MEET THE CLASS OF 2018

Mihael Cudic
Maddie Epping
Taylor Farley
Mehdi Hamouda
Emily Kolyvas
Matthew Mulé
John Shannon
Alex Waldman
Lawrence Wang
Lauren Wedekind
Yifan Zhou

Doctoral Research Interests

- Artificial Intelligence
- Biophysics
- Cancer biology
- Cell signalling
- Drug resistance
- Genetics
- Genomics
- Immune regulation
- Immunology
- Infectious disease
- Microbiology/biome
- Neuroimmunology
- Neuroscience
- Pharmacology
- Stem cell biology
- Tissue engineering
- Vaccinology
- Virology

SPECIAL THANKS

Thank you to the many PIs who volunteered their time to participate in the interview panels and assist in the selection of this outstanding new class:

- Daniel Anthony
- Chris Baker
- David Bodine
- Harold Burgess
- Jeff Diamond
- Adrian Ferre-D’Amare
- Kenneth Fischbeck
- BJ Fowlkes
- Robert Gilbert
- Ed Giniger
- John Hanover
- Heather Hickman
- Mariana Kaplan
- Brian Kelsall
- Andrew Mammen
- David Margulies
- Joe Mindell
- Klaus Okkenhaug
- Brian Oliver
- Paul Pharoah
- Antonina Roll-Mecak
- Pam Schwartzberg
- Phillip Shaw
- Richard Siegel
- Peter St George-Hyslop
- Carter Van Waes
- Michael Ward
- Andy Baxevanis
- Sonja Best
- Jason Brenchley
- William Figg
- Montserrat Garcia-Closas
- Ariel Levine
- Niki Moutsopoulos
- Barbara Rehermann
- Mihaela Serpe
- Ilyas Singeç
- Justin Taraska

OXCAM STANDS OUT: OITE GRADUATE AWARDS

Congratulations go out to the scholars and mentors who were recognized during the 2018 Graduate Student Research Symposium. Hosted annually by the Office of Intramural Training and Education (OITE), the Research Symposium provides an opportunity for NIH graduate students to present their research through invited talks, poster sessions, and an elevator pitch competition. These events are followed by a graduation ceremony for those students completing their PhD research and two award ceremonies – one to recognize the year’s outstanding mentors and the other to issue the NIH Graduate Student Research Awards (GSRA). This year’s recognized graduates included recent OxCam alumni Dr. Andrew Breglio (NIDCD/Oxford), Dr. Christie Campla (NEI/Oxford), and Dr. Angela Ianni (NIMH/Oxford), as well as Wellcome Trust alumna, Dr. Ayesha Sengupta (NIAAA/Oxford).

The GSRA’s are issued in different categories and awarded based on poster presentations that are judged by NIH postdoctoral fellows and staff scientists. This year, four of the twelve GSRA’s were issued to OxCam scholars in various categories: Justin Demmerle (NICH/D/Oxford) and Ryan Prestil (NINDS/Cambridge) were awarded in the category of Biochemistry/Developmental/Cell & Molecular Biology, Joseph Roney (NINDS/Oxford) for Structural Biology/Biophysics/Chemistry, and Erin Coonahan (NIAID/Oxford) for Pharmacology/Clinical/Translational Science. Additionally, three of the four Outstanding Mentor Awards went to OxCam mentors, based on recommendations from their OxCam Scholars. Drs. Lisa Cunningham (NIDCD), Todd Macfarlan (NICH), and Laura Koehly (NHGRI) were all nominated by their students (Dr. Andrew Breglio, Justin Demmerle, and Jeff Leinert respectively) and presented the award in recognition of their outstanding leadership, support, and dedication to their graduate students.
SCIENTIST SPOTLIGHT

Once again, this year Dr. William Figg took time to attend the OxCam/MDPhD Interview Event and present his science to candidates interested in completing their PhD through an interdisciplinary, dual-mentored research program at the NIH. Dr. Figg is Deputy Chief of the Genitourinary Malignancies Branch and Head of the Molecular Pharmacology Section in the National Cancer Institute (NCI). Dr. Figg came to the NIH in 1992 as a researcher in the Clinical Pharmacology Branch and became Head of the Molecular and Clinical Pharmacology Section the following year. During his time at the NIH, Dr. Figg has served as a mentor for PhD students at the NIH, including scholars in the OxCam and Wellcome Trust programs.

We had the opportunity to catch up with Dr. Figg for an update on his current research (below):

Dr. Figg’s research program is focused on the development of new anticancer therapies, using prostate cancer as the target disease and angiogenesis as the target pathway. His lab is one of the few that conducts research spanning the entire drug development pipeline from target identification/validation in drug discovery to preclinical development (characterizing molecular pharmacology/toxicology and animal testing) and ultimately to clinical evaluation. Dr. Figg’s group develops tools and bench-to-bedside approaches that are most promising for guiding and refining the drug development process. Recently, his laboratory has discovered that a transporter becomes upregulated in prostate cancer that influxes androgens. They are currently focused on understanding the role of this transporter in steroid hormone transport and its molecular characterization in prostate cancer for future drug discovery efforts, including the development of a high throughput screening assay. His group works closely with the NCI drug screening laboratory to identify novel potential inhibitors. For example, they have identified several agents that target the HIF-1alpha pathway. Dr. Figg also utilizes rational drug design for the synthesis of novel safer thalidomide analogs. The lead compound(s) undergo extensive optimization and testing in preclinical models for antitumor efficacy in his lab with the goal of identifying the most effective drug candidate to move into the clinic. In parallel, his group also investigates pharmacogenetic and pharmacodynamic markers to monitor clinical response and resistance to drug therapy. They integrate pharmacogenetics/pharmacogenomics research in these drug development efforts to evaluate the impact of genetic variants on drug metabolism, response and toxicity. Dr. Figg has been involved in over 200 clinical trials and introduced over 75 compounds into humans.

For more information, visit: https://ccr.cancer.gov/Genitourinary-Malignancies-Branch/william-douglas-figg.

OXCAM GRADUATE AWARDS: OITE

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Four students are selected to give oral presentations and they are selected based on their scientific merit and diversity. It was great to see OxCam alumna Dr. Kim Breglio (NCATS/NIAID/Oxford), who was selected as one of the student speakers at the event, presenting her research on Phenotypic changes and drug sensitivity associated with an ATG18 mutation in Plasmodium falciparum.

This year also marked the second year for the Elevator Pitch Competition during the Symposium. For this contest, scholars are judged based on their ability to explain their science to a general audience in two minutes or less. Of those who competed in the Elevator Pitch Competition, three awards are given and two of these were given to OxCam Scholars: Craig Pearson (NHLBI/Cambridge) took home first place and Nicholas Ader (NINDS/Cambridge) was one of two runners up.

This was an exciting year for NIH research and, with 123 graduate student participants, it was great to see so much OxCam/WT trust involvement at the Symposium. With all of the recognition for scholars and mentors this year, we are really looking forward to seeing what next year’s participants have to offer.
In the world of software development, tools that allow the output of one program to be interpreted by another are referred to as “glue.” This analogy might resonate with other OxCam students, who often find themselves uniting researchers across disciplines and continents. My PhD mentors, Prof. Richard Durbin at the University of Cambridge and Dr. Stephen Chanock at the NIH - NCI, come from different fields but had long wanted to collaborate. Stephen led many of the early studies that associated specific genomics regions with cancer risk by genotyping and sequencing large population studies and pursuing regions of high interest. Richard’s lab has not traditionally worked in cancer genomics but has been at the forefront of genome analysis for almost two decades. When I approached them both upon joining the OxCam program we devised a research plan that combines the analysis of large cancer-related datasets with development of new software to improve such analyses.

As part of a collaboration between researchers at NCI and the Broad Institute, I’m intimately involved in the analysis of more than 400 thyroid tumors from individuals who were exposed to environmental radioactivity from the Chernobyl nuclear power plant disaster in 1986. My role is to survey the tumors and their matched normal tissue samples for differences that appear to be caused by radiation. When radiation strikes DNA it induces double strand breaks; errors in the repair processes that rejoin the DNA strands can cause mutations. Many of these take the form of structural variants, large changes in the genome’s structure. These changes vary in size from fifty basepairs to many millions. From a computational perspective, such modifications are difficult to detect, as they are significantly longer than individual sequencing reads. Reads containing signatures of these variants map poorly to the human reference genome and are often discarded.

One solution to this problem is to generate a reference that incorporates known or suspected variation; we can do this using a variation graph. Other students in the Durbin group have implemented these data structures, and I’m incorporating them into new methods for structural variant detection. Variation graphs help solve the problem of poor read alignment around structural variants and we hope will have better sensitivity compared to existing methods. The goal is to apply the tools I develop to the Chernobyl data, yielding a better understanding of structural variation in radiation-exposed samples.

Having the mentorship of both Richard and Stephen has helped me grow as an interdisciplinary scientist. In between time spent on analyzing the Chernobyl datasets and developing methods for structural variant detection, I’ve had the ability to explore other cross-disciplinary projects, including developing methods for analyzing HPV infections and writing software to pass genome assemblies between programs. For young scientists with multiple passions, I think the OxCam program provides a unique and valuable experience.

MEET THE MENTOR

It is a pleasure to share a fine graduate student with Richard Durbin and begin to approach some of the key issues in cancer genomics- both in tumor characterization of large structural events and the contribution of structural variants in germline DNA. In our collaborative study, we are looking at effect as well as the consequence of environmental radiation on the human genome, particularly as it relates to thyroid cancer. In parallel, we are also investigating the effect of radiation on both the types and rates of de novo mutational events, looking across generations in a trio study design. Training new scientists in both cancer genetics and computational approaches to genomic analyses represents an important next step in beginning to more thoroughly understand the landscape of genomic changes in cancer, especially in types driven by exposure to radiation. Moreover, we will begin to look closely how the environmental exposures can shape genomic changes in cancer.

HELP US HIGHLIGHT YOU
We are always looking for new ways to honor and celebrate the accomplishments of our scholars, alumni, and mentors. If you ever have any exciting news, about yourself or your colleagues and peers, that you would like to share with the OxCam Office, please feel free to reach out to us at any time. We are also looking for pictures from scholars’ travels and time in the lab if you have anything you would like to share for the website, newsletters, and other program materials.

CONTACT US ANY TIME WITH NEWS AND UPDATES

angela.harris@nih.gov or oxcam@od.nih.gov
**MEET THE CLASS DEANS**

As Program Academic Dean, Dr. James Sellers tracks the academic progress of all of the scholars in the program. Rather than taking on this task alone, each year, Dr. Sellers identifies two NIH PI’s who are enthusiastic about graduate training and willing to serve as Class Deans for each incoming NIH OxCam Class.

These two individuals are an extra layer of support for scholars and a point of contact for the program directors when it comes to checking in on student progress throughout their time in the program.

We are excited to announce the Class of 2018 Deans, Drs. Heather Hickman and Rusan Nasser:

**Dr. Heather Hickman** received her Ph.D. from the University of Oklahoma Health Sciences Center in 2003. While training in the lab of Dr. William Hildebrand, she investigated the presentation of viral ligands by major histocompatibility class I molecules. She next joined the Laboratory of Viral Diseases (LVD - NIAID), first as a postdoctoral fellow with Dr. Jonathan Yewdell and later as a Senior Associate Scientist. In 2017, Dr. Hickman became an Earl-Stadtman tenure-track Investigator in the Viral Immunity and Pathogenesis Unit of the Laboratory of Clinical Immunology and Microbiology, NIAID. Dr. Hickman’s lab studies the generation and execution of antiviral CD8+ T cell responses in the skin. Initiation of CD8+ T cell responses is a complex process that begins in the draining lymph node and is shaped by a number of factors, including the delivery, availability, and location of the viral antigen that activates T cells. The Hickman lab uses a variety of cutting-edge techniques, including intravital microscopy, to visualize T cell activation as well as the function and movement of activated effector T cells in virus-infected skin. Utilizing pathogens ranging from small RNA viruses (such as Zika and Chikungunya) to large DNA viruses (vaccinia virus), the lab aims to understand common features of protective CD8+ T cell immunity to viral infection and vaccination using both small animal models and clinical samples.

**Dr. Nasser Rusan** moved to the U.S. from Jordan in 1996. He graduated from the University of Massachusetts with a B.S. in molecular biology in 2000 and a Ph.D. in molecular and cellular biology in 2005. He conducted postdoctoral research at the University of North Carolina Chapel Hill from 2005-2011. He was awarded an American Cancer Society Postdoctoral fellowship in 2006, and received the University of North Carolina Postdoctoral Award for Research Excellence in 2009. Dr. Rusan joined the NHLBI in 2011 as an Earl Stadtman tenure-track Investigator. He is a member of the American Society for Cell Biology and serves on the editorial boards of Frontiers in Developmental and Cell Biology and Molecular Biology of the Cell (MBoC).

The Rusan Lab studies the role of centrosomes during animal development. The centrosome is a non-membrane bound organelle that serves as the main microtubule (MT) organizing center of most animal cells. Centrosomes function to initiate and maintain cell polarity, guide cell migration, direct intracellular cargos, and properly distribute other organelles. In mitosis, centrosomes are critical for accurate construction of the mitotic spindle to ensure faithful chromosome segregation to the two daughter cells. Thus, it is not a surprise that defects in centrosome function lead to a wide range of failures at the cellular level, which in turn, leads to tissue defects and many human diseases. The lab aims to determine how centrosomes are properly constructed from their individual parts and how centrosomes function in a wide range of cell types to avoid human diseases such as polycystic kidney disease, microcephaly, cancer and many others.

The Class Deans for the other current classes are as follows: **Class of 2017:** Drs. John Hanover and Jennifer Lee; **Class of 2016:** Drs. Jenny Hinshaw and Todd Macfarlan; **Class of 2015:** Drs. Chris Baker and Lisa Cunningham; **Class of 2014:** Drs. Adrian Ferre-D’Amare and Kent Hunter.

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**NEW EVENTS**

The NIH OxCam/WT Student Leadership Board (SLB) are working hard to organize and host a variety of events for scholars in the program.

Scholars Hannah Mason (Class of 2017), Joseph Mcabee (Class of 2015), and Kristoffer Johansen (Wellcome Trust – Class of 2016) were selected to represent their classes in October of 2017 and since then, they have made strides in providing opportunities and engagement for their peers. Starting in November with OxCam/Wellcome Trust participation in the NIH Annual Gingerbread competition (and an outstanding 3rd place win for Facebook votes), this SLB has worked to plan and promote a variety of events and activities to help their peers come together and bond. Along with taking over the organization of the monthly Cozzi Clinical Case Series, the SLB has worked to plan numerous events including hockey games, ice skating, an Olympic watch party, and a crawfish boil. They have also started issuing their own Newsletter to highlight scholars and student events and announce upcoming opportunities.

One of their latest initiatives is a series of “Lunch and Learn” seminars. Each of these events will invite a guest scientist to chat with scholars about various career paths. Dr. Derek Narendra, former OxCam Scholar and Assistant Clinical Investigator in the Neurogenetics Branch of NINDS, was the first guest for this series of events. Dr. Narendra will become an NIH OxCam mentor for one of our Track 1 MD/PhD students in the Class of 2019 and has a unique perspective and career path, which he shared with scholars, including the experiences and opportunities that led him through medical school and residency, and back to the NIH. Dr. Dan Barber, Stadtman Investigator in the T-Lymphocyte Biology Unit of NIAID, joined scholars in April to focus on early career transition, specifically focusing on identifying postdocs and other opportunities immediately following PhD completion. Providing guidance based on his own experiences as a postdoc, as well as his experiences now as a Principal Investigator who hires postdocs, the discussion covered how to plan and choose the right postdoc as well as timing, when to start looking for opportunities, and best practice for the search process. The next “Lunch and Learn” will be with Dr. Vanja Lazarevic, Investigator in the Experimental Immunology Branch of NCI, in June.
As scholars leave the program and move into their careers, it is exciting and challenging to keep track of the diverse pathways they take. In doing this, we try to reach out and get a more personal view on the achievements and steps that our alumni have taken and their views on the program and its influence on their trajectory.

NIH OxCam alumnus Mahim Jain completed his PhD at the University of Oxford in 2009 with support from his mentors, NIH - NHGRI Senior Investigator Dr. Maximilian Muenke and University of Oxford Professor Lon Cardon (now CSO at BioMarin Pharmaceutical), and earned his MD from the University of Indiana in 2010. He is currently an Assistant Professor of Pediatrics at Johns Hopkins University, where he splits his time between clinical research and patient care at the Kennedy Krieger Institute. We are delighted to hear from Dr. Jain about his path to becoming a physician-scientist.

I entered the NIH Oxford program as a third-year medical student, interested in developing a well-rounded understanding of human pathophysiology. As a member of the NIH Oxford Biomedical Scholars program, I applied emerging technologies to understand the genetic underpinnings of both complex human traits, such as attention-deficit/hyperactivity disorder and rare human traits, such as craniosynostosis. The program not only taught me the scientific process, but provided me with experience in a variety of genetics subfields and numerous mentors to emulate. The value of the program to my scientific development included learning specific techniques to complete my thesis, but also more importantly, taught me scientific critical thinking skills and strategies for confronting genetics-based research questions. Learning these skills has proven to be a strong foundation for my current roles as a scientist and clinician. My dissertation work was conducted through collaborative supervision by two investigators at the NIH and two at the University of Oxford. Through these interactions and mentorship, I gained an understanding of clinical genetics, statistical genetics and population genetics. My experience in the program also taught me the value of utilizing collaborative, multi-institute and multidisciplinary research to quickly make discoveries and disseminate them to the scientific community. I sought to refine my interest in explaining rare phenotypes and utilizing state of the art genomics technologies through continuing with a residency in genetics and pediatrics as well as post-doctoral training at the Baylor College of Medicine. After my residency training, I led the sequencing effort with the Baylor Undiagnosed Diseases Network, a program that utilized multidisciplinary expertise to diagnose patients with rare disorders. I am building upon my experience in a dual faculty position at the Johns Hopkins Medical Institute and the Kennedy Krieger Institute, where my research and clinical programs are integrated and use multivariate platforms to diagnose rare genetic conditions. In my research program, I place importance in collaborative efforts, which has translated to my clinical research on Osteogenesis Imperfecta, as I am currently a site PI for the multi-site, NIH-funded Brittle Bone Disorders Consortium. In my clinical practice, and as the Director of the Bone and Osteogenesis Imperfecta Clinic at the Kennedy Krieger Institute, I diagnose and treat patients who have rare skeletal disorders. The skills I learned in the NIH Oxford Scholars program not only developed me into a scientist, but allow me to provide an analytical and balanced approach to diagnosis and treatment of rare genetic disorders.

Dr. Mahim Jain

Greetings from the OxCam Office! We are looking forward to seeing everyone at the upcoming Annual Workshop hosted by the University of Cambridge at Homerton College in July. The Workshop sessions will include The Future of Industry-Academic Collaborations, Publishing Science, and Public and Patient Involvement. The OxCam Class of 2018 will be joining us, so please be sure to welcome them!

Don’t forget the GPP application portal opens in August 2018 for Fall 2019 enrollment. If you have any contacts who would be interested in an outstanding dual-mentored international collaboration for their PhD research, please point them in our direction: https://oxcam.gpp.nih.gov.

Current students and mentors, quick reminder, Progress Reports will be due September 1st (details will be sent in early July). Best of luck to those of you who are finishing up and preparing for your viva. Please send us some of your graduation photos for our Facebook page (facebook.com/NIHOxCam).

I would also like to take this opportunity to formally welcome Lauren Adams, Program Analyst, and Ashley Moore, Program Support Specialist, to the OxCam Administrative Team. You can find our contact details on the OxCam website or in NED.

Katie Soucy