THIS ISSUE:
BIOMEDICAL IMAGING

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Welcome to our 2013 Newsletter and best wishes to all of our friends and alumni. We have had a remarkable year and look forward to significant progress in the 2013-2014 academic year.

We are in the midst of two exciting projects to provide BME with additional space to support the growth of the department as it anticipates the establishment of the undergraduate program. The first project is temporary space in Kimball Hall to support our initial growth of faculty. We will gain 7700 square feet of laboratory and office space in newly-renovated Kimball Hall, which will be available starting January 2015.

The second and most critical project is the construction of a new BME building. The university has authorized the initial planning of the building and the approval of the conceptual design. We are discussing a plan to allow BME to expand to 22 tenure-track faculty and accommodate a program with approximately 170 Ph.D. students, 75 M.Eng students, and an undergraduate program graduating 75 B.S. students a year. This project will secure the future successes of BME and for that we greatly value the College of Engineering and the University’s support.

We also welcome Nozomi Nishimura, Steven Adie, and Ben Cosgrove as Assistant Professors. Nozomi joined the faculty in January 2013 after having worked as a research associate in the Schaffer Laboratory. Nozomi applies optical imaging tools to understand neurodegenerative disease, cardiovascular disease, and cancer. Steven, whose specialty is opto-mechanical imaging, began July 1, 2013 and comes from a post-doctoral position at the University of Illinois. Steven’s research is featured in this issue. Ben is completing his post-doctoral studies at Stanford and will join us July 1, 2014. You can learn more about Ben’s research on systems biology and cell signaling also in this issue. Also added to the faculty is Xiling Shen who is splitting his appointment between Electrical & Computer Engineering (75%) and BME (25%). Xiling further strengthens our efforts in Systems Biology.

We have added nine new NSF fellows to our Ph.D. students this year. This increment brings the number up to 40 NSF fellows since 2008. In each of these years we believe we have had more NSF Fellows than any other BME department! This is both a tribute to our students and to the faculty who mentor these students. Given that our
graduate program is of modest size (95 Ph.D. students) this record is particularly remarkable!

We have also piloted a new medical immersion experience for our M.Eng students at Robert Packard Hospital (Sayre, Pa.) and Cortland Regional Hospital (Cortland, N.Y.). This one-week-long program provides a more complete understanding of what it is like to practice human medicine and how the products of biomedical engineers can improve human health care. This experience parallels, in concept, our Ph.D. immersion summer term (seven weeks) at Weill Medical College, but is much shorter due to the limited time M.Eng students are with us. We believe that the students greatly benefit from these experiences.

We also note with sadness the passing of two of our advisory board members, David Lederman and Jack Boehringer. Both were great individuals and loyal Cornellians and we will miss their advice and help.

We have also continued to receive important financial contributions from our alumni and friends. Notable is the $1 million contribution from the late Jack and Carol Boehringer to their endowment to support M.Eng students in BME or Systems Biology.

We also have received a splendid gift from Lowell McAdam to support hiring a chaired tenure track faculty member with an interest in heart assist devices and also to hire a practitioner who will lead interdisciplinary teams of M.Eng students working with clinicians and industrial colleagues on heart assist devices.

While the department faces many issues in its growth to become a full-service, nationally esteemed department, I believe we have made great progress. Our success is due in large measure to our alumni and friends.

Best wishes to all of you and thank you for your support of Cornell BME!

Sincerely,

Michael L. Shuler
Professor and Chair
The Department of Biomedical Engineering proudly congratulates the nine students who won the 2013 National Science Foundation’s Graduate Research Fellowship.

This year’s winners are (from left) Jean Cruz, Marsha Lampi, Tara Srinivasan, Jorge Mojica Santiago, Ashley Torres, Alexandra McGregor, Michael McCoy III, Marie Godla and Julie Kohn (not pictured). Turi Alcoser and Leah Pagnozzi received honorable mentions.

The NSF’s Graduate Research Fellowship Program helps “ensure the vitality of the human resource base of science and engineering in the United States and reinforces its diversity. The program recognizes and supports outstanding graduate students in NSF-supported science, technology, engineering, and mathematics disciplines who are pursuing research-based master’s and doctoral degrees at accredited U.S. institutions.”

Forty NSF Fellowships have been awarded to Cornell BME students since 2008. Congratulations to all of you for this great achievement!

Promotions & Tenure

Five of our Biomedical Engineering faculty earned promotions during the past year.

Effective November 2012:
Michael King was promoted to the rank of Full Professor.
Jonathan Butcher, Claudia Fischbach-Teschl, and Chris Hernandez were promoted to the rank of Associate Professor with Tenure.

Effective July 2013:
Cynthia Reinhart-King was promoted to the rank of Associate Professor with Tenure.

Congratulations to these colleagues on their outstanding achievements and well-deserved promotions!
Irwin Mark Jacobs ’54, founding chairman and CEO emeritus of Qualcomm, and his wife, Joan Klein Jacobs ’54, have made a $133 million gift to Cornell and the Technion-Israel Institute of Technology to create the Joan and Irwin Jacobs Technion-Cornell Innovation Institute (JTCII).

The JTCII is a centerpiece of Cornell Tech, whose permanent campus will be located on Roosevelt Island in New York City. The gift will help support joint activities between Cornell and the Technion, including dual master’s degree programs, faculty, graduate students and industry interactions.

The gift was announced at New York City Hall on April 22, 2013 by Mayor Michael R. Bloomberg, Cornell President David Skorton and Technion President Peretz Lavie.

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Advisory Council 2013

David Anderson
Gentis Inc.

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University of Maryland

Kenneth R. Diller
University of Texas at Austin

Al Di Rienzo
Biomedical Institute of the Americas

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David J. Farrar
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Rich Newman
Syracuse University

Buddy D. Ratner
University of Washington

Bruce Tromberg
University of California, Irvine

George Truskey
Duke University

Craig A. Wheeler
Momenta Pharmaceutical
Jack and Carol Boehringer made a generous gift in the amount of $1 million to benefit the Boehringer Family Master’s of Engineering Student Award. This award was established to honor their family tradition of Cornellians and is intended to be received by an exceptional graduate student in biomedical engineering or manufacturing systems engineering.

Sadly, Jack passed away on March 5, 2013. John “Jack” Boehringer was president and founder of Boehringer Laboratories, Inc., which designs and manufactures medical instruments for diagnosis and control in surgical, anesthesia and respiratory fields. Boehringer Labs holds 80 patents in these areas. Jack and Carol had a life-long love of sailing and Jack flew his own plane for many years. They established the Boehringer Family Master’s of Engineering Student Award in 2002 and have continued to support that fund over the years.

Cellular and Molecular Bioengineering (CMBE), an official journal of the Biomedical Engineering Society, is now in its sixth year since its founding in 2008. Taking effect in July 2013, BME professor Michael King has been appointed as the journal’s new Editor-in-Chief. The change was announced in a pair of editorial articles published in the June 2013 issue of CMBE.

You are encouraged to follow CMBE on Twitter (@CMBEjournal) and like the journal on Facebook (www.facebook.com/CMBEjournal), and to submit your best work for publication that applies tools and concepts from engineering to solve important problems in biology at the cellular and molecular scales.
The Department of Biomedical Engineering has learned of a wonderful gift from Trustee Lowell McAdam to the College of Engineering, which is likely to offer opportunities for research and learning for BME. A Class of 1976 engineering alumnus and member emeritus of the Engineering College Council, Mr. McAdam has made a gift in support of both a professorship specializing in cardiovascular research and related technologies and an industrial practitioner for heart assist technology.

The Lowell and Susan McAdam Professor will be appointed by the Dean at the college level, but will likely provide opportunities for coursework and research for BME students wishing to explore this exciting and growing field. The senior level position will be filled by a leading researcher specializing in cardiovascular disease and ventricular assist devices (VAD). This thought leader will address “big picture” questions regarding healing the heart.

The Lowell and Susan McAdam Industrial Practitioner for Heart Assist Technology will be an engineer with considerable corporate research experience, recruited from industry and charged with identifying partners who will create substantial research and learning experiences. The industry practitioner will lead interdisciplinary teams of Masters of Engineering students from across the college to work on improving VADs and related technologies to improve cardiac health through collaborative projects with industry partners and clinicians that will allow our students to both gain invaluable experience working with researchers in an industry-like scenario, and will assist our partners in solving real-world problems they encounter.

Mr. McAdam and his family have made this generous gift in honor of Mr. McAdam’s late wife, Susan ’76, an alumna of the College of Human Ecology. It is their hope that the research and advances undertaken at Cornell, in partnership with industry and medicine, will help other families affected by heart disease.
Steven Adie spent his childhood in India before his family migrated ‘down under’ to Australia, where he spent his formative years and completed his tertiary education. While medical imaging was always an interesting option for what to do when he ‘grew up,’ his passion for optics took off in the final year of his undergraduate studies at The University of Western Australia (UWA). During this year he constructed a confocal profiler to measure the topography of laser-ablated eyes ex vivo; a research project jointly supervised by the Department of Physics and the Lions Eye Institute (LEI) in Perth, Western Australia.

Steven graduated in 1997 with a B.Sc. with first class Honours in Chemical Physics, and subsequently joined the R&D division of a startup company that grew out of the LEI. Here he worked on a low-coherence profilometer for quality testing of LASIK eye surgical systems, and on a video-based eye tracker for use during LASIK surgeries. In 2001 Steven returned to UWA to pursue a Ph.D. in Prof. David Sampson’s group in the Department of Electrical and Electronic Engineering. His research was on methods to enhance contrast in optical coherence tomography (OCT), including speckle-based analysis, group refractive index measurements of tissue, and polarization-sensitive OCT. In particular, his interest in elastography (the imaging of tissue mechanics) led him to demonstrate the first in vivo optical coherence elastography (OCE) of human skin using audio frequency excitation.

Soon after completing his Ph.D. in 2007, Steven began a postdoc in Prof. Stephen Boppart’s group at the Beckman Institute, at the University of Illinois at Urbana-Champaign. His research comprised two major themes. First was the development of computed imaging techniques to optimize resolution in volumetric OCT, in collaboration with Prof. Scott Carney. These methods offer the potential for aberration-free tomography without the traditional depth-of-field constraints of optical imaging systems. The second theme was dynamic OCE. In collaboration with Prof. Sampson’s group at UWA, this included the demonstration of OCE-based mechanical spectroscopy and mechanical phase contrast tomography, as well as 3D in vivo OCE of human skin.

These methods have recently been extended to include ultrasound-based excitation, in collaboration with Prof. Michael Insana at the University of Illinois at Urbana-Champaign. During his postdoc, Steven also acquired extensive experience with technology-based translational research for image-guided surgery of breast cancer.

Steven was attracted to the BME department at Cornell because of its integrated research topics (which include emphases on optical imaging and cancer mechanics), and the close collaboration between faculty across different departments. The Adie lab at Cornell will leverage OCT-based tomography of tissue structure and function to better understand the progression of disease.

Of particular interest is the role of mechanics in cancer initiation and tumor development, to help establish the in vivo relevance of in vitro studies on cancer mechanics, and support the long-term goal of improving the diagnosis and treatment of cancer and other diseases.

About the research image:
Volumetric reconstruction of normal human skin from the fingerprint region of the index finger. Real-time computationally extended depth-of-field enabled high-resolution imaging of spiral sweat ducts in the stratum corneum and deep tissue structure in the superficial dermis. Image adapted from Ahmad, Shemonski, et. al., Nature Photonics, 2013.
Nozomi Nishimura grew up in Tucson, Arizona. She majored in physics at Harvard College where she worked with Prof. Eric Mazur on femtosecond laser ablation. In graduate school she became interested in neuroscience and worked with Prof. David Kleinfeld at the University of California at San Diego. Although still in the Physics Department, her research focused on studying blood flow in the brain of rodents and developing laser-based models of small strokes. She came to Biomedical Engineering at Cornell in 2006 as a postdoc with Prof. Chris Schaffer. At Cornell, her research expanded the use of in vivo imaging techniques to study a variety of disorders including Alzheimer’s disease, cardiac disease and cancer metastasis. She became an Assistant Professor in Biomedical Engineering in 2013.

Her lab’s goal is to understand how the vascular, immune, inflammatory systems and cells native to a tissue interact in these diseases. A major challenge in such work is that model systems, such as cell culture or even organotypic tissue culture, cannot fully recapitulate all the different cell types involved in disease, so in vivo studies are required. However, it is experimentally difficult to study and manipulate cell-level dynamics in live animals. Recent work has focused on developing technologies such as improved imaging using multiphoton microscopy that work in whole animals and have sufficient spatial and temporal resolution to quantify cellular dynamics. Her lab also uses optical tools, such as femtosecond laser ablation, to produce targeted disruption with cellular-scale precision. These tools will be used to unravel the interaction of various physiological systems in multiple diseases, with special interests in cancer metastasis and cardiac blood flow.

While at UC San Diego, she received a National Science Foundation Graduate Research Fellowship and as a postdoc she was awarded a L’Oréal USA Fellowship for Women in Science, the NIH Ruth L. Kirschstein NRSA Postdoctoral Fellowship, and the American Heart Association Postdoctoral Fellowship. This year, she was awarded a Scientist Development Grant from the American Heart Association to study microinfarction in the heart.

About the research image:
Myocytes (green) and microvascular blood flow (red) in a beating rodent heart imaged with in vivo multiphoton microscopy.

Read more:
The Schaffer lab develops and uses advanced optical techniques to observe and manipulate in vivo biological systems, with the goal of constructing an understanding of the cellular interactions that underlie normal and disease-state physiological processes in the central nervous system. Much of their work focuses on the role of cortical microvascular lesions in neurodegenerative disease, where they are trying to determine the mechanisms by which occlusions or hemorrhages in small cortical blood vessels lead to the neuronal damage and neuro-inflammation that may drive loss of cognitive function. They have also worked to expand the capabilities of non-linear microscopy to enable visualization of new biological structures (e.g. imaging myelin using third harmonic generation, see figure) and accessing new organs (e.g. long-term imaging of mouse spinal cord).

About the research image:
Myelinated axons in a coronal section of a mouse spinal cord imaged using third-harmonic generation microscopy.

Read more:

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Yi Wang

Professor Wang’s group has pioneered the quantitative susceptibility mapping (QSM) technology for studying tissue electron response in the large magnetic field in MRI. QSM is now offering new insights into iron and oxygen metabolisms in neurodegenerative and inflammatory diseases such as AD, PD and MS, and stroke. Recently, they have discovered rapid iron accumulation during MS lesion formation using QSM, which is potentially an effective biomarker for monitoring MS disease activities.


About the research images:
Quantitative susceptibility mapping (QSM) enables the study of tissue magnetic property, which offers a new vision into the brain of a multiple sclerosis patient (lesions by arrows).

Chris Schaffer

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About the research image:
Myelinated axons in a coronal section of a mouse spinal cord imaged using third-harmonic generation microscopy.
Rebecca Williams is the director of the Biotechnology Resource Center’s Imaging Facility, which provides access to and training on state-of-the-art imaging technologies such as confocal and multiphoton microscopy, mouse imaging and high-resolution ultrasound and Computed Tomography (CT).

Williams’ research focuses on applying cellurally-resolved imaging in tissue constructs and live animals. Specific research areas include the role of oxygen gradients and matrix structure and remodeling in cartilage, ovarian and cancer models.

Warren Zipfel

The Zipfel lab develops and employs a wide variety of optical imaging and spectroscopic techniques in studies in basic cell biology and cellular biophysics, as well as applied biomedical areas such as optical detection of disease.

Areas of instrumentation development range from non-linear optical microscopic and laparoscopic technologies for clinical applications to new high speed fluorescence lifetime and phosphorescence lifetime imaging modalities for basic research.

Major biological directions of the Zipfel lab are in the area of optical detection of cancer, probe development for targeted cellular imaging and quantitative in vivo oxygen concentration measurements, and studies in basic cancer biology using in vitro and in vivo models of ovarian and mammary cancer.

Read more:
Xiling Shen

Dr. Xiling Shen has been an assistant professor in the School of Electrical and Computer Engineering at Cornell University since 2009 and a joint faculty member in BME since 2013. He received his B.S. and M.S. from Stanford University in 2001 and Ph.D. from Stanford University in 2008. He also worked as an analog and wireless circuit designer at Barcelona Design and Texas Instruments between 2001 and 2004. In the emerging field of Systems Biology, the Shen lab tries to tackle complex biological questions from a system engineering perspective rather than treating individual reactions in an isolated fashion.

Of particular interest are how individual cells make decisions in heterogeneous populations to form tissues, and how such decision-making processes are subverted by diseases like cancer. The Shen lab studies colorectal cancer, intestinal stem cells, and tuberculosis tissue remodeling to answer some of the fundamental questions and to pursue clinical therapeutics.

About the research image (left):
A colon cancer stem cell (CCSC) divides asymmetrically, generating a CCSC daughter cell and a non-CCSC daughter cell. Such cell fate decisions vary at different stages of tumor progression, leading to varying tumor-initiating, proliferation, and metastatic potential.

Read more:
Ben Cosgrove

Stem cells are the engines of tissue regeneration. Usually held dormant, stem cells are sparked into action in response to injury and generate both the mature cells needed to repair tissue while also replenishing its stem cell reserve. This process is stimulated by a series of temporally and spatially staged microenvironmental factors. Understanding how stem cells use the integrative action of their regulatory circuitry to interpret and balance diverse streams of microenvironmental “information” is the research challenge addressed by our newest faculty member, Ben Cosgrove.

In the course of his biomedical engineering training, Ben has focused on developing quantitative tools to interrogate and model the behaviors of cells within tissues. Ben completed his bachelor’s degree in Biomedical Engineering from the University of Minnesota in 2003. As an undergraduate, Ben developed new cell patterning tools for engineering tissues ex vivo and established educational tools for teaching tissue engineering principles. These experiences initiated a long-term commitment to biomedical engineering education, and he passionately looks forward to teaching BME students at Cornell.

In 2003, Ben started his Ph.D. research with Dr. Doug Lauffenburger and Dr. Linda Griffith in the Department of Biological Engineering at MIT. Ben’s graduate research established new experimental and computational systems biology approaches to interrogate the signal transduction networks governing liver hepatocyte cell death responses to toxic therapeutic agents. The models predicted hepatocyte responses to drugs with rare and hard to predict toxicity with unprecedented accuracy and elucidated new roles for synergistic and antagonistic signaling cascades in hepatocytes.

Since 2009, Ben has been a post-doctoral fellow in Dr. Helen Blau’s laboratory at Stanford University where he is supported by an NIH Pathway to Independence Award. He has been using molecular imaging, engineered biomaterials, and systems biology approaches to elucidate the effects of aging on skeletal muscle stem cells (also known as satellite cells). His postdoctoral research has revealed defects inherent in stem cells from elderly muscles that limit their ability to repair tissue and has pinpointed one specific signal transduction pathway that is aberrantly regulated in aged muscle stem cells. By therapeutically targeting this pathway, Ben has demonstrated an approach to rejuvenate these aged stem cells and improve their contributions to repair, enhancing the strength of aged muscles.

Ben will establish his research laboratory in the Department of Biomedical Engineering at Cornell in the summer of 2014. His laboratory will focus on applying systems biology tools to the study of stem cell signaling networks to elucidate how the regulation of stem cell fates goes awry in aging and degenerative diseases. The Cosgrove Laboratory will develop new single-cell assay and modeling approaches to deconstruct these variable cell fate outcomes with the goal of rationally improving stem cell-targeted regenerative medicine therapies.

His group of biomedical engineers, stem cell biologists, and systems biologists will tackle these problems in a multi-disciplinary fashion. Ben was attracted to Cornell based on its track record of excellent BME graduate students and the potential for numerous collaborative interactions with BME research faculty, including in the areas of biomimetic microenvironment engineering, modeling cell signaling, and in vivo tissue imaging.
Imaging Facility adds two tools for microscopy

Cornell’s Imaging Facility has added two more state-of-the-art machines, one to extract tiny samples for genetic analysis and another to image fast microscopic events.

The Imaging Facility, located in Weill Hall and in the College of Veterinary Medicine, specializes in microscopy, whole organism imaging, and high-resolution micro-CT (computed tomography).

The facility now has a spinning disk confocal microscope that enables users to image and manipulate fluorescent specimens rapidly, and an instrument for laser capture micro-dissection, which allows researchers to isolate specific cells or tissues from a sample by slicing out particular regions with a laser.

The laser capture micro-dissection unit provides another capability for genomic analysis that can be bridged with other BRC resources for every phase of an experiment, said research scientist Rebecca Williams, the Imaging Facility’s director.

“A researcher can microdissect a sample and end up with a tube of cells. Then we can help them find the correct genomics core facility” to have that sample sequenced, and then put them in touch with a biostatistics technician who can help analyze the sample, she added.

Along with image analysis and visualization, the facility has software to manage the amount of data generated from taking 100 images per second, for example.

Faculty Honors & Awards

Adele Boskey was honored with the ‘Boskey Symposium in Mineralized Tissues’ for 45 years of service at the Hospital of Special Surgery.

Claudia Fischbach-Teschl has been awarded a Fellowship for Experienced Researchers by the Alexander von Humboldt Foundation in Germany. This fellowship will allow her to conduct a 1-year research project in the Department of Biomaterials at the Max Planck Institute of Colloids and Interfaces in Potsdam, Germany where she will collaborate with Dr. Peter Fratzl to evaluate the role of bone materials properties in breast cancer metastasis.

Jan Lammerding received an NSF Career Award sponsored by NSF CBET for “CAREER: The role of nuclear biomechanics during cell migration in 3-D environments.”

Nozomi Nishimura received a Scientist Development Grant from the American Heart Association to bring new imaging tools to the investigation of heart attacks. The award is entitled “Mechanisms for lesion expansion after microinfarction: in vivo multiphoton microscopy of beating heart.”

William Olbricht received a Howard Hughes Medical Institute Med-Into-Grad Product Development and Dissemination grant for the project “Expanding Clinical Training Opportunities for Biomedical Scientists and Engineers.”

Cynthia Reinhart-King was awarded a 2013 Cook Award. The award honors individuals who deserve recognition for their commitment to women’s issues and their contributions for changing the climate for women at Cornell University.

Chris Schaffer was named an Inaugural Engaged Learning and Research Faculty Fellow. As a Fellow, Prof. Schaffer will receive support and advice in the development of his new course, ‘Science Policy Bootcamp: From Concept to Conclusion.’
Larry Bonassar, in collaboration with other Cornell bioengineers, has created an artificial ear that looks and acts just like a natural ear. This development gives hope to thousands of children born with microtia, which is a congenital deformity that can result in hearing loss due to the missing external structure of the ear.

Serena Altschul from CBS News met with Larry to discuss the bioengineered ear and what this development could mean for the future of bio-printing.

The video of the interview can be found on the CBS Sunday Morning website (www.cbsnews.com) as well as the ‘Spotlight’ section on the BME site (www.bme.cornell.edu).

Above photo: Larry Bonassar holds one of the bio-engineered ears. Photo right: The 3-D printer deposits cells encapsulated in a hydrogel that will develop into new ear tissue. The printer takes instructions from a file built from 3-D photographs of human ears taken with a scanner in Rhodes Hall.

Abhiram Varadarajan, M.Eng 2012

The M.Eng program was a great way to deepen my understanding of the engineering design process, learn about the amazing research being done at Cornell and network with the extremely active community. Supplementing my coursework with courses at the Johnson Graduate School of Management really added another dimension to the program for me. After graduation, I started a company, Varada Innovations, Inc. We are developing a minimally-invasive surgical tool aimed at consistently optimizing and personalizing ACL reconstructions. My time at Cornell provided me with a great deal of resources and connections which I was able to leverage to really get this company off the ground.
Nathanael Rosidi, Ph.D. 2011

During my time at Cornell University, I studied the physiological consequences of various neurodegenerative diseases using approaches found in engineering and applied physics, specifically non-linear microscopy. I finished my dissertation in the summer of 2011 and started down a new path in management consulting at Booz Allen Hamilton. At Booz Allen, I provided strategic and technical consulting for the healthcare market (i.e., government, pharmaceutical, payer, provider, and life science companies). I have recently switched out of consulting and have co-founded a startup that helps drive medical decision-making through quantitative analysis.

Scott Tucker, M.Eng 2011

Post-graduation from the master’s program, I worked in Dr. Timothy Wright’s biomechanics lab at the Hospital for Special Surgery in New York City for two years. While at HSS, I focused predominantly on knee joint biomechanics with specific foci on ligament reconstructions, joint arthroplasty, and computational modeling. With several manuscripts in publication and even more in progress, I have matriculated to the Penn State College of Medicine for a combined M.D./Ph.D. degree program. I intend to pursue orthopaedic surgery for my medical subspecialty and computational modeling/mechanical engineering for my graduate studies. The skills taught to me in the Cornell classrooms and in the lab of Dr. Jonathan Butcher continue to serve me well as I pursue my personal goals and tackle biomechanics research questions.

Diana Milam, M.Eng 2011

Since graduation, I joined the Siemens Graduate Program, which is a two-year leadership development program, consisting of 3 eight-month rotations. My first rotation was in Project Management at the Healthcare Customer Services National Headquarters in Cary, N.C. and my second rotation was in marketing at the Global Healthcare Headquarters in Erlangen, Germany. I’m currently completing my third and final rotation as a Project Engineer for the Molecular Imaging PET headquarters in Knoxville, Tenn. I am thankful for my time at Cornell, as I believe it greatly prepared me to take on strong leadership roles in the corporate healthcare world.

Daniel Dotse, M.Eng 2010

Cornell University’s BME program really transformed my way of thinking and approaching difficult problems. The classes I took were very challenging and interesting in the sense that they were structured to bring the best out of anyone—and that had a great effect on me. Currently, I am working at Regeneron Pharmaceuticals, Inc., helping discover and manufacture drugs that benefit a lot of people and most of the skills I employ today, I got from Cornell.
Shilpa Batra, M.Eng 2006

As a daughter of an Indian diplomat and entrepreneur, and growing up as a multi-lingual across all of Europe, Shilpa brings a unique and international perspective to global leadership. Her younger years of travelling, international schooling, and exposure to the world of international affairs has left a long-lasting fascination for politics and diplomacy and she shares this insight in the book that she is currently writing.

Ms. Shilpa Batra is currently attending Harvard University as a candidate for the Master’s in Management degree, with a keen interest in Innovation and Entrepreneurship. Simultaneously, she is engaged full-time in managing a quality management system of a site post-acquisition and working through the challenges of the evolving healthcare regulatory landscape at the leading global Fortune 500 medical device firm, Medtronic, Inc. Prior to this, she had explored her passion for the medical field through various roles in the pharmaceutical, bio-tech and medical device space, after having pursued undergraduate and master’s degrees in Biomedical Engineering from Cornell University.

Between the perfect balance of experiences at the professional and academic level, Shilpa strives to look for opportunities to communicate her experiences and knowledge by engaging with the community in areas of engineering, management and innovation. As Marketing Chairperson of the Boston chapter of Society of Women Engineers (SWE) and President of the Harvard E Business Society (HEBS) she aspires to bring to the engineering community her high energy, perspective and passion to help promote and deliver an understanding of the vital role business education and networking plays in the success of global emerging leaders and entrepreneurs.

Hot off the Press: Mechanical and Chemical Signaling in Angiogenesis

“Mechanical and Chemical Signaling in Angiogenesis,” edited by Cindy Reinhart-King and published by Springer, brings together an international group of experts to describe the most recent advances in angiogenesis research at all length scales: molecular, cellular and tissue.

Scientists from diverse fields including biomedical engineering, cell and developmental biology, chemistry, mathematics, and materials science describe cutting-edge research focused on both the mechanical and chemical signals regulating angiogenesis.

The authors describe novel biomaterials, in vivo models, microfabricated devices, mathematical models, and specific clinical advances.

Specific contributors include Roger Kamm (MIT), Shahin Raffi (Weill Cornell), Andrew Putnam (UMichigan), Geerten van Nieuw Amerongen (VU University Medical Center, Amsterdam), Hyunjoon Kong (UIUC), Sujata Bhatia (Harvard), Tom Sato (NAIST), Sarah Heilshorn (Stanford), Owen McCarty (OHSU) and Jerry Lee (NCI), Roeland Merks (Netherlands Institute for Systems Biology), Benjamin Ribba (INRIA, France), and Alisa Morss Clyne (Drexel).

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Student & Postdoc Awards 2013

Duan Bin in Prof. Butcher’s lab has been awarded an American Heart Association Postdoctoral Fellowship.

Brandon Borde, a Ph.D. student in the Bonassar lab, received a Graduate Fellowship from the Sloan Foundation.

Siddarth Chandrasekaran’s image of co-cultured tumor spheroids was selected by the journal Biomaterials for their 2012 Year in Images poster. Siddarth is a Ph.D. student in the King lab.

Dennis Chua, a student in the Lammerding lab, was awarded a Tau Beta Pi Scholarship for the 2013-2014 school year.

Catherine Clark, a postdoctoral associate in the Schaffer lab, was named Inaugural Engaged Learning and Research Fellow.

Peter DelNero, a Ph.D. student in the Fischbach-Teschl lab, received a STAR award for his abstract at the SFB Annual Meeting.

Emily Farrar in Prof. Butcher’s lab has been awarded a student travel award from the American Association of Anatomists.

Darvin Griffin, a Ph.D. student in the Bonassar lab, received a Fellow’s Scholarship from the National Society of Black Engineers.

Chin Yee Ho, a postdoctoral associate in the Lammerding lab, was awarded a postdoctoral fellowship from the American Heart Association.

Andrew Hughes, a Ph.D. student in the King lab, received a 2012 Graduate Student Research Award from the Separations Division of the American Institute of Chemical Engineers.

Casey Kraning-Rush in Prof. Reinhart-King’s lab was awarded an F31 Fellowship from the NCI.

Marsha Lampi, a Ph.D. student in the Reinhart-King lab, received a Ford Foundation fellowship.

Stephanie Lindsey in Prof. Butcher’s lab has been selected for the NSF GROW Fellowship to study computational modeling in France.

Maureen Lynch, a postdoctoral associate in the Fischbach-Teschl lab, received a travel grant by the International Bone and Mineral Society to attend the 12th International Conference on Cancer-Induced Bone Disease in Lyon, France.

Brooke Mason, a Ph.D. student in the Reinhart-King lab, in collaboration with the Moffitt Cancer Center, is awarded a Transnetwork Grant through the NCI PS-OC to pursue her work investigating the effects of matrix mechanics on angiogenesis.

Alexandra McGregor, a Ph.D. student in the Reinhart-King lab, received a Clinical Translational Science Center Fellowship.

Michael Mitchell, a Ph.D. student in the King lab, received the Extended Abstract Award at the 14th International Congress of Bioengineering in Istanbul, Turkey; was selected to participate in the NSF NextProf Future Faculty Workshop at the University of Michigan, and the Coulter College at the 2012 Biomedical Engineering Society Annual Meeting; and received an NSF fellowship to attend the 12th International Summer School on Biocomplexity and Biodesign. He also was inducted into the Edward A. Bouchet Honor Society, and received the Oral Presentation Award at the Ecole Nationale Superieure des Mines de Saint Etienne in Porquerolles, France. Michael has also won the 2013 BMES Graduate Design and Research Award for an extended abstract titled “Unnatural Killer Cells: TRAIL-coated Leukocytes that Kill Cancer Cells in the Circulation.”

Leah Pagnozzi in Prof. Butcher’s lab has been awarded an NIH fellowship to attend this year’s U.S.-Turkey Advanced Institute on Global Healthcare Challenges and Solutions, as well as being awarded a 2013 Armenian Graduate Student Fellowship.

Alyse Portnoff, a Ph.D. student in the DeLisa lab, was the recipient of a Best Poster Award at the Society for Biological Engineering’s 4th International Conference on Biomolecular Engineering.

Anne Rocheleau, a Ph.D. student in the King lab, received the Lydia I. Pickup Memorial Scholarship from the Society of Women Engineers for the 2013-2014 school year.

Harshal Sawant in Prof. Butcher’s lab has been selected to attend our 2nd annual Student Research Summit at the GE Global Research site in Niskayuna, N.Y. on Friday, August 9, 2013.

Fredrik Thege, a Ph.D. student in the Kirby lab, received an award for his poster at the 2013 Gordon Research Conference on Microfluidics.

Elizabeth Celeste Wayne, a Ph.D. student in the Schaffer lab, was a recipient of the 2013 Cook Award from Cornell University. This award honors individuals who deserve recognition for their commitment to women’s issues and their contributions for changing the climate for women at Cornell.

Cynthia Wisnieff, a Ph.D. student in the Wang lab, received the White Matter Study Group Annual Presentation Award at the 21st Annual International Society for Magnetic Resonance in Medicine meeting.
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