Training Future Rock Stars  

(Continued from front)

clinical or research oncology by challenging them to think critically in a hands-on laboratory environment. Synthesis of data through analytical reasoning is reinforced rather than memorization of facts.

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With the opening of our new building, we hope to expand the program to accommodate more students and incorporate groundbreaking models like the training examples. Our passion for training future rock stars will never cease – it will multiply. If you have any questions regarding the program, or would like to participate, please do not hesitate to contact us.

New Faces

Dr. Reggie Hill joins us as a new faculty member from the University of Notre Dame. His research focuses on understanding how the multitude of cells surrounding pancreatic cancer cells can cause resistance to therapy. He also works with engineers to develop ways to detect pancreatic cancer at an earlier stage where surgical intervention is still possible. Outside of the lab, Reggie considers himself a film buff and enjoys science fiction movies.

Mary Duan joins the clinic as our second Physician Associate. Mary has worked in oncology for over 17 years. Mary finds oncology an exciting and rewarding field due to the ever improving medicines and therapies. Mary is passionate about giving her patients hope. Outside of the clinic, Mary enjoys spending time with her husband, two sons, and their dog, Abby.

Katrina Barron joins us as our Director of Development. Most recently, Katrina was the Manager of Donor Stewardship at Memorial Sloan Kettering Cancer Center in New York. Prior to that, she worked at UCLA as an Associate Director of Development in the Alumni Scholarships Program. Outside of work, Katrina enjoys listening to podcasts, baking, and spending time with her family.

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REBELS

Doctor’s Notes

From the Desk of David B. Agus, MD

Dear Friends,

On behalf of everyone at the Ellison Institute, I want to wish you all a happy and healthy holiday season and New Year. We here at the Ellison Institute are especially grateful for our new building, which is slated to be completed in Spring of 2019. We look forward to sharing it with you very soon!

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As I reflect on this exciting year for the Ellison Institute, I am thankful to our partners and collaborators for contributing their expertise in our fight against cancer. I am thankful for the countless hours that our scientists and faculty have dedicated to research for our cause. Most of all, I am especially thankful to you, my patients, friends, and supporters, who continue to believe and support the vital work we do. Because of you and your support, the Lawrence J. Ellison Institute for Transformative Medicine of USC is able to make a difference in research and treatment and goes hope to us all.

Training Future Rock Stars

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Ellison Institute and Agilent Technologies Join Forces to Reimagine Cancer and Wellness

The Ellison Institute is thrilled to announce an exciting multi-year partnership with Agilent Technologies. After an extensive planning phase, we launched two pathbreaking collaborative research projects. One has great potential to change how cancer is visualized, diagnosed and treated in the future and the other, how we define the healthy state of individuals.

**Seeing is Believing**

For hundreds of years, the pathologist’s worldview has been in 2D. Tumors are biopsied, tissue samples fixed and stained, and viewed under the microscope. Imagine what we are missing by not being able to see the tumor and surrounding tissue as it exists in the body—in 3D. We aim to answer this crucial question.

Today, 3D tissue imaging and analysis are not the norm in research or clinical diagnostics, primarily due to technical difficulty in constructing 3D tissue models in the lab and the need for sophisticated computer-learning programs to generate artificial tissue from a tissue block (Agilent).

As we shrink in scale from the pathologist’s world of tissues and cells, we enter the realm in which we can interrogate the intricate, real-world 3D tumor models. These breakthroughs in machine learning may be the key. This technology now enables self-driving cars, language translation, and Netflix movie recommendations. Machine learning is particularly good at interpreting large, complex images, much as pathologists do to diagnose cancer by looking at tissue under the microscope. We believe that detailed tumor structure contains additional information about the best therapy choice than can be discerned by the pathologist’s eye. In September 2018, the Ellison Institute for Cancer Research Foundation (BCRF) was awarded a grant to the Ellison Institute to determine whether machine learning can accurately interpret breast cancer images to predict which patients will benefit most from particular therapies.

**Cancer is a devastating disease that changes many aspects of a cell and its surrounding environment; metabolism may play a major role in the early detection and diagnosis of cancer and in the course of therapies.**

**UPDATE:** The Resolution Revolution: The Ellison Institute’s Collaboration with the Translational Imaging Center of USC and Olympus

Last year, we announced the exciting launch of our multi-year USC-Olympus Innovation Partnership in multi-scale bioimaging. We are thrilled to share this update.

The ultimate aim of the Ellison Institute-led collaboration is to implement the world’s premier, multi-scale bioimaging program within our new, state-of-the-art home in West Los Angeles.

To this end, in collaboration with the Translational Imaging Center of USC and Olympus, we have embarked upon four breakthrough pilot projects. First, we are reconceiving Olympus’s award-winning endoscope with enhanced FLIM (fluorescence-lifetime imaging microscopy) tools to produce a multi-modal instrument capable of determining clinically relevant tissue states from fresh biopsy. Second, we are designing new drug screening assays compatible with high-resolution, live-cell imaging microscopy and an active feedback system for image optimization. Third, we are transforming Olympus’s flagship confocal microscope into a new, fully contained, automated, high-throughput 3D/4D imaging system capable of delivering drugs. Lastly, we are producing a new clinical decision support platform, built upon the latest lightsheet microscopy, capable of measuring the dynamic responses of living, 3D tumor explants in drug screens to predict best treatment strategies. Taken together, these pilot projects form the foundation of a new pioneering, multi-scale bioimaging center.

Multi-scale imaging is critical to increase our understanding of cancer biology, the tumor microenvironment, and especially individualized responses to drug screens using a patient’s live tumor cells.

Cancer is a complex disease and patients’ tumors are rarely exactly alike. A treatment that works for one patient may not work for another, so developing and providing tools to determine the effectiveness of anti-cancer compounds tailored to an individual patient is an important part of precision medicine.

The USC-Olympus Innovation Partnership is working to demonstrate the clinical relevance of new technologies that combine the workflow of a surgical biopsy and primary diagnosis with microscopic cellular and molecular characterization, resulting in personalized medicine and treatment selection to advance cancer research and improve patient diagnosis.

Ellison Institute Receives BCRF Funding to Improve Breast Cancer Treatment through Machine Learning

Too often cancer patients don’t receive their best therapy option. The problem is we don’t know for sure which treatment will provide the greatest benefit to a particular patient. One approach is to integrate in vitro drug screens with new imaging technologies to help warrant their use, they often fall short. For example, 35% of breast cancer patients with HER2-positive breast cancer won’t respond to Herceptin. And 60% of melanoma patients who are given the immunotherapy drug Opdivo won’t benefit. These patients might have instead benefited from other therapies. How can we do better?

Recent breakthroughs in machine learning may be the key.

**Figure 1:** H&E (left) and molecular marker (right) stained breast cancer showing cancer-cell nests (upper left corner, green in right image; orange cell outlines indicate dark region, pink in right image), and collagen (right side, black in right image). This work is supported by Grant Award ID BCRF-18-002 from the Breast Cancer Research Foundation.
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Join the fight against cancer!

Every gift matters in the fight against cancer. By supporting the Ellison Institute, you will help us continue to fight this disease and significantly benefit the lives of those battling cancer today. Simply fill out the enclosed envelope to donate to the Lawrence J. Ellison Institute for Transformative Medicine of USC or visit our website at ellison.usc.edu/donate. Contact Katrina Barron at 310-601-3352 or BarronK@usc.edu for more information.

Lawrence J. Ellison Institute for Transformative Medicine of USC

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