



USC Center for Applied Molecular Medicine and USC Westside Cancer Center



From left, Dr. Mitchell Gross, Dr. David Agus and Dr. Jonathan Katz

Camm Update

by Dr. Jonathan Katz

Since our last update, we have had many exciting developments within the CAMM research group. One of the difficulties in fighting cancer is that, in spite of similarities in appearance or tumor origin, the underlying cellular aberrations can vary tremendously, even within a single patient. Recognizing this, we have been focusing our efforts on novel methods of diagnosis and disease classification that treats each patient's disease as unique -- even to the point of examining a disease at the single cell level.

In the past year we have seen explosive growth in our projects in the physical sciences. In collaborations with MIT and the Viterbi School of Engineering here at USC, we have two projects that combine expertise in physics and engineering along with medicine. Using the single-cell analysis platform put into production here by Dr. Maryann Vogel-sang, Dr. Shannon Mumenthaler has been guiding a project using nanofluidics and rapid image processing technology to develop a process in which a collection of single cells can be isolated from a biological sample and directly analyzed. By incorporating a dual-laser based optical cell manipulator, we have added the ability to trap cells, apply force, and directly measure their plasticity and elasticity. This allows us to see, very rapidly, if a particular drug has an effect on the properties of the individual cells that make up a tumor. Next, CAMM has been working under the direction of Dr. Mitchell Gross to develop a medical device that can characterize the molecular status of living tissues. Using micro-scale ultrasound and electronic sensors ("silicon chips"), we can examine and affect cells in a very small area. At low energies, we can use the device with a microscopic acoustic

Dear Friends,

This has been a mixed year for the USC Center for Applied Molecular Medicine and the USC Westside Cancer Center. We have had one of our most exciting years in terms of scientific progress, but, UNFORTUNATELY STILL lost the fight against cancer with several of our patients. We need to do much better in this war against this awful foe.

We are honored to continue to work in the fight against cancer alongside our patients. You will see in the CAMM Update some of the advances of the Center. We need to do more, and I am asking for your help. Please help us continue to advance the fight.

I wrote a book that is coming out January 17 (*THE END OF ILLNESS*, Free Press – Simon and Schuster) detailing my beliefs in a new way to approach health. There is an adage, "In order to understand peace, you have to go to war." The more than two decades I have spent fighting cancer on the front lines has led me to a new understanding of general health. The work searching for better treatments to combat this ravaging disease has led me to new understanding about what it means for each of us to be healthy—and how to achieve it. As a result, I present a new paradigm for examining and caring for the human body, which honors our bodies as complex, whole systems, rather than focusing on a single issue – such as a genetic mutation, a germ, a deficiency or a number such as blood pressure, weight, or cholesterol. This systemic viewpoint is what has allowed me to challenge long-held beliefs and dismantle misperceptions about what "health" really means. I would be honored to hear your opinions on the book and am excited for you to read it.

Please help us continue the fight. **Fight on!**

With respect and gratitude,



David B. Agus, MD

**THE END
of
ILLNESS**



David B. Agus, MD

Visit this website for health
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USC Westside Cancer Center

The USC Norris Westside Cancer Center (WCC) offers the most cutting-edge cancer treatment options available for men diagnosed with prostate cancer from some of the nation's most respected, recognized and knowledgeable doctors in the field of medical oncology. The Center is advancing the clinical care of prostate cancer through the latest biomedical research, personalized medicine and clinical trials. WCC's personalized medicine means not only treating a patient's individual *disease*, but also treating the individual *patient*. WCC recognizes that each patient is different both biologically and emotionally. This recognition helps guide the doctors in creating unique treatment solutions for each individual. The WCC is closely tied with the USC Center for Applied Molecular Medicine in order to use current molecular technologies to help care for patients with cancer.



From left, *Justine Socia, NP*, *Dr. David Agus* & *Dr. Mitchell Gross*

How can you help?

In today's economic environment, federal cancer research funding is in jeopardy, and at the same time, requests for support continue to increase. Now more than ever, CAMM needs your assistance in order for us to make an impact on this terrible disease. To make a donation to CAMM please visit us at www.doctorsofusc.com/wcc_donate or use the enclosed envelope to mail in your donation to the USC Westside Cancer Center. Thank you in advance, your generosity is greatly appreciated.

Spotlight on Dr. Jonathan Katz



Dr. Jonathan Katz is an Assistant Professor of Medicine at USC and the Director of Operations at the Center for Applied Molecular Medicine. In this capacity he oversees the operations of the mass spectrometry facility, clinical and experimental sample preparation, protocol development and data management. His primary research interests are in creating better clinical diagnostics that can help guide disease management decisions. Using his experience with Fourier-transform mass spectrometry, complex sample processing and molecular profiling, he has developed high-throughput techniques that produce informative, very high resolution, multidimensional mass spectral profiles; by interrogating these profiles, we are discovering the molecular fingerprints of biological state, clinical outcome and the underlying biochemical processes associated with cancer progression and management. Dr. Katz is an occasional performer at the Magic Castle as well as an avid, but poor, ukulele player.

CAMM Update *continued*

beam. Ultimately, we would like to incorporate these microprobes into existing medical devices that are used in minimally invasive surgery; such tools would become "smart scalpels" that would enable a surgeon to make more accurate and controlled incisions. These projects are excellent examples of how we are able to utilize our expertise in the physical sciences to advance the practice of medicine.

Our center has also been aggressive in our continuing research to identify protein biomarkers which are predictive of treatment response or indicators of therapeutic effectiveness. One of our success stories was guided by Dr. Kian Kani. He has been performing quantitative proteomic profiling of prostate tissue in order to identify novel proteins which may be used to monitor cancer progression. In one of the most ambitious proteomics experiments to date, we were able to hone in on several very promising proteins. A confluence of exciting laboratory and patient-based research has led us to one particular protein biomarker. We have identified that this biomarker is elevated in the blood and in circulating tumor cells in patients with advanced forms of prostate cancer. Currently, we are exploring how this marker may help us predict the effectiveness of standard therapies for prostate cancer, such as surgery or chemotherapy, and may help identify a subset of prostate cancer patients who should receive specialized forms of therapy. Further, other studies are exploring how this marker changes in aggressive forms of human prostate cancer modeled in the laboratory. We are currently compiling all this data to be used in several manuscripts headed for publication.



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