, e59285.
- Zeng Y., **Liu G.**, Ma Y., Chen X. and Ito Y. (2013) Organic-High Ionic Strength Aqueous Solvent Systems for Spiral Counter-Current Chromatography: Graphic Optimization of Partition Coefficient. *J Liq. Chromatogr. Relat Technol.* **36**, 504-512.
- Zhou Z. L., **Yu P. P.**, Geller H. M. and Ober C. K. (2013) Biomimetic Polymer Brushes Containing Tethered Acetylcholine Analogs for Protein and Hippocampal Neuronal Cell Patterning. *Biomacromolecules* **14**, 529-537.

THE SCIENCE BEAT

By Dinari Harris, Ph.D.

Zhou Z. L., Yu P. P., Geller H. M. and Ober C. K. (2013) Biomimetic Polymer Brushes Containing Tethered Acetylcholine Analogs for Protein and Hippocampal Neuronal Cell Patterning. *Biomacromolecules* **14**, 529-537.

Despite recent advances in understanding the mechanisms of nerve injury, tissue-engineering solutions for repairing damage in the central nervous system (CNS) remains elusive, owing to the crucial and complex roles played by neurons. Tissue engineering and regenerative medicine is a growing area of research that aims at regenerative alternatives to harvested tissues for transplantation. Driven by clinical needs, nerve regeneration studies have recently become the focus of research and area of growth in tissue engineering. Tissue engineering research aims to develop artificial tissues from natural materials using genetically modified cells and matrices. It also seeks to develop uses for artificial biopolymers, both degradable and non-degradable, to improve tissue and organ function. Tissue engineering has emerged as an integrated approach that utilizes engineering, biomaterial sciences, biochemistry and cell and molecular biology. Biomimetic polymer synthesis for the generation of functional cell-surface interfaces is a promising solution to promote neuronal growth and guide the regenerating nerve. However, biomaterials play a pivotal role as scaffolds to provide three-dimensional templates and synthetic extracellular-matrix environments for tissue regeneration. It is often beneficial for the scaffolds to mimic certain advantageous characteristics of the natural extracellular matrix, developmental, or wound healing programs.

A variety of microfabrication technologies are being increasingly developed to synthesize prosthetic and medical devices that support cell adhesion, growth/proliferation, and differentiation. One such method generates biocompatible polymer chains or polymer brushes that are capable of such diverse biological roles. Polymer brushes refer to polymeric assemblies tethered at one end to a solid substrate either through covalent attachment or physical adsorption. Recently, functional modified moieties on the polymer brushes have allowed attachment of bioactive components including neurotrophic factors. One such factor, Acetylcholine (ACh), a neurotransmitter in the CNS, activates ACh receptors on cells, induces neuronal outgrowth, and promotes the formation and strengthening of synapses. Due to its roles in regulating neuronal develop-

ment, enhancing neuronal growth, and guiding the nerve growth cone, ACh has been used to elicit and direct nerve regeneration after injury. Therefore, *in vivo* and *in vitro* studies on the role of ACh in nerve regeneration are widely conducted. As a result, studies have demonstrated that ACh-like functionalities in biomimetic polymers could promote neuron sprouting and extension in explanted dorsal root ganglia.

To further understand cell-surface interactions that mediate neuronal cell adhesion and differentiation, Zhou *et al.* developed a novel method utilizing biomimetic polymer brushes containing a tethered neurotransmitter acetylcholine analog to promote hippocampal neuron attachment and neural outgrowth. They prepared and extensively characterized these polymer brushes using a variety of techniques. The brushes were synthesized in a two-step reaction, covalently coupling ACh analogs intermittently between polyethylene glycol (PEG) units. They characterized these polymer brushes by using a wide range of chemical and physical approaches, including X-ray photoelectron (XPS), Fourier transform infrared (FTIR), near edge X-ray adsorption fine structure (NEXAFS) spectroscopy to confirm chemical composition and atomic force microscopy (AFM) to determine that the surface topology of the brushes were relatively smooth. Dissociated mouse hippocampal neuron plated on ACh-modified polymer brushes showed cell viabilities similar to that associated with plating on traditional poly-L-lysine coated glass coverslips. More importantly, the introduction of ACh analogs altered the “non-sticky” properties normally associated with PEG and drastically improved neuronal cell attachment and favored the outgrowth of neurons over astrocytes by 3-times. Interestingly, hippocampal neurons cultured on polymer brushes were significantly longer than those cultured on the poly-L-lysine surfaces. Unlike poly-L-lysine coated surfaces, fabrication of polymer brushes can be used to study cell patterning and protein adsorption. Varying, both the choice of chemical composition on the patterns of the polymer brushes (2 examples included in the article: PEG, a non-adhesive material or ACh analogs, a neurotransmitter) or the widths on the surface of brushes provides unlimited applications to study cell-material interactions and neural tissue engineering. In the study by Zhou *et al.*, the authors found that their microfabricated ACh-modified brushes with different patterns are an effective means to study cell reactions to surface chemical and physical cues similar to cell culture conditions. The mechanical and surface properties of ACh-modified polymer brushes make it a good

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substrate for neural cell adhesion, proliferation and differentiation.

This research adds to the interesting finding that biomaterial and biocompatible polymer materials are able to sustain the population of neural cells and generate new differentiated cells. The results from Zhou *et al.* suggests that the introduction of bioactive polymer brushes mimics a good biological scaffold for neuronal growth and may be a good starting

point for the design of brain-implantable devices. These sorts of devices will be able to induce or activate existing neural cells to self-renew and produce new neurons, boosting the CNS regenerative response *in situ*. Enabling the CNS to regenerate could open doors to promising new strategies to tackle accidental damage as well as numerous diseases like stroke and degenerative disorders such as Parkinson's and Alzheimer's diseases.

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ing whatsoever in the dominant skills required of your new position: how to successfully manage a group of people whose daily activities are under your complete direction. You'll find that most of your new day-to-day problems are now personnel problems: How do you learn how to manage and motivate a team of individuals, many of whom at different stages of career development, from different cultures, and may respond best to different leadership styles? How do you defuse conflicts between subordinates? And how do you recognize that *you* may be the source of the conflict?

Even as trainees, we know how critical these skills, or lack of them, can be in a mentor. If we think back through all of our former lab experiences, it's likely that what separates the good memories from the bad was not the quality of the science but the ability of the PI to foster a harmonious and collaborative lab environment. Conversely, we've all experienced either directly or through colleagues the horrible dysfunction that results from mentors with bad management skills. Examples of bad management may include the boss who motivates only through fear, the boss whose main communication strategy depends upon your skill at mind-reading, the boss who ignores everyone but their most senior staff, the boss who discusses your data to everyone but you, the boss who wants everything done yesterday; you get the picture. And hopefully, no matter which [fabulous and extremely high-paying] field you end up in, you never want to become *that* kind of boss. How to avoid it?

Enter the Leadership, Management and Mentoring Training workshop for Intramural Fellows offered by the NIH Office of Intramural Training and Education. Now I'd be lying if I said that "bolster my CV" wasn't the chief thing on my mind when I signed up for these courses. But having now attended a handful of these trainings sessions I can say that I have found them incredibly valuable and worthwhile as I begin my own job search and think about the kind of boss I hope to be. Dr. Lori Conlan, Julie Gold and the rest of the team at the OITE have put together an excellent set of seminars, workshops, and resources that are aimed to teach

postdocs how to lead and serve in science-based management roles, how to deal with interpersonal conflicts that arise, and how to successfully work as part of a team.

I have attended the Mentor Training, Workplace Dynamics Series, and the Management Bootcamp. Through participating in these courses I have learned more about my particular leadership and communication style, and how to be more cognizant of how subordinates and colleagues perceive me and interpret my actions. More importantly, I've learned how to identify and understand others' preferences and styles so I can communicate more effectively with them.

I highly recommend these training programs to all postdocs – whether you want to become a PI, work in industry or science policy, or take a job with a consulting firm. Mentor Training focuses on how to establish expectations of your mentee, how to build mentee confidence and independence, and how to design projects. The Workplace Dynamics Series is a 5-part training session focusing on: Self-Awareness; Communication, Learning & Influencing Others; Conflict & Feedback; Team Skills; and Diversity in a Multicultural Society. The Management Bootcamp teaches specific skills needed to successfully manage your staff and team. In addition to the course material, OITE provides an array of resources if you would like to delve deeper into any one topic.

The courses are offered during normal business hours; some just a few hours over a couple of weeks, and others are 2-day intensive sessions. But all are worth taking time away from the bench to learn some real-world workplace skills, and to ensure that your future trainees end up leaving your care with good memories, rather than cautionary lessons about group dysfunction. And they don't look bad on the CV either.

You can find more information about The Leadership, Management And Mentoring Training For NIH Intramural Fellow at the website

https://www.training.nih.gov/leadership_training

Need Weekend Plans? Check out the activities below:

April 13: National Cherry Blossom Festival Parade

<http://www.nationalcherryblossomfestival.org/2013/04/08/national-cherry-blossom-festival-parade-this-Saturday/>

April 13: Sakura Matsuri Japanese Street Festival

<http://www.us-japan.org/dc/sakura.php>

April 13: Songkran (Thai New Year) Festival

<http://www.watthaidc.org/watdc2012/>

April 11-21: Filmfest DC

<http://dc.about.com/od/specialevents/a/FilmfestDC.htm>

April 24-28: Smithsonian Craft Show

<http://dc.about.com/od/smithsonianmuseums/a/SmithCraftShow.htm>

Registration is **open** for the

11th Annual NHLBI DIR Scientific Retreat

May 20, 2013

**The Ronald Reagan Building and International Trade Center
Washington, DC**

The Office of Education encourages all researchers in the DIR to attend our annual Scientific Retreat at the Ronald Reagan building on the National Mall. This year we will feature posters and talks by NIH Fellows and Staff Scientists selected from the abstracts. Lunch will be provided with generous support of the Foundation for the Advanced Education in the Sciences and NHLBI Investigators. The day will conclude with an awards ceremony and Happy Hour.

To register, please visit: <http://dir-intranet.nhlbi.nih.gov/oe/abstractsubmission/default.asp>

To submit an abstract: <http://dir-intranet.nhlbi.nih.gov/oe/abstractsubmission/abstractform.asp>

*Please note: location assignments for poster sessions are no longer arranged by category but by date when abstract is submitted. *Size of posterboard is 4' x 4'*

To nominate your mentor for an award: <http://dir-intranet.nhlbi.nih.gov/oe/abstractsubmission/mentorform.asp>

**Deadline for Abstract Submission and Mentor Nominations is May 1st
Registration closes on May 10th**