“Yes, I have an MD degree and a PhD degree…and I want to be a nun.” The onslaught of questions I often receive in response to this statement is indicative of the uniqueness of my situation and gives me a chance to express my gratitude to Penn State.

I was raised in a Catholic family in Philadelphia and my uncle was a priest. I saw firsthand how fulfilling a life lived for others could be. He had Type II DM and CKD and I remember the discussion he had with my parents the day he told us he would be starting dialysis. He died of an MI when I was 16. It was at this time that I understood the frailty of life and the importance of a life well lived. I received a presidential scholarship from Villanova University which paid tuition, room, board and books. My heart was full of gratitude and I tried to “pay it forward” by being very active on campus especially in campus ministry. My senior year, as I was applying to graduate and medical schools, I had an experience where three days in a row, 3 different priests suggested that I become a sister. I thought about it and prayed about it and knew in my heart that one day I would be a sister.

I started Penn State MD PhD program in the year 2001 after deferring admission for one year. I enrolled in the PhD program at the University of Pennsylvania in organic chemistry. It was during this year that I took my time and decided wholeheartedly to become a physician so I could offer my clinical skills to help others. Penn State Hershey was a wonderful experience for me. I viewed learning about the human body and science as a type of spiritual exercise. I am a bit of a philosopher at heart and enjoyed in a pure sense the beauty of science. I seriously researched nearly every possible option for graduate studies, I love chemistry and decided to pursue the rigors of a PhD in organic chemistry. I appreciated the program’s commitment to allow me to follow my dreams of chemistry focusing on antiviral drug design.

My years at University Park were formidable. I chose a graduate advisor who was young and ambitious Dr. Jocelyn Edathil graduated from Penn State Hershey MD/PhD program in 2010.

Advisor: Blake Peterson PhD (UP), Chemistry graduate program.
Residency: Internal Medicine, Temple University Hospital

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Alumni Spotlight

and enjoyed working on a collaborative project with a slightly more senior and well known researcher. It was intellectually satisfying to design molecules, synthesize, test for antiviral activity and study their metabolism. I felt like I was in pharma. I had an opportunity to write and obtain multiple grants, present frequently and even review articles. I started a group called Lion Lectures to help promote collegiality among junior graduate students and provide a forum for presentations. Not only did I work hard in lab, I was in charge of multiple organizations including the Penn State Catholic Graduate group and Bread of Life prayer groups.

During this time, I felt more fervently that I was supposed to become a religious sister. So much so that near the end of my PhD I contacted the Mother General of the order I was thinking about joining. In my enthusiasm I asked her if she would take me without finishing graduate school. She advised me to finish my PhD. It was a tough time and I had multiple medical issues including multiple herniated discs and was barely ambulatory. Yet, with that mandate, I successfully defended my thesis and completed my PhD. It’s one of the great days in a person’s life!

When I returned to Hershey, I again wholeheartedly applied myself to trying to remember all the clinical medicine I had learned so long ago. I enjoyed patient care and was fulfilled in a different way. Research fulfillment comes in months to years. Clinical medicine gratifies more quickly yet you don’t retain a body of work. Again I asked enthusiastically if I could enter the convent before finishing medical school, yet I was advised to complete the work I started. I enjoyed internal medicine and viewed it as a good residency for service. Before I apply for residency, I tried again. I asked if I could join after medical school. Then the sisters again asked me to finish my residency. I was so surprised. I had wanted to join for 10 years at this point.

I did some research into the topic and discussed in great detail with other physicians sisters. I also spoke with physician-scientists who were religious nuns. Everyone advised me to finish residency before starting my religious formation. Now at the end of my clinical training I can truly understand this wisdom and advice. I decided to go to Temple University where I could give back to the community where I was raised.

At Temple, the patient population was complicated and very sick. We saw advanced pathology and young patients. I enjoyed gathering data and making diagnoses. In my scientific mind, each patient was an experiment and the data was fascinating. Personally, I was fulfilled in helping the poorest of the poor and tried to remember that I went in to medicine to help others. This sustained me on my 30 hour calls and to fight the fatigue. In my second year residency I went to India and spent one month with the sisters and saw amazing Tropical medicine. I worked in HIV, TB and leprosy clinics. Since then, I have been involved in multiple projects in HIV medicine. In my last year, I had the opportunity to go to Chicago to attend the conference Association of Brothers, Priest and Sister Physicians. I heard the formation stories of many priest and sisters and their long journeys. There were
Alumni Spotlight

a few physician scientists there as well.

During residency, at first, I was terrified to tell anybody that I was going to be a sister. I didn’t want to be treated very differently. I slowly begin to share my future plans. Surprisingly, everyone including my program director was fully supportive. In fact the nominated me for and I received the Humaneness in Medicine award from the Philadelphia County Medical Society. I begin my religious formation (my “nun residency”) in the Fall.

I truly appreciate Penn State for having allowed me to pursue my dreams. It’s a wonderful honor to be in a MD/PhD program. There are three requirements to be a religious sister. One is physical health, another is emotional balance, and the third is freedom from financial obligations. I decided to pursue the MD/PhD dual degree because I loved research and wanted to become a physician. I am honored to able to be a physician, a scientist and a future sister.

When I was a second year medical student, I used to gaze into the future and try to imagine what my life

would be after the many years of training and I have learned there important concepts. Firstly, seek mentors. Each step along the way, I tried to gather as much advice as possible. I sought out people who had gone before me. Mentorship therefore is a critical concept. Before I made any decision, I applied the scientific method. I tallied pros and cons. I sought out those who could aid my decision, in medicine, in science and in the religious life. Secondly, I learned that in a dual degree program you should show proficiency in each field. If you are an MD, give 100% to your medical education. If you are a PhD, work hard toward your research. And for me, as I pursue the religious life, I want to be fully trained to be a sister. Lastly, life is short so work hard, play hard and for me, pray hard. That’s the only way you can enjoy the process because it’s along hard road but the benefits are many.

Recent Thesis Defenses

Theresa Carr
Advisors: Lisa Shantz, Ph.D.
Graduate Program: Physiology
Defense Date: April 30, 2013
Thesis Title: The role of mammalian target of rapamycin (mTOR) in skin carcinogenesis

Shane A. J. Lloyd
Advisors: Henry Donahue, Ph.D.
Graduate Program: Cell & Molecular Biology
Defense Date: May 9, 2013
Thesis Title: The Role of Connexin 43 Gap Junction Protein in the Musculoskeletal Changes Induced by Mechanical Unloading

Darrin V. Bann
Advisors: Leslie Parent, M.D.
Graduate Program: Cell & Molecular Biology
Defense Date: May 9, 2013
Thesis Title: Intracellular Trafficking of Retroviral Gag and RNA During Late Replication

Daniel Lapp
Advisors: Colin Barnstable, Ph.D.
Graduate Program: Neuroscience
Defense Date: June 6, 2013
Thesis Title: Molecular Mechanisms of Astrocyte Protection Following Oxidative Stress
Congratulations 2013 Graduates
Match Day 2013 MD/PhD Students

James Bauer
University of Wisconsin, Pathology
2005-2013
Ph.D.—August 2011
M.D.—May 2013

Melanie Dispenza
Northwestern, Internal Medicine
2005-2013
Ph.D.—December 2011
M.D.—May 2013

Kathryn Erickson-Ridout
Brown University, Psychiatry
2004-2013
Ph.D.—August 2011
M.D.—May 2013

Carolina Pinzon-Guzman
Vanderbilt, General Surgery
2005-2013
Ph.D.—August 2011
M.D.—May 2013

Emilie Muelly
University of California-Davis, Radiology
Preliminary: Kaiser Santa Clara, Medicine
2007-2013
Ph.D.—August 2011
M.D.—May 2013

Incoming Class of 2013
Applications and Admissions

194 applicants received
163 completed their applications and were screened
53 interviewed
28 acceptances offered

6 are currently in the entering class (as of 5/22/2013)

Oliver Mrowczynski—University of California-San Diego
Sa Do Kang—Duke
Ruizhe (Jerry) Ren—Cornell
Tarik Salameh—Penn State-Schreyer Honors College
Scott Tucker—Cornell
Monica Manglani—Lafayette
Gap junctions are membrane-spanning channels that allow for the movement of small molecules between adjacent cells or between the cell and extracellular environment. Connexin43 (Cx43) is the predominant gap junction protein in bone. Numerous studies from our laboratory and others have shown that Cx43 has a critical role in the skeletal response to mechanical forces both in vitro and in vivo. However, what is not well understood is the role that Cx43 plays in the response to mechanical unloading (i.e., lack of weight bearing). Mechanical unloading results in deleterious effects on the musculoskeletal system. For example, astronauts develop muscle atrophy and experience bone loss at a rate ten times faster than post-menopausal women. Clinically, patients confined to their bed due to neurological injury or trauma experience bone loss and increased risk of fracture. A better understanding of the mechanisms underlying the deleterious musculoskeletal changes induced by mechanical unloading is required in order to identify novel targets for therapeutic countermeasures.

My dissertation research addressed the following specific aims: 1) Examine the time course for structural, functional, and molecular changes occurring in muscle and bone in response to mechanical unloading; 2) Characterize the response of Cx43 deficient mice to mechanical unloading; and 3) Determine how Cx43 deficiency modulates specific bone signaling pathways and cellular activity induced by unloading. We utilized the animal model of mechanical unloading called hindlimb suspension (HLS) to complete these aims. The HLS model was developed by Morey-Holton and colleagues at the NASA Ames Research Center and prevents weight bearing on the hindlimbs.

First, we collected tissue from mice following 0, 7, 14, and 21 days of HLS or normal loading. We found that muscle atrophy (due to decreased protein synthesis and increased protein degradation) precedes bone loss during mechanical unloading. Reduced mechanical force due to muscle atrophy may compound bone loss associated with a lack of weight bearing. Furthermore, age-related trabecular bone loss in mice, similar to that which occurs in mature astronauts, is superimposed on unloading. Preservation of muscle mass, cortical bone structure, and overall bone strength with age in normally loaded control mice suggests that muscle has a greater effect on cortical versus trabecular bone. Taken together, these findings suggest that a therapeutic approach that targets muscle may also help to preserve bone during periods of disuse.

We next sought to determine the role of Cx43 in unloading-induced bone loss by subjecting mice with a bone-specific deletion of Cx43 (cKO) to HLS. Following three weeks of HLS, wild-type (WT) mice experienced substantial bone loss; however, these deleterious effects were attenuated in cKO mice. Unloading also suppressed bone formation in WT mice, while there was no change from baseline for cKO-Suspended. mRNA levels of the gene encoding sclerostin, an osteocyte-derived inhibitor of bone formation, were greater in WT-Suspended, whereas cKO-Suspended was unchanged. The proportion of sclerostin-positive osteocytes was significantly lower in cKO-Control versus WT-Control, a difference accounted for by the presence of numerous empty lacunae and apoptotic osteocytes. There was no change in trabecular osteocyte viability. Osteoclast indices were lower in Suspended cKO versus WT-
Research Spotlight

Suspended. Osteocyte apoptosis induced by Cx43 deficiency appears to preserve bone structure by preventing both suppression of bone formation and increased bone resorption during mechanical unloading. Attenuated trabecular bone loss, despite an apparent lack of effect on osteocyte viability in this compartment, suggests that an additional mechanism, independent of osteocyte apoptosis, may also be important.

Taken together, my work has demonstrated that Cx43 plays an integral role in the skeletal response to mechanical unloading. Deficiency of Cx43 reduces osteocyte viability, which may desensitize bone to unloading and reduce the primary source of sclerostin and RANKL, an activator of osteoclast-mediated bone resorption, that are upregulated during mechanical unloading. Combined with previous work from our laboratory demonstrating an increased anabolic response to mechanical loading in Cx43 deficient mice, these results suggest that Cx43 may be an important target for prevention of bone loss associated with aging and disuse.

Shane Lloyd completed his undergraduate degree in Pharmacology & Therapeutics at The University of British Columbia in Vancouver, Canada. His dissertation research was conducted in the laboratory of Dr. Henry J. Donahue in the Department of Orthopaedics & Rehabilitation. Shane is a co-investigator on a NASA research grant investigating the musculoskeletal effects of long duration spaceflight. Shane successfully defended his dissertation in May of 2013 and will be returning to the third year of medical school this summer. Shane has served as President of the College of Medicine Graduate Student Association (2011-2012) and Student Assembly (2012-2013). He is a 2010 recipient of the Judith Bond MD/PhD Student Award and was recently awarded Penn State’s Ardeth and Norman Frisbey International Student Award.

Entering the Lab

Paul Hsu
Yuguang (Roger) Shi, Ph.D.
Biomedical Sciences graduate program

Olivier Noel
James Broach, Ph.D.
Biomedical Sciences graduate program

Amy Lu
Colin Barnstable, Ph.D.
Biomedical Sciences graduate program

Akua Sarfo
John Wills, Ph.D.
Biomedical Sciences graduate program

Saumya Maru
Aron Lukacher, Ph.D.
Biomedical Sciences graduate program

Biomedical Sciences graduate program
Recent Student Awards and Travel

Theresa Carr

Three Ph.D. students receive prestigious award

Three College of Medicine Ph.D. students—Fengyang “Dylan” Lei, Theresa D. Carr, and Wint Nandar—were among thirteen recipients of the 2013 Penn State Graduate School Alumni Association Dissertation Award across the University. This award provides recognition and funding to outstanding doctoral students. It is one of the most prestigious available to graduate students at Penn State and “recognizes outstanding achievement in scholarship and professional accomplishment.”

“Development of a T cell-based cancer immunotherapy by using the induced pluripotent stem cell” is the title of the winning dissertation by Lei, a microbiology and immunology student. His thesis advisor is Jianxun “Jim” Song, assistant professor of microbiology and immunology. Physiology student Carr’s dissertation was titled “The role of mammalian target of rapamycin (mTOR) in skin epithelial carcinogenesis.” Her advisor is Lisa Shantz, associate professor of cellular and molecular physiology. Nandar’s winning dissertation was titled “Modeling the impact of H63D HFE polymorphisms on amyotrophic lateral sclerosis (ALS).” She is a neuroscience student, and her advisor is Jim Connor, distinguished professor of neurosurgery. Each winning student received a $5,000 award and was recognized at the Graduate School Alumni Society’s Spring Social and Recognition Program. Funds for these awards were made possible by a gift from the Penn State Alumni Association.

Shane Lloyd

Shane Lloyd was awarded the “Ardeth and Norman Frisbey International Student Award”. They award three students out of all Penn State campuses: one undergraduate, one graduate student, and one for a "student leader regardless of academic level". He won in the student leader category, with recommendations from Drs. Donahue, Davis, and Verderame.

Jocelyn Edathil-Alumni

She won the Philadelphia Medical County Humanness in Medicine award given to a resident showing compassionate care to patients.

Kathryn Erickson-Ridout

Department of Psychiatry Award for Clinical Excellence in Psychiatry

Dean’s Awards for Scholarly Achievement (shared with 2 other graduates)

Bernard Brodie Pharmacology Graduate Award (for outstanding scholarly and research achievements; shared with 2 other graduates)

Emilie Muelly

Moskowitz Family Endowment Award for Graduate Research Excellence

Department of Neural & Behavioral Sciences Award (for outstanding research performance in neural & behavioral sciences; shared with 2 other graduates)

Carolina Pinzon-Guzman

Department of Neural & Behavioral Sciences Award (for outstanding research performance in neural & behavioral sciences; shared with 2 other graduates)

Student Travel

Francis LeBlanc

Atlanta, GA to attend the ASH Conference (American Society of Hematology)

Gene Cozza

Seven Springs, PA to attend the Translational Research Cancer Center Consortium conference

Cody Weston

London to attend the International BioIron Society Meeting
Recent Publications


*Carr TD, Digiovanni J, Lynch DJ, Shantz LM (2012) Inhibition of mammalian target of rapamycin (mTOR) suppresses UVB-induced keratinocyte proliferation and survival Cancer Prevention Res (Phila) [Epub ahead of print] PMID: 23129577


The past few months have been very busy and productive for the program. Our External Advisory Board (Skip Brass, MD/PhD, U. Penn, Kerry O’Banion, MD/PhD, Rochester, and Mike Frohman, MD/PhD, Stony Brook) visited us in January after Hurricane Sandy cancelled their planned visit for last fall. The EAB was enthusiastic about our progress over the past year and made some excellent suggestions for further enhancements to the program. We are working with our Internal Advisory Board, Dr. Verderame, and Dr. Daniel Notterman, Vice Dean for Research, to implement these changes. We held our 9th Annual Retreat in State College during the first weekend in April. It was great to get the entire group of students together to hear about their latest research accomplishments, their clinical experiences, and enjoy their camaraderie. Our invited speakers, Jennifer Baccon (Assistant Professor of Pathology, PSU), Aashish Didwania (Assistant Professor of Medicine and Internal Medicine Residency Director, Northwestern), and Michael Saulino (Assistant Professor of Physical Medicine and Rehabilitation, Jefferson Medical College, and a PSU MD/PhD alum) gave outstanding and informative talks and interacted with students throughout the weekend. We also enjoyed the participation of 14 Schreyer Honors College (SHC) students who gave us a tour of the University Park campus and joined us to get a glimpse into what it’s like to be a budding physician-scientist. We will be welcoming four of these students to our campus this summer for the second year of the SHC Early Exposure to the MD/PhD Program. One of these students, Kristin Lambert, has been offered Early Assurance Status (EAS) in the MD/PhD Program and is expected to begin the program as an M1 in 2014. We are excited to have accepted our first EAS student in the inaugural year of the program and look forward to many more to come.

This has been a particularly busy recruitment season. We wound up interviewing 53 applicants, seven of whom returned for second look. Particular thanks go to Barb Koch for organizing the recruitment and second look days, and to the student recruitment team (Ron Panganiban, Michal Kidacki, Bill Su, Olivier Noel, and Yanli Wang) for their help in making the recruitment days so successful. We also have some new changes in program leadership to announce. Dr. Melissa Rolls has agreed to serve as Associate MD/PhD Program Director at University Park, and will serve as head of the selection committee for identifying SHC scholars for our summer early exposure program. We thank Melissa for taking on these important roles. Dr. Jennifer Baccon has accepted our invitation to become co-Director of BMS 506 (Biological Basis of Human Health & Disease), co-leader of the Clinical Exposure Program, and as a residency advisor to our M3/M4 students. Dr. Diane Thiboutot will join Jennnifer and Leslie as clinical advisors.

The Clinical Research Conference (CRC) series kicked off with the first dinner meeting in February. Diana Tacelosky, Steven Steinway, and Michal Kidacki led the discussion about a patient with immunosuppression and disseminated fungal infection. It was a lively and informative session and the feedback we received was extremely positive. The second CRC was in April, when Tulasi Khandan, Katrina Heyrana, and Bill Su discussed pyoderma gangrenosum. We appreciate the work of Steve Steinway, Aron Lukacher, and Keith Cheng in initiating and organizing the CRC. These sessions are a fantastic opportunity to directly link patient cases with current biomedical research, and they give us another chance to bring together and strengthen our MD/PhD community.

- Robert Levenson, Ph.D. & Leslie Parent, M.D.
Faculty Highlights
Latest Additions to the MD/PhD Steering Committee and Training Faculty

Patrick Drew, PhD is an Assistant Professor of Engineering Science & Mechanics at University Park and also Neurosurgery. His research includes development and control of the ‘infrastructure’ of the brain, the network of blood vessels that supply neurons with oxygen and nutrients.

Faoud Ishmael, MD, PhD, Assistant Professor in Medicine/ Pulmonary & Allergy and Biochemistry & Molecular Biology. His research involves allergies and allergic diseases.

Douglas Stairs, PhD is an Assistant Professor of Pathology, Pharmacology and Biochemistry & Molecular Biology. His research involves esophageal cancer.

Program Updates
Schreyer Honors College Summer Research Internship, MD/PhD Early Exposure Program

Started in the summer of 2012, this program follows the Summer Undergraduate Research Internship Program (SURIP) schedule and events. Interns had the opportunity to spend half a day per week with a preceptor in clinic, while their remaining time is spent in a research lab. Last summer, our interns were Abby Talbert (advisors: Keith Cheng MD PhD, Dennis Gingrich MD, Diane Thiboutot MD) and Kristin Lambert (advisors: Leslie Parent MD, Cynthia Whitener MD, Kathleen Julian MD). This summer, we have four interns: Kristin Lambert (returning from last summer), Grace Lee, Erica Mellinger, Priyanka Solanki.

Congratulations to Kristin Lambert, who was offered a place in the MD/PhD Program, entering Fall 2014.
Selected Photos from the 2013 Retreat