



Photos By: Bryce Duffy

Dear Friends and Supporters,

As we continue to expand our research and clinical teams, we remain encouraged about continued progress in the field. I am thrilled to announce a new program within the Center for Applied Molecular Medicine (CAMM) to better understand the genetic makeup of cancer. In keeping with our philosophy that more data matters in personalized treatment, this program will use exciting new technologies to profile a patient's cancer as well as analyze the patient as a whole. Furthermore, the program will launch a collaborative endeavor with Thermo Fisher Scientific to use next-generation genetic sequencing technology together with cutting-edge analytics. Along with other novel measurements we are employing, we hope to learn from each patient experience and their tumor response to therapy. Such information will help improve not only the care of that patient, but also the care of future patients. This program aims to answer key questions like: *Is every cancer cell in a patient the same? How does the cancer evolve over time? What is the best way to use genetic information to help guide patient care?* In our next newsletter, we will share more details about this ambitious new venture.

I wish to thank my team, patients and generous donors for your vital help in establishing this Program and for your ongoing commitment to overcome this deadly disease. Because of your efforts, cancer care is changing. Revolutionary technology is allowing us to target and treat each patient uniquely. I am enthusiastic and optimistic about these innovative developments, some of which are described in this newsletter.

As always, thanks for being a part of our team.

With respect,



David B. Agus, MD

Keck School of
Medicine of USC

What is Big Data?

Spotlight on Naim Matasci, PhD

Big Data. It's hard to pick up a magazine without seeing it mentioned. But what is Big Data and why is it important for cancer researchers? Big Data is not so much about the mere size of a collection of data as it is about the complexity of that dataset. Everyday tools like Microsoft Excel simply can't cope with the richness of the data and their multidimensional relationships. Just as online retailers such as Amazon collect data about what we order, our browsing history and social profiles to present us with surprisingly accurate personalized recommendations, here at CAMM we generate complex, multifaceted cancer datasets that can lead to personalized therapies.

This complexity comes from combining many different types of data, all referring to a common subject, like tumor samples. For cancer researchers, these might include high-resolution images of cancer cells, deep proteomic assays and gigabytes of genetic sequences. The main challenge we face with Big Data is enabling researchers to understand them by creating an intuitive "picture" from this great diversity of sources. We at CAMM believe this integration will be essential for understanding the mechanisms of cancer and finding new cures.



As the Director of Data Management and Analytics, Dr. Naim Matasci helps clinicians and researchers to organize, store, analyze and visualize their complicated data with the goal of obtaining new insights. A particularly important recent development is CAMM's ability to obtain comprehensive genetic information from patient samples in less than a day. Together with Drs. Rudeman, Gross and Patsch, Dr. Matasci is using this technology to understand the dynamics of tumor growth and to develop methods for early cancer detection from an everyday blood draw.

Prior to joining CAMM, Dr. Matasci gained extensive expertise in the management and analysis of Big Data while working on a large-scale project developing computational infrastructure for the life sciences. He is originally from the southern part of Switzerland and grew up speaking Italian. He lives in Claremont with his wife, their nine-month-old daughter and dog. In his free time he likes to hike, work in the garden and change diapers (he doesn't really like the latter, but spends a significant amount of time doing it).

GIVE A GIFT! You can help support our team and our ongoing cancer research at WCC & CAMM. Simply return the enclosed envelope, call 310-272-7640, or visit: <http://keck.usc.edu/donateWCC>

Our team thanks you in advance! Your generosity means so much!
To opt out of future CAMM/WCC mailings, please email wcc@med.usc.edu

Merging Experiments and Simulations with a Data Language

by: Paul Macklin, PhD

Imagine that your doctor presents you with a digital version of your cancer cells on a computer screen. As the cells begin to fade from the screen, your doctor explains that this is a simulation of your cancer responding to a new therapy. Using your virtual tumor response as a guide, the doctor suggests this is the most effective treatment for you today.

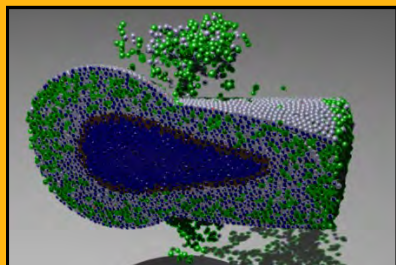
The determined researchers at CAMM are currently making great strides toward this vision. Just as laboratory scientists use living cancer cell lines to study cancer and test new drugs, we plan to use digital cell lines in virtual patient experiments. To help make this a reality, we are developing tools to create digital cell lines using state-of-the-art experiments and measurements collected at CAMM and WCC.

While scientists and clinicians are able to measure the properties of cancer with more detail and precision than ever before, computer models cannot yet use this information to simulate treatments. In the same way that PCs were once unable to read documents from Macs, digital models are currently unable to use datasets collected from patients and laboratory experiments because they have incompatible formats. Thanks in part to a grant by the Breast Cancer Research Foundation, CAMM is creating a new data language (MultiCellDS: Multicellular Data Standard) to help solve this problem. MultiCellDS will enable disparate data formats to be reconciled into one processing system, allowing computer models to apply this critical information to their simulations. The new language will help computer modelers, biologists and clinicians share and combine measurements and predictions.

Ultimately, we aspire to develop digital cancer cells as described in the scenario above, using real-time patient analysis to create a virtual cancer model and therapy strategy personalized to each patient. The new language of MultiCellDS is one critical step in this ambitious and exciting project.

To learn more, please visit MultiCellDS.org and MathCancer.org.

One day, 3-D computer models like this one will read each patient's data, simulate many possible treatments, and help choose the best plan for the patient's needs.



Future Rock Stars of Science by: Kian Kani, PhD



2014 Jr. Fellows visit the WCC lab

Over the past five years, the Center for Applied Molecular Medicine (CAMM) has recruited talented and motivated high school students to partake in our Jr. Fellows program. The goal of the program is to immerse Jr.

Fellows in an intellectually rich environment that highlights the challenges facing medical oncologist and researchers today. This year, five outstanding Fellows spent three weeks at the CAMM laboratories learning to integrate disparate techniques ranging from mathematical modeling, physics, proteomics and molecular biology to cancer research. Their assignment was to develop a treatment strategy for a mock patient based on his genetic disposition to therapy response. The Jr. Fellows were given a private tour of the Westside Cancer Center (WCC) and were exposed to various aspects of clinical medicine with the WCC nurses, clinical coordinators, administrative staff and Drs. Gross and Agus.

We are very proud of this year's Jr. Fellows class and will follow their progress enthusiastically. Visit our CAMM website for a detailed list of our graduates. Potential future rock stars of science can apply beginning in February 2015, with a start date in early June 2015. For additional program details, contact:



Dr. Kani & the 2014 Jr. Fellow Grads

Dr. Kani: kani@usc.edu
or visit us at: <http://keck.usc.edu/research/jrfellow>

WCC Welcomes Kelly Santoro

Physician Assistant



Kelly Santoro joined the USC Westside Cancer Center team in September as a Physician Assistant. Kelly was born in Houston, TX, and spent her childhood overseas in Singapore and graduated from the Singapore American School in 2004. She then attended Arizona State University, where she met her husband, Scott, and graduated summa cum laude with a bachelor's degree in biological sciences and a minor in Spanish. After working as an EMT for one year in Los Angeles, she attended the Physician Assistant program at Yale University, composing an honors thesis on distress in lung cancer radiotherapy patients. Kelly then moved to Pittsburgh, PA, where her husband was completing dental school at the University of Pittsburgh. There, she worked at the University of Pittsburgh Medical Center for 2.5 years in hematologic malignancies. Kelly and Scott relocated to Los Angeles this summer to be closer to family. She enjoys traveling, photography, swimming, cycling and the outdoors. Kelly is honored to be a part of CAMM, WCC and the Trojan Family.

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