Building Updates

- Construction on our new building is going very well and we are close to completion. It’s exciting to see the building come together as we are gearing up for the opening this fall.

- We’ve begun to gather historical and scientific artifacts – antecedents to the research that directly influences our science in the building. We have partnered with institutions around the world to create meaningful exhibition space for visitors to enjoy.

- Our HOPE sculpture, by renowned artist Robert Indiana, safely arrived and will be in the heart of the new building. The sculpture is a meaningful reminder of what inspires our faculty, researchers, clinicians, and staff every day.

New Faces

Dr. Maryann Vogelsang returns to our team as our Director of Strategic Scientific Initiatives. She brings with her over a decade of pre-clinical and clinical proteomics experience and diagnostic test development. Most recently, Dr. Vogelsang led the research operations and assay development teams at NantOmics in Rockville, MD. Long before that, she was a member of the Trojan family at the Center for Applied Molecular Medicine, and is happy to be back home. Maryann is responsible for the integration of external collaborations, institutional program management, and the development of our interdisciplinary mentorship program. Outside of the office, Dr. Vogelsang enjoys exploring nature and visiting museums with her family. She was an avid beach volleyball player and looks forward to introducing her girls to the sport.

Dear Friends,

This summer has been an exciting one at the Lawrence J. Ellison Institute for Transformative Medicine of USC. This will be the last newsletter before our move into our new 80,000 square foot building in Los Angeles. The preparation for this move has been years in the making and is truly a dream fulfilled. Our doctors, nurses, scientists, and staff have all been influential in creating a place where patients and visitors can learn about healthcare from a new point of view, and we can dramatically impact the way we research and treat cancer patients.

One of the hallmarks of the Ellison Institute is our focus on collaboration, both within and outside the traditional realms of cancer research. Our goal is to attack cancer from every angle – whether it be collaborating with physicists, mathematicians, or economists. The Ellison Institute is proud to have a consortium of leading experts, such as our Ellison Institute Members and Visiting Scholars, who come from areas across USC and the nation to collaborate within our Institute. Many of these collaborations have already produced significant discoveries as you will read in this season’s newsletter on page 2. Our hope is that these partnerships will garner new insights and create valuable discussions around cancer and approaching this disease.

I also recently had the honor of co-chairing the 2019 FORTUNE Brainstorm Health Conference in San Diego along with Arianna Huffington and Clifton Leaf. FORTUNE Brainstorm Health gatherings not only leaders of top companies, hospitals, insurers, and cutting-edge pharma and biotech companies, but also titans of venture capital, tech, telecom, and other industries, all of whom are rapidly changing the face of healthcare. The aim of this conference is not only to push boundaries in each of these areas, but also to show how businesses, both established and new, can lead the way. I had enlightening conversations with these industry leaders and learned of technologies that can move people to better behavior – and better health. It was also powerful to learn of ways we can best harness the power of business to improve health’s bottom line. We look forward to hosting conversations such as these as a part of our community engagement initiatives in our new building – be on the lookout for events focusing on cancer research developments, health, wellness and more.

“Our goal is to attack cancer from every angle – whether it be collaborating with physicists, mathematicians, or economists.”

David Agus, M.D.

We had a major loss this month at the Ellison Institute as our member scientist Murray Gell-Mann passed away at the age of 89. He was the first recipient of our Rebels With a Cause award at our inaugural event in 2012. Murray, one of the greatest physicists of his generation, influenced my thinking of cancer in a profound way. I was privileged to work by his side in the war on cancer. I will always remember his wit, charm, and intellect. A memorial in the new building will follow.

There is much more on the horizon in the coming months and I look forward to sharing these developments with you over the next year. As always, I ask that you consider helping to fund progress and speed development at the Ellison Institute so that patients can benefit soon. I hope to work with each of you to continue to make a difference today in the lives of those struggling with cancer. Thank you for being a part of our mission and journey!

With respect,

David B. Agus, M.D.
Professor of Medicine and Engineering
Founding Director and CEO, Lawrence J. Ellison Institute for Transformative Medicine
University of Southern California
t the Ellison Institute, we believe the fastest way to significantly reduce cancer occurrence is to increase collaborative efforts within the research and medical communities, beginning here at USC. We are incredibly excited to share news of our collaboration with the USC Center for Drug Discovery, which is being led by renowned medicinal chemist and professor of chemistry and pharmaceutical sciences, Dr. Charles McKenna. McKenna’s team of chemists is collaborating with Ellison Institute’s interdisciplinary team of biologists, biochemists, biophysicists, engineers, and clinicians to design, develop, and ultimately bring to market better and safer anti-cancer drugs.

We are off to a tremendous start with a potentially groundbreaking discovery, which has the potential to revolutionize prostate cancer treatment. Prostate cancer cells rely on the androgen receptor (AR) to thrive. In healthy men, AR is regulated by the hormone testosterone. But in advanced, “castration-resistant” prostate cancer, AR has found a way to promote tumor growth without the hormone. Such patients initially respond to antiandrogen drugs, like enzalutamide (Xtandi), that block AR. But treatment can have serious side-effects, and tumors eventually become resistant to existing agents.

Our goal is to develop new antiandrogen drugs to extend survival. While testing compounds’ potential to block AR, we discovered a surprising phenomenon: a class of antiandrogens can act as both AR inhibitors and activators. This goes against our current understanding of how the AR works. We hope to piece together a better model of AR function, one which will indicate new ways to target the molecule. Along those lines, we are currently testing a promising set of new compounds with robust AR-blocking activity and predicted low toxicity. McKenna added, “In finding more effective answers to the challenge of cancer, innovative ideas are paramount and unexpected discoveries can hold out the promise of significant advances. I am thrilled by the opportunity to partner with the world class Agus team at Ellison Institute on this and other initiatives to find better answers to cancer, including faster translation of drug discoveries to the clinic.”

McKenna is one of ten founding Ellison Institute Members. Launched in fall 2018, the Ellison Institute Members program brings together world-leading researchers and clinicians to drive translational research and reinvent clinical care for patients in the modern era of molecular-driven medicine. “Charles McKenna and the other founding institute members join me and my team during an exciting time. We are pleased to grow our infrastructure and administrative leadership teams, and forging new collaborations. By working together, we will change the way we treat and prevent cancer,” said Dr. Agus.

The funds will be divided equally between Finley, Mumenthaler, and a third researcher, Paul Macklin, Ph.D., an associate professor at the Indiana University School of Informatics, Computing, and Engineering, and an Ellison Institute alumnus. This award will support their research in the use of computer simulations to understand the complex cellular interactions that fuel the growth and spread of tumors in the body. Their research focuses on colorectal cancer, which is the third-leading cause of cancer death in men and women in the country, with about 90 percent of those diagnosed with metastatic disease dying from the disease.

Dr. Finley, an assistant professor at USC’s Department of Biomedical Engineering, is building mathematical models to predict the metabolism in cancer cells and fibroblasts – cells that support and interact with these cancerous cells. The team will then be able to run simulations and test hypotheses about how structures and molecules inside a cell interact during tumor formation and spread.

This phase will take place inside “mini-organs,” called organoids, created in Dr. Mumenthaler’s lab at the Ellison Institute. The use of organoids is an increasingly popular method in biomedical research that allows scientists to safely experiment on highly accurate tissue types without risking the health of patients.

“My models of intracellular metabolism are embedded in PhysCell, where Macklin will perform hundreds of simulations to identify how the overall growth of the tumor can be halted,” Finley explained. “Finally, within 3 years, we will test the model predictions about the most promising candidates for inhibiting tumor growth in the realistic experimental models of tumor growth that Dr. Mumenthaler’s lab builds.”

If the simulations suggest a specific compound may reduce tumor growth, the organoids will also allow the researchers to try it on real cells — both in a few select cases.

“The big advantage of conducting research in a computerized environment is you can afford to fail.” Dr. Paul Macklin

“The big advantage of conducting research in a computerized environment is you can afford to fail.” Dr. Paul Macklin

Dr. Seth Seabury, Dr. Jerry Lee, and Dr. Mayada Aljehani          Photo Credit: Chris Shinn

Analyzing this test population from the DoD has given us new information that can affect millions of Americans. More than 80% of U.S. cancer patients are initially diagnosed and treated in a community hospital setting similar to some DoD military treatment facilities. Given the rapid adoption of therapies within community cancer centers, it will be critical to understand the interplay between cancer and treatment characteristics, the affordability of care, and the results from that care. With this multidisciplinary approach, Dr. Lee and the Ellison Institute will continue to be at the forefront of understanding how these trends drive access to care and patient outcomes.

A New Partnership with the Department of Defense Brings Insight Into Patient Costs

The Ellison Institute, in collaboration with teams around USC, is currently using a novel approach by combining tools from health economics and engineering to better understand the relationship between characteristics of a patient’s cancer and the implications it may have on the overall cost and value of care. Dr. Jerry Lee, the Ellison Institute’s Chief Scientific and Innovation Officer, has helped the U.S. Department of Defense (DoD) and Department of Veterans Affairs build a national effort to assess the adoption of new approaches and technologies into real-world settings. To further his work, Dr. Lee has initiated a new partnership to analyze data of cancer patients from the military health system — a network that serves around 9 million beneficiaries.

To explore and validate new insights from this data, Dr. Lee is working with Ellison Institute Member Dr. Dana Goldman, the Leonard D. Schaeffer Director’s Chair at the Schaeffer Center for Health Policy & Economics of USC, and Seth Seabury, Associate Professor, Department of Pharmaceutical and Health Economics, to examine the contributing factors for the wide range of costs and outcomes of cancer treatments. The DoD data obtained for these studies features patient populations that were treated for a variety of cancers between 2014 and 2016. Lee has been able to see patterns not just by cancer, but also by specific tumor characteristics (with the goal of gathering similar patients within these sets). Researchers then studied these sets’ treatment paths both within and outside the military treatment facilities.

Dr. Lee and his collaborators have already discovered inconsistencies in cost within each cancer and tumor type, with some cohorts of patients paying millions of dollars more for treatment for the same type of cancer diagnosis. This information becomes more valuable over time as they begin to see the health outcomes of these patients – ultimately bringing us to the question of value. Does the cost associated with a DoD beneficiary receiving care at an academic medical center, as opposed to a military treatment facility, result in different outcomes? Our teams aim to reveal these insights as we continue to follow these patient cohorts with our DoD collaborators.

$3.1 Million NCI Grant Supports Computer Simulations for New Cancer Treatments

Cancer cells are characterized by continuous, unchecked growth. One hypothesis suggests this may be due in part to their more effective use of nutrients, like sugars and oxygen. With a new $3.1 million grant from the National Cancer Institute, Ellison Institute Professor Shannon Mumenthaler, Ph.D., and Ellison Institute Member Stacey Finley, Ph.D., hope to explain why this occurs and determine how to stop cancer growth.

The funds will be divided equally between Finley, Mumenthaler, and a third researcher, Paul Macklin, Ph.D., an associate professor at the Indiana University School of Informatics, Computing, and Engineering, and an Ellison Institute alumnus. This award will support their research in the use of computer simulations to computationally explore the complex cellular interactions that fuel the growth and spread of tumors in the body. Their research focuses on colorectal cancer, which is the third-leading cause of cancer death in men and women in the country, with about 90 percent of those diagnosed with metastatic disease dying from the disease.

Dr. Finley, an assistant professor at USC’s Department of Biomedical Engineering, is building mathematical models to predict the metabolism in cancer cells and fibroblasts – cells that support and interact with these cancerous cells. The team will then be able to run simulations and test hypotheses about how structures and molecules inside a cell interact during tumor formation and spread.

This phase will take place inside “mini-organs,” called organoids, created in Dr. Mumenthaler’s lab at the Ellison Institute. The use of organoids is an increasingly popular method in biomedical research that allows scientists to safely experiment on highly accurate tissue types without risking the health of patients.

“My models of intracellular metabolism are embedded in PhysCell, where Macklin will perform hundreds of simulations to identify how the overall growth of the tumor can be halted,” Finley explained. “Finally, within 3 years, we will test the model predictions about the most promising candidates for inhibiting tumor growth in the realistic experimental models of tumor growth that Dr. Mumenthaler’s lab builds.”

If the simulations suggest a specific compound may reduce tumor growth, the organoids will also allow the researchers to try it on real cells — both in a few select cases.

“The big advantage of conducting research in a computerized environment is you can afford to fail.” Dr. Paul Macklin

“The big advantage of conducting research in a computerized environment is you can afford to fail.” Dr. Paul Macklin

$3.1 Million NCI Grant Supports Computer Simulations for New Cancer Treatments

Cancer cells are characterized by continuous, unchecked growth. One hypothesis suggests this may be due in part to their more effective use of nutrients, like sugars and oxygen. With a new $3.1 million grant from the National Cancer Institute, Ellison Institute Professor Shannon Mumenthaler, Ph.D., and Ellison Institute Member Stacey Finley, Ph.D., hope to explain why this occurs and determine how to stop cancer growth.

The funds will be divided equally between Finley, Mumenthaler, and a third researcher, Paul Macklin, Ph.D., an associate professor at the Indiana University School of Informatics, Computing, and Engineering, and an Ellison Institute alumnus. This award will support their research in the use of computer simulations to computationally explore the complex cellular interactions that fuel the growth and spread of tumors in the body. Their research focuses on colorectal cancer, which is the third-leading cause of cancer death in men and women in the country, with about 90 percent of those diagnosed with metastatic disease dying from the disease.

Dr. Finley, an assistant professor at USC’s Department of Biomedical Engineering, is building mathematical models to predict the metabolism in cancer cells and fibroblasts – cells that support and interact with these cancerous cells. The team will then be able to run simulations and test hypotheses about how structures and molecules inside a cell interact during tumor formation and spread.

This phase will take place inside “mini-organs,” called organoids, created in Dr. Mumenthaler’s lab at the Ellison Institute. The use of organoids is an increasingly popular method in biomedical research that allows scientists to safely experiment on highly accurate tissue types without risking the health of patients.

“My models of intracellular metabolism are embedded in PhysCell, where Macklin will perform hundreds of simulations to identify how the overall growth of the tumor can be halted,” Finley explained. “Finally, within 3 years, we will test the model predictions about the most promising candidates for inhibiting tumor growth in the realistic experimental models of tumor growth that Dr. Mumenthaler’s lab builds.”

If the simulations suggest a specific compound may reduce tumor growth, the organoids will also allow the researchers to try it on real cells — both in a few select cases.

“The big advantage of conducting research in a computerized environment is you can afford to fail,” Macklin said. “By comparison, lab research is extremely expensive in terms of time and money.”

He added: “If you’ve got the freedom to experiment, you can really narrow your ideas down until you’re spending your experimental budget on the most promising ideas. You’re not trying to go all the way to a clinical trial phase and then failing after spending millions or billions of dollars.”

“We’re combining mathematical models with experimental data to computationally explore the most promising strategies,” agreed Mumenthaler.

 ElementRef
Joining Forces to Advance Cancer Drug Discovery at Ellison

A New Partnership with the Department of Defense Brings Insight Into Patient Costs

The Ellison Institute, in collaboration with teams around USC, is currently using a novel approach by combining tools from health economics and engineering to better understand the relationship between characteristics of a patient’s cancer and the implications it may have on the overall cost and value of care. Dr. Jerry Lee, the Ellison Institute’s Chief Scientific and Innovation Officer, has helped the U.S. Department of Defense (DoD) and Department of Veterans Affairs build a national effort to assess the adoption of new approaches and technologies into real-world settings.

To develop and evaluate new insights from this data, Dr. Lee is working with Ellison Institute Member Dr. Dana Goldman, the Leonard D. Schaeffer Director’s Chair at the Schaeffer Center for Health Policy & Economics of USC, and Dr. Seth Seabury, Associate Professor, Department of Pharmaceutical and Health Economics, to examine the contributing factors for the wide range of costs and outcomes of cancer treatments.

Funding from the DoD data obtained for these studies features patient populations that were treated for a variety of cancers between 2006-2018. We were able to create a comprehensive patient not just by cancer, but also by specific tumor characteristics (with the goal of gathering similar patients within these sets). Researchers then studied these sets’ treatment pathways both within and outside the military treatment facilities.

Dr. Lee and his collaborators have already discovered inconsistencies in cost within each cancer and tumor type, with some cohorts of patients paying millions of dollars more for treatment for the same type of cancer diagnosis. This information becomes more valuable over time as they begin to see the health outcomes of these patients – ultimately bringing us to the question of value. Does the cost associated with a DoD beneficiary receiving care at an academic medical center, as opposed to a military treatment facility, result in different outcomes? Our teams aim to reveal these insights as we continue to follow these patient cohorts with our DoD collaborators.

$3.1 Million NCI Grant Supports Computer Simulations for New Cancer Treatments

Cancer cells are characterized by continuous, unchecked growth. One hypothesis suggests this may be due in part to their more effective use of nutrients, like sugars and oxygen. With a new $3.1 million grant from the National Cancer Institute, Ellison Institute Professor Shannon Mumenthaler, Ph.D., and Ellison Institute Member Stacey Finley, Ph.D., hope to explain why this occurs and determine how to stop cancer growth.

The funds will be divided equally between Finley, Mumenthaler, and a third researcher, Paul Macklin, Ph.D., an associate professor at the Indiana University School of Informatics, Computing, and Engineering, and an Ellison Institute alumnus. This award will support their research in the use of computer simulations to explore the complex cellular interactions that fuel the growth and spread of tumors in the body. Their research focuses on colorectal cancer, which is the third-leading cause of cancer death in men and women in the country, with about 90 percent of those diagnosed with metastatic disease dying within five years.

Dr. Finley, an assistant professor at USC’s Department of Biomedical Engineering, is building mathematical models to predict the metabolism in cancer cells and fibroblasts – cells that support and interact with these cancerous cells. The team will then be able to run computer simulations to test if certain molecules inside a cell interact during tumor formation and spread.

“This phase will take place inside ‘mini-organs,’ called organoids, created in Dr. Mumenthaler’s lab at the Ellison Institute. The use of organoids is an increasingly popular method in biomedical research that allows scientists to safely experiment on highly accurate tissue types without risking the health of patients.”

“My models of intracellular metabolism are embedded in PhysCell, where Macklin will perform hundreds of simulations to identify how the overall growth of the tumor can be halted,” Finley explained.

“Finally, within 3 years, we will be able to test models about the most promising candidates for inhibiting tumor growth in the realistic experimental models of tumor growth that Dr. Mumenthaler's lab builds.”

If the simulations suggest a specific compound may reduce tumor growth, the organoids will also allow the researchers to try it on real cells – but only in a few select cases.

“The big advantage of conducting research in a computerized environment is you can afford to fail,” Macklin said. “By comparison, lab research is extremely expensive in terms of time and money.”

He added: “If you’ve got the freedom to experiment, you can really narrow your ideas down until you’re spending your experimental budget on the most promising ideas. You’re not trying to go all the way to a clinical trial phase and then failing after spending millions or billions of dollars.”

“We’re combining mathematical models with experimental data to computationally explore and ultimately narrow down the infinite treatment options first, followed by experimental validation of the most promising strategies,” agreed Mumenthaler.

Analyzing this test population from the DoD has given us new information that can affect millions of Americans. More than 80% of U.S. cancer patients are initially diagnosed and treated in a community hospital setting similar to some DoD military treatment facilities. Given the rapid adoption of therapies within community cancer centers, it will be critical to understand the interplay between cancer and treatment characteristics, the affordability of care, and the results from that care. With this multidisciplinary approach, Dr. Lee and the Ellison Institute will continue to be at the forefront of understanding how these trends drive access to care and patient outcomes.
Dear Friends,

This summer has been an exciting one at the Lawrence J. Ellison Institute for Transformative Medicine of USC. This will be the last newsletter before our move into our new 80,000 square foot building in Los Angeles. The preparation for this move has been years in the making and is truly a dream fulfilled. Our doctors, nurses, scientists, and staff have all been influential in creating a place where patients and visitors can learn about healthcare from a new point of view, and we can dramatically impact the way we research and treat cancer patients.

One of the hallmarks of the Ellison Institute is our focus on collaboration, both within and outside the traditional realms of cancer research. Our goal is to attack cancer from every angle – whether it be collaborating with physicists, mathematicians, or economists. The Ellison Institute is proud to have a consortium of leading experts, such as our Ellison Institute Members and Visiting Scholars, who come from areas across USC and the nation to collaborate within our Institute. Many of these collaborations have already produced significant discoveries as you will read in this season's newsletter on page 2. Our hope is that these partnerships will garner new insights and create valuable discussions around cancer and approaching this disease.

I also recently had the honor of co-chairing the 2019 FORTUNE Brainstorm Health Conference in San Diego along with Arianna Huffington and Clifton Leaf. FORTUNE Brainstorm Health gathers not only leaders of top companies, hospitals, insurers, and cutting-edge pharma and biotech companies, but also titans of venture capital, tech, telecom, and other industries, all of whom are rapidly changing the face of healthcare. The aim of this conference is not only to push boundaries in each of these areas, but also to show how businesses, both established and new, can lead the way. I had enlightening conversations with these industry leaders and learned of technologies that can move people to better behavior – and better health. It was also powerful to learn of ways we can best harness the power of business to improve health’s bottom line. We look forward to hosting conversations such as these as a part of our community engagement initiatives in our new building – be on the lookout for events focusing on cancer research developments, health, wellness and more.

“Our goal is to attack cancer from every angle – whether it be collaborating with physicists, mathematicians, or economists.”

David Agus, M.D.

We had a major loss this month at the Ellison Institute as our member scientist Murray Gell-Mann passed away at the age of 89. He was the first recipient of our Rebels With a Cause award at our inaugural event in 2012. Murray, one of the greatest physicists of his generation, influenced my thinking of cancer in a profound way. I was privileged to work by his side in the war on cancer. I will always remember his wit, charm, and intellect. A memorial in the new building will follow.

There is much more on the horizon in the coming months and I look forward to sharing these developments with you over the next year. As always, I ask that you consider helping to fund progress and speed development at the Ellison Institute so that patients can benefit soon. I hope to work with each of you to continue to make a difference today in the lives of those struggling with cancer. Thank you for being a part of our mission and journey!

With respect,

David Agus, M.D.
Professor of Medicine and Engineering
Founding Director and CEO, Lawrence J. Ellison Institute for Transformative Medicine
University of Southern California

Dr. Maryann Vogelsang returns to our team as our Director of Strategic Scientific Initiatives. She brings with her over a decade of pre-clinical and clinical proteomics experience and diagnostic test development. Most recently, Dr. Vogelsang led the research operations and assay development teams at NantOmnics in Rockville, MD. Long before that, she was a member of the Trojan family at the Center for Applied Molecular Medicine, and is happy to be back home. Maryann is responsible for the integration of external collaborations, institutional program management, and the development of our interdisciplinary mentorship program. Outside of the office, Dr. Vogelsang enjoys exploring nature and visiting museums with her family. She was an avid beach volleyball player and looks forward to introducing her girls to the sport.

**Join the Fight Against Cancer!**

*Every gift matters in the fight against cancer.* By supporting our disruptive, multidisciplinary research you will help change the face of cancer treatment and significantly benefit the lives of these 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 now! ellison.usc.edu/donate Contact Katrina Barron at 310-601-3352 or barronk@usc.edu for more information.

**Building Updates**

- Construction on our new building is going very well and we are close to completion. It’s exciting to see the building come together as we are gearing up for the opening this fall.
- We’ve begun to gather historical and scientific artifacts – antecedents to the research that directly influences our science in the building. We have partnered with institutions around the world to create meaningful exhibition space for visitors to enjoy.
- Our HOPE, sculpture, by renowned artist Robert Indiana, safely arrived and will be in the heart of the new building. The sculpture is a meaningful reminder of what inspires our faculty, researchers, clinicians, and staff every day.

**New Faces**

Dr. Maryann Vogelsang returns to our team as our Director of Strategic Scientific Initiatives. She brings with her over a decade of pre-clinical and clinical proteomics experience and diagnostic test development. Most recently, Dr. Vogelsang led the research operations and assay development teams at NantOmnics in Rockville, MD. Long before that, she was a member of the Trojan family at the Center for Applied Molecular Medicine, and is happy to be back home. Maryann is responsible for the integration of external collaborations, institutional program management, and the development of our interdisciplinary mentorship program. Outside of the office, Dr. Vogelsang enjoys exploring nature and visiting museums with her family. She was an avid beach volleyball player and looks forward to introducing her girls to the sport.

**REBELS REVIEW**

**Doctor’s Notes**

*From the Desk of David B. Agus, M.D.*

Lawrence J. Ellison Institute for Transformative Medicine of USC

9033 Wilshire Blvd., Suite 300, Beverly Hills, CA 90211
Tel: (310) 272-7640 Fax: (310) 272-7656
ellison.usc.edu