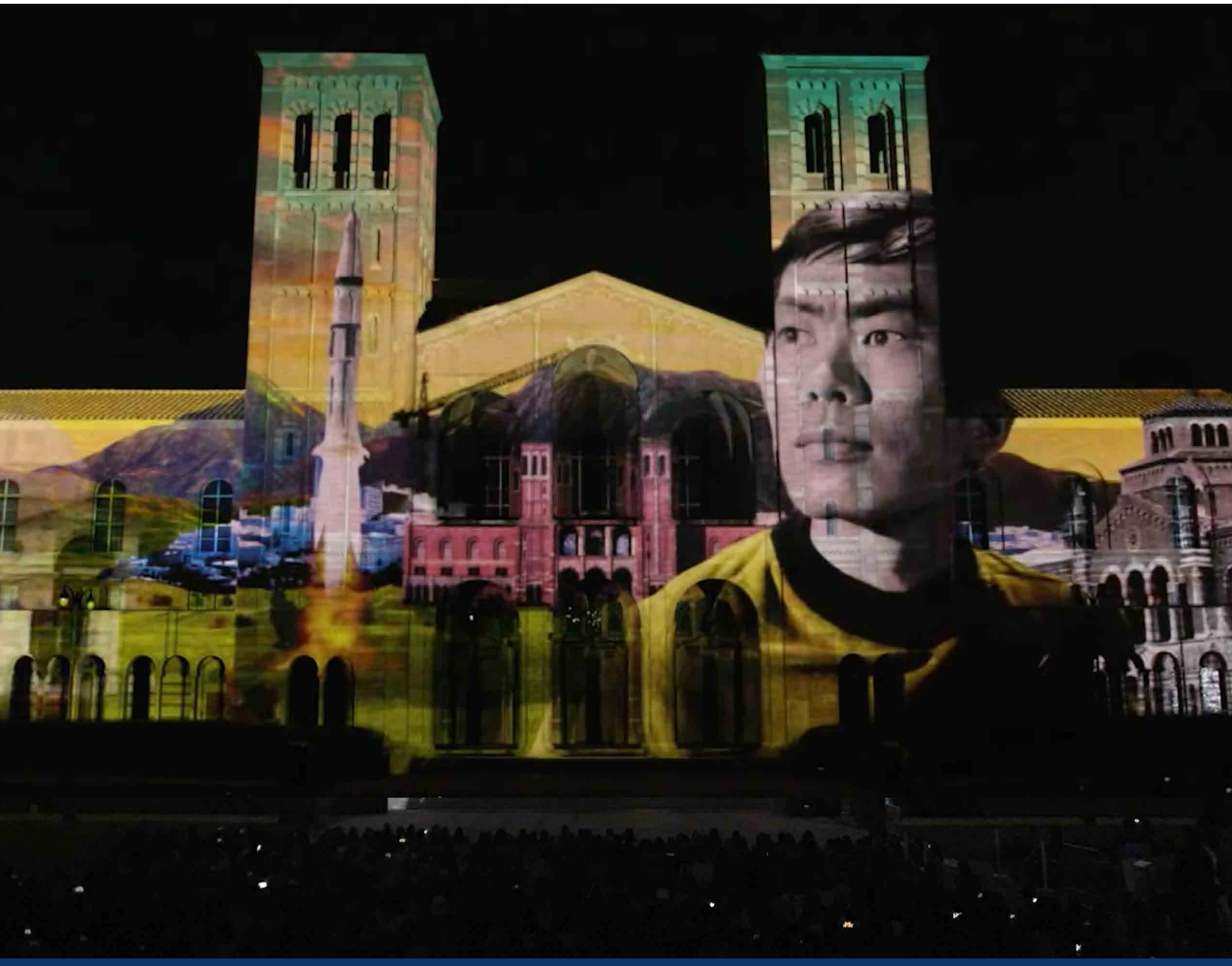
UCLA TECHNOLOGY DEVELOPMENT GROUP

UCLA Technology Development Group

INNOVATION MAGAZINE

JULY 2020 I VOL 6



UCLA Technology Development Group

INNOVATION MAGAZINE

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JULY 2020 VOL 6

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Lighting the Way Projection Show on Royce Hall commemorating yearlong UCLA 100 celebration
Photo: UCLA Newsroom

CONTENTS

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Amir Naiberg *UCLA TDG*

A message from Amir Naiberg

Dear Readers,

On March 16, overnight, UCLA Technology Development Group (TDG) transformed its operations to the virtual domain and our team members started telecommuting. TDG was well equipped to face the challenges presented by SARS-CoV-2, whereby, our committed team did not allow the virus to change our work plans and the end of this fiscal year is likely to be record breaking.

In order to help our community to fight COVID-19, TDG launched several new initiatives: our website has a new section highlighting COVID-19 research preformed at UCLA, and we also developed a section organizing funding opportunities and other resources available to faculty and entrepreneurs.

We just launched the TDG HUB for Entrepreneurship section of our website. It was specifically built to help our entrepreneurial community find and navigate available resources. Information about funding, incubators/accelerators, campus programs and LA ecosystem support can now be accessed with a simple click of your mouse.

Our marketing activities went online with a webinar series covering various aspects of the pandemic, from medical solutions to economic impact and these webinars can be viewed in our new YouTube channel. We intend to continue with our online marketing efforts and produce additional webinars on a variety of topics.

In this magazine, we cover our annual MedTech conference and a novel collaboration with Autobahn Labs. We check-in on the progress of Nanotech Energy, Orthosciences, and BBA Health. We provide funding updates from UCLA Innovation Fund, Octant and Theseus AI as well as licensing deals with Katmai Pharmaceuticals and Maxwell Biomedical. TDG announces newly formed start-ups with 1200 Pharma and TORL Biotherapeutics. We also catch up with researchers Dr. Gay Crooks, Dr. Steven Jonas, Jason Belling and Paul Weiss on their important and ground breaking work.

Finally, I would like to welcome our new TDG board of director members: Sylvio Drouin, Vice President, Research Labs Unity Technologies, Eva Ho, General Partner at Fika Ventures and Thomas Herget, Head of Silicon Valley Innovation Hub, Merck KGaA.

Their combined expertise and experience adds depth to our BOD that will serve our organization and community in the future.

Sincerely,

Amir Naiberg
Associate Vice Chancellor, CEO and President

Gay Crooks *UCLA Newsroom*

Lead stem cell researcher Dr. Gay Crooks on COVID-19 research grant

THREE RESEARCHERS AT UCLA recently received grants to find treatments and vaccines for COVID-19. The funds came from the California Institute for Regenerative Medicine (CIRM), which functions as the State's stem cell agency. Among the recipients are Dr. Gay Crooks, professor of pathology and laboratory medicine and of pediatrics and co-director of the UCLA Broad Stem Cell Research Center.

We caught up with Dr. Crooks to discuss the $150,000 award and delve into the science of what she does and how her study of immune cells known as T cells respond to SARS-CoV-2, the virus that causes COVID-19. Dr. Crooks believes a better understanding of the science will lead to the development of vaccines and therapies that can help fight the virus.

In the Crooks Lab, researchers study how uncommitted stem cells move through an organ called the thymus to maturate and become T Cells. "How does the thymus instruct the incoming normal stem cells to turn into the T cell lineage? In studying that process we've come up with different ways in vitro to mimic that. Artificial ways to instruct and manipulate the stem cells to go into the T cell lineage," says Crooks.

The big area of research in her lab is known as Artificial Thymic Organoids or ATO for short. These cells are created in a dish and made in a very artificial way. Crooks and her team can direct stem cells to go into the ATO system, and generate T cells at the end. "We've done a lot of work with TDG in patenting that process and in fact we started a company to take that forward into possible T cell therapy," Crooks comments. Although this research is related to the COVID-19 grant research, Crooks' work for the CIRM grant examines a specific process.

> **"This particular grant takes knowledge and understanding of the cell study done prior to the grant and it applies that basic biology to this translational problem."**
> ***– Gay Crooks***

Crooks and her fellow researchers are taking a new and innovative way to studying the response of the T cells. Rather than take cells from patients already infected with COVID-19, they are using T cells donated by healthy people and introducing these cells to the virus in the lab. Studying the T cell responses in this way can show how T cells may recognize and then ultimately eradicate COVID-19.

With the CIRM grant, the Crooks Lab is turning their focus on the dendritic cell. A rare cell that is small in number and found only in lymph node and tissue.

In simple terms, Dr. Crooks explains, "If you are a virus coming in to the body, be it Covid or Cancer, the dendritic cells pick up the proteins of that virus and catches them and brings them inside the dendritic cell. It then goes through antigen processing where the protein gets chopped up into little proteins called peptides. Then the peptides go through what is called antigen presentation. Presenting the peptides on the surface of the dendritic cell activates the T cells."

Through Crooks' studies, the conventional dendritic cell or cDC1 has been identified as the one type of cell that is good at processing and presenting antigens.

Dr. Christopher Seet, a physician and a former PhD student turned semi-independent investigator, discovered how to make the stem cell commit to the cDC1 pathway. By using stem cells from healthy patients, you can create a lot of these healthy cells and use them as a tool. "We can now make a lot of them and then use them to discover T cells, TCR (T cell receptors) and the antigens that they respond to. We couldn't do that without this technology of making it from stem cells because they are too rare in the blood," states Crooks.

Crooks addresses how to use this as a tool against COVID-19

"Because these cells are so good at taking full length complex proteins, chopping them up, and presenting them as antigens, we are able to take one of the full length proteins and insert it in stem cell using a viral vector. We put the gene in for SARS-CoV-2 virus and the stem cell is then able to express that gene. Then we make them into dendritic cells," Crook explains.

From there, the lab studies which T cells respond and which T cells bind to the SARS-CoV-2 protein, thereby identifying what antigens are used to potentially help create a vaccine.

When asked about the specific uses for the grant, Crooks replied, "This particular grant takes knowledge and understanding of the cell study done prior to the grant and it applies that basic biology to this translational problem. It was only by studying basic biology of how this was done normally in the body, and realizing that we can recapitulate this in vitro in the lab, that we are now able to use it and apply it to this clinical problem. That's what the grant is."

While most grants are five year studies, the CIRM grant is only a one year grant. Crooks and her team are expected to provide a rapid turnaround in results. Crooks concludes, "We must show clear progress in a short period of time because it is urgent. These grants are very specifically chosen to be feasible within that short time period. They are not about understanding biology but rather applying the known biology to this problem of COVID-19." **IM**

Exclusive license signed with Katmai Pharmaceuticals

KATMAI PHARMACEUTICALS signed an exclusive, world-wide license with UCLA in March 2020. Katmai is an academic-partnered drug discovery and joint development company focused on proprietary brain-localized, oncogene-targeted therapeutics and predictive biomarkers for neuro-oncology indications. The company was founded by a UCLA team of leading cancer biology, drug development, and clinical researchers developing targeted treatments and predictive biomarkers for cancers originating in, or spreading to the brain. The lead team includes: Tim Cloughesy MD, UCLA Neurology, Bradley Gordon, president and ceo, Katmai Pharmaceuticals, Michael Jung PhD, distinguished professor, UCLA College of Chemistry & Biology and David Nathanson PhD, assistant professor of Molecular and Medical Pharmacology at UCLA DGSOM.

The science addresses the problem of cancer drug resistance, specifically tumor cell populations that contribute to the resistance of cancer drugs. The company's lead drug candidate is focused on Oncogenic EGFR (epidermal growth factor receptor) Target. This small molecule therapeutic targeting a key genetic driver of certain brain cancers, has advanced to IND-track preclinical development. Katmai recently entered into a partnership with a leading biopharma company to accelerate product development and commercialization of this drug candidate. **IM**

Sonosim's Nicole Durden and Koren Bertolli with UCLA TDG CEO Amir Naiberg on the Transforming UCLA IP into Products panel

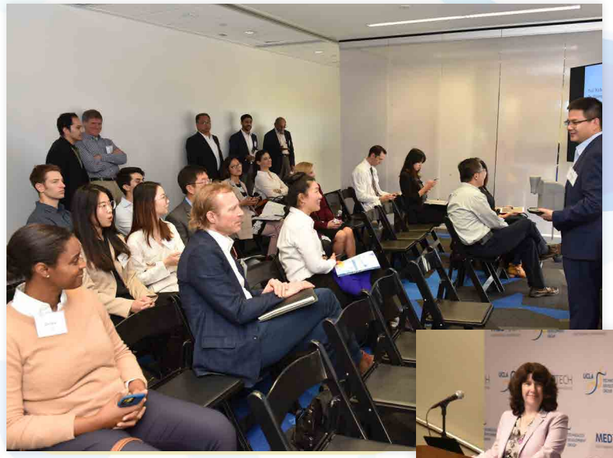
8th Annual UCLA MedTech Partnering Conference

UCLA TDG in partnership with MedTech Innovator, hosted the 8th Annual UCLA MedTech Partnering Conference at the UCLA California NanoSystems Institute on Tuesday March 3, 2020. The conference provided a unique opportunity for inventors, investors and industry executives to meet, learn about industry trends and explore how to work together. Program highlights included Philip Nelson, director of engineering, Google, who presented "Accelerating Bio Discovery with Machine Learning", a panel on digital health and patient data, a discussion on investments in the medtech industry, and a talk on the "Rise of Digital Medication as an Alternative to Drugs."

UCLA innovation was also very much on display, with a presentation of UCLA Innovation Fund portfolio projects, to fireside chats with startups commercializing UCLA IP, to utilizing CNSI's Magnify Incubator and demonstrations of medical devices being developed at UCLA.

Partnering meetings with Industry and Investors was a highlight of the event, with more than 100 meetings confirmed through the partnering app and many more in person meetings. The sold out crowd was comprised of 30% industry, 17% investors, and 35% UCLA and 18% other local research institutions.

UCLA was delighted to welcome our counterparts from around the ecosystem – event research partners included Caltech, USC, the Lundquist Institute, Cedars-Sinai, UC Santa Barbara, and UC Irvine. Research partners had the opportunity to include their startups or research teams in the wildly popular demonstration track, which ran all afternoon. **IM**



Live Demonstrations at MedTech 2020

Rise of Digital Medication as an Alternative to Drugs panel with L to R: Dina Lozofsky, Benjamin Lewis, Martha Lawrence and Joel Kehle

Attendees in the Partnering Lounge

Networking session in the CNSI Lobby

All MedTech photos: Todd Cheney/UCLA

Sam Elhag

Courtesy of Theseus AI

Theseus AI secures $350K within its first year

THESEUS AI

FOUNDED IN FEBRUARY OF 2019, Theseus AI has dedicated itself to the development of advanced software that provides objective data and treatment recommendations.

Since that time, the company has grown while remaining nimble and focused. Theseus currently has six team members working in various aspects of research and development, with an interdisciplinary staff possessing technical, business, and healthcare backgrounds. The company has also surrounded itself with advisors who have practical experience in the technology and healthcare space Theseus AI inhabits.

Sam Elhag who leads commercialization efforts for Theseus AI discusses the progress the company has made and the boost in funding. Recently, the company has partnered with researchers at three other institutions. "We are looking to extend our research and build a clinical workflow around the algorithms that we licensed at UCLA," explains Elhag.

Theseus AI is also building a strategy for submission of a first product to the FDA. "Our most likely approach is to go down a 510(k) path which allows you to submit using a predicate device. Two of three devices submitted are approved in 6 - 9 months." Elhag continues, "The first milestone is a pre-submission meeting with the FDA and later, an actual submission. The pre-submission meeting gives you an opportunity to ask questions and discuss requirements with the FDA, including what additional clinical studies may be needed."

> **"We are piloting the first version of our product with various institutions and payers as well as extending its use at UCLA."**
>
> ***– Sam Elhag***

As most researchers know a vital part of the process is funding. Theseus AI recently secured a round of capital and Elhag was open to discussing the process. "We recently closed a $350K pre-seed that is intended to support a few specific milestones. We are piloting the first version of our product with various institutions and payers as well as extending its use at UCLA. The majority of funding came from angel investors and was led by Bayes Venture Capital." Elhag explains, "They understand the healthcare and musculoskeletal space because many of them were operators in those fields."

When asked about how a young company secures funding, Elhag shares, "There is a great article from a local VC named Mark Suster where he writes about how investors care about lines instead of individual data points. Folks are looking for a longer-term relationship in which they have the chance to get to know you and understand that you are going to accomplish the things that you say you will. It's important to set milestones and demonstrate that you can make progress consistently over time."

Elhag continues, "Additionally, it's important to find the right investor fit for your company. Different technologies have different risks or require different types of support. We were fortunate to find investors with an understanding of what it takes to get a company like this off the ground and agreed on the milestones that we are aiming to achieve."

A strategic approach is important when securing investment. Elhag believes that setting clear goals, demonstrating value for early customers, and communicating regularly with investors can help to secure the next round of funding. "The statement about a line versus a data point actually goes both ways. Some founders say 'well I am just trying to raise funding' and do not necessarily have a perspective on the type of investor they would like to work with. An investment is really a partnership and the right investors can really make a big difference in achieving your goals."

But Elhag thinks it's also key to be prepared for adjustments. "It's important to set goals but you may have to adapt your approach to reaching those goals as you learn more information from the market."

Theseus AI continues to move forward in its mission to improve chronic pain treatment and diagnosis. **IM**

Thomas Lipkin

UCLA TDG

UCLA Innovation Fund updates

THE UCLA INNOVATION FUND, managed by Thomas Lipkin, director of UCLA Innovation Fund and new ventures at UCLA TDG, saw a record number of applications for 2020 in our Therapeutics and MedTech tracks. This encouraging response from faculty highlights that even in our fifth year, there is still a significant unmet need for gap funding to translate academic research to market.

While numerous projects experienced delays due to the closing of on-campus research labs, much of the work was able to be transitioned to outsourced contract research organizations and device manufacturing firms. Engaging industry-specific consultants for necessary diligence continued, and business development efforts increased as our teams transitioned to working remotely.

The UCLA Innovation Fund has received over 350 applications, and is a proud supporter of 36 projects to date. 21 projects are still active, nine projects have been discontinued, and five new startup companies have been launched. Our New Ventures team is excited to provide project updates in our UCLA Innovation Fund Spring 2020 Newsletters which you can find linked here. **IM**

Jack Kavanaugh *Courtesy of Nanotech Energy*

Building a better battery

Nanotech Energy

CAN SOMEONE MAKE a modern-day advanced solution to the lithium battery? A safer and more durable power source that can change the habits of battery consumption? Dr. Jack Kavanaugh thinks so and the secret comes down to one word: Graphene.

But, what is graphene? It is a single layer of graphite and an allotrope of carbon with a unique atom structure. Nanotech Energy hopes to find a replacement for the standard lithium batteries most consumers use. Why graphene? Through research, Dr. Richard Kaner, distinguished professor at UCLA College of Chemistry & Biology, realized that because of graphene's unique molecular makeup, the material has special strength and better conductivity properties. He has developed a process that allows graphene to be used in many applications.

Nanotech Energy is a supplier of graphene, graphene super batteries and other graphene-based products. The company started in 2014 and has grown, just completing their Series C funding of $27.5M and headed into their Series D funding. We sat down with Nanotech Energy CEO, Dr. Jack Kavanaugh, to get some insight from this successful entrepreneur and to find out more about the company.

> **"UCLA instills innovative thinking and development. It's fertile for new ideas and exploring beyond that what could be possible."**
>
> *– Jack Kavanaugh*

How did you make the transition from being a medical doctor to batteries?

I have an MBA which I got at UCLA and spent some time doing mergers and acquisitions at a fairly high level for a number of years. I was founder and CEO of ZetaRX that became Juno. We had a trial while I was there that reported the best results ever in the history of cancer therapy. I have a long history of involvement in chemistry and other businesses, not just medicine.

So, this was less of a transition and more of an evolution of your interests and studies?

Yes. I am very excited about things I have done but am always searching for new innovations. I call them "Gatekeeps." I do not like to do copycats of things that have already been done. I am interested in finding science that has not occurred in a commercial sense before. I am driven to do things that have a positive social impact.

Did you meet Dr. Kaner while at UCLA?

Yes. When I met Dr. Kaner, we ended up doing three spin offs from UCLA including Nanotech. Dr. Kaner was the first person ever to file the patent on graphene technology that's commercializable in 2002 with the use of a chemical process. We're very excited with what he is able to do and it goes back to chemistry.

Did you look at the use of graphene specifically as an alternative to lithium batteries that were already in the market?

Dr. Kaner had done some work with supercapacitors, and we saw limitations in supercapacitors. We saw there were unresolved issues with lithium batteries and saw that lithium batteries are not safe because they do catch fire and explode. We thought this [graphene] could exceed what either one could do individually, and Dr. Kaner had very special potential solutions.

What have the developments been at the company since Series C funding?

There was one company that came to us and challenged us to make high performance, non-flammable batteries. We have six generations of batteries. Each based on different chemistries and with different practical uses. We've developed conductive inks, conductive adhesives, electromagnetic shielding in a spray that can be painted on. We make the best graphene in the world and we do this in a factory in Northern California.

Where does this take the company moving from Series C to D?

In the last month, we have added ten additional PhD scientists with industry experience in individual teams. Six battery techs plus inks, conductive material, graphene and shielding – so ten arenas. We will add more scientists. We've also built out our capabilities to produce on high levels of the inks, epoxies and the graphene. The next round we'll build out manufacturing capabilities for electrodes and batteries.

Are you looking to expand the factory?

We have prototype labs now but the next step is commercialization. That's a larger project that requires much more capital-intensive investment to be able to manufacture high production levels of electrodes and batteries. We can do all the other products now.

Do companies come to you or are you seeking uses in the lab?

We've been approached by many companies and we've selected one or two to work with in each of the industry applications because it has broad applications. Consumer electronics, things like phones and smart pads and computers and other communication devices. Also, defense, aerospace, solar, wind and bridge stabilization and of course, anything that involves a vehicle - plane, boat or cars. We're selecting very visible companies as the first ones to work with as both potential customers and users.

We're also looking at potential relationships to build out a super factory. It is quite expensive. If there is the capability and a situation that we can trust, we're looking to see how to expand on our own and through relationships. There is a very high, unfilled demand in battery manufacturing. We could raise a certain amount of money and be able to manufacture, but demand far exceeds what we are capable of doing. If we could expand further that could be helpful.

Do you think the curiosity and culture at UCLA has helped benefit you to develop the companies you've founded and run?

UCLA instills innovative thinking and development. It's fertile for new ideas and exploring beyond that what could be possible. UCLA is a great incubator for these types of ideas and encourages the type of thinking that has met many of our parameters. We don't jump into something easily. I think our group has done six spinouts at UCLA. **IM**

Dennis Slamon *Milo Mitchell/UCLA*

One lab, two startups

DR. DENNIS SLAMON is a professor and chief of hematology/oncology at the David Geffen School of Medicine at UCLA. He also serves as the director of Clinical/Translational Research and director of Revlon/UCLA Women's Cancer Research program at UCLA Jonsson Comprehensive Cancer Center. Dr. Slamon and the Slamon Lab have worked over 12 years to fight breast cancer. Slamon recently won the 2019 Lasker-DeBakey Clinical Medical Research Award for the development of Herceptin, a drug that treats breast cancer.

The award winning physician and scientist and the Slamon Lab are behind two new UCLA startup "spinouts".

1200 Pharma is a startup formed from a collaboration between UCLA researchers and CalTech researchers to develop small molecule-based cancer therapies. The startup focuses on leveraging proprietary assays developed in Dr. Slamon's Translational Oncology Research Laboratory to identify and characterize unique biomarkers of different cancers. These biomarkers are then utilized to target novel small-molecules to accelerate pre-clinical drug discovery and clinical approval timelines.

While 1200 Pharma focuses on small molecules, TORL Biotherapeutics develops antibody-based cancer therapies. From Dr. Slamon's Lab, researchers use proprietary assays to identify and characterize the biomarkers of various cancers. The characterization is then utilized to direct the synthesis of novel antibodies that would be used for further pre-clinical studies.

> **"1200 Pharma and TORL Biotherapeutics provide a new collaborative model between the university and startups."**
>
> *– Ragan Robertson, UCLA TDG*

"1200 Pharma and TORL Biotherapeutics provide a new collaborative model between the university and startups. This model helps drive discovery of new therapeutic pathways, while reducing the timeline from bench to bedside," said Ragan Robertson, business development officer, UCLA Technology Development Group. **IM**

Aydin Bakakhani *UCLA Engineering*

Maxwell Biomedical licenses technology developed by UCLA professor

UCLA TDG HAS LICENSED key patents and technology for the commercial development of its novel heart pacing technology developed by Aydin Babkhani, a UCLA associate professor of electrical engineering to Maxwell Biomedical, Inc.

Babakhani, along with his Integrated Sensors Lab, has been working on the tiny pacemaker device that helps control abnormal heart rhythms referred to as arrhythmias.

Now Babakhani, Maxwell Biomedical, together with collaborators at three research institutes, have taken things a step further into the future. The team is in the midst of developing a first of its kind device that is both leadless and runs without the need of battery power.

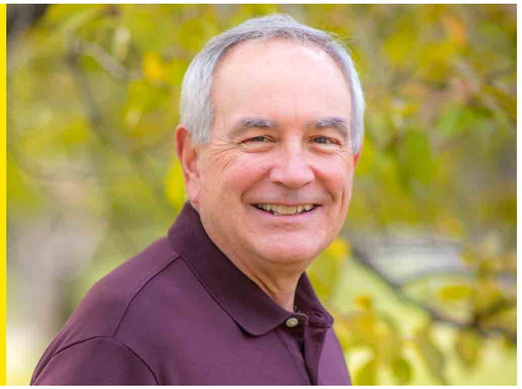
This breakthrough invention will be used to more accurately detect and treat atrial fibrillation (AFib) in patients.

The flexible micropacing device and system are designed to monitor and analyze patient ECG (electrocardiogram) on a regular basis. If an AF episode is detected, the device will perform low-energy (pain-free) pacing to restore normal sinus rhythm in the patient.

Maxwell Biomedical Inc. is a privately funded medical device company committed to revolutionizing the diagnosis and treatment of AFib, with its proprietary, pain-free, pacing technology. The partnership addresses the significant unmet medical need for approximately 33 million people worldwide who have atrial fibrillation. The technology is a new and novel device-based approach to return patients to normal sinus rhythm every time an AFib episode occurs. The micropacing solution reduces AFib burden and slows the disease state progression using a proprietary algorithm.

Today there are two therapeutic options for the treatment of AF but neither have lived up to the hopes for effectiveness. The first is management with antiarrhythmic drugs which can have many side effects for patients. The second is catheter ablation which has varied success rates and may require multiple procedures. Therefore, Babakhani, in collaboration with the other research institutions and Maxwell Biomedical hope to provide an innovative and effective solution.

The Maxwell Biomedical system is not currently approved for commercial use. For more information, visit www.maxwellbiomedical.com. **IM**



Bryce Benjamin

Courtesy of Orthosciences

Orthosciences product now in market

OrthoSciences™

ORTHOSCIENCES PROVIDES A UNIQUE fluoride anti-cavity toothpaste for kids and adults who wear braces. The product called ORTHOCARE Toothpaste, contains a combination of ingredients that reduce the risk of white spots that occur around the brackets of braces and related gingivitis. Wenyuan Shi, chief executive officer and chief science officer at Forsyth Institute and former chairman of oral biology at UCLA School of Dentistry and Eric Kang Ting, professor of orthodontics at UCLA School of Dentistry, wanted to come up with a solution for these perennial orthodontic treatment-related conditions. They reached out to serial entrepreneur and longtime colleague Bryce Benjamin to help. A year of market research later, the trio formed the company Orthosciences. Within 4 years of forming the company, the team was able to bring the first product to market. A remarkably short period of time for a new product with fluoride which is classified as a drug! Benjamin, founder and CEO of Orthosciences, tells us more about the journey and where the company is headed.

"We spent a year and a half in laboratory research, a year and a half in product development and production sourcing, followed by a year of human clinical trials. During the first phase, graduate students in Dr. Shi's labs screened hundreds of combinations of compounds through a novel protocol of invitro testing to see which would reduce the bad bacteria in the mouth that cause enamel demineralization (white spots) and gum inflammation (gingivitis). They came up with a combination of three amino acids that had the most beneficial effect."

> **"We anticipate a ten-fold increase in revenue just based on optimizing what we're doing."**
>
> *– Bryce Benjamin*

"Once the "secret sauce" was determined and patent disclosures filed through UCLA's Office of Intellectual Property (now UCLA Technology Development Group), we moved on to productization. We searched and found a contract manufacturer that already had a baseline fluoride toothpaste who was willing to work with our added ingredients," said Benjamin. "By partnering with a company that already had FDA approval, Orthosciences was able to leapfrog directly to product development – key to our fast go-to-market timeline."

"After thorough safety testing and analysis, we moved on to human trials. To date, two rounds of patient clinical trials have been conducted by the UCLA School of Dentistry Orthodontic Clinic which have validated the invivo product efficacy."

ORTHOCARE Toothpaste was introduced to the marketplace just last year to a strong reception. Even though the market for toothpaste is vast and dominated by a few big companies, the team had a plan.

Benjamin explains, "We knew to avoid going directly head to head with Colgate and Crest, and Walmart wasn't going to come knocking on our door right away. We always had the niche market strategy of focusing on orthodontic patients and launching virtually, so that's what we've done to date. In terms of distribution, we're only selling online through our website and through Amazon."

The company uses digital marketing including Google search, social media and online advertising to reach potential customers. In addition, Orthosciences targets orthodontists to become product evangelists and recently promoted its toothpaste at the AAO Annual Session (American Association of Orthodontists) employing a traditional grassroots marketing tactic.

Orthosciences is still in early stage growth and Benjamin tells us about the next phase of the company.

"I've learned over the years that it takes a long time and hard work to become an overnight success. We project a multiple-fold increase in revenue over the next year just based on optimizing what we're doing currently, and down the road we can expand to other application areas. We've proven the market demand for ORTHOCARE Toothpaste, and now we're ready for a round of investment that will enable us to press harder on the marketing accelerator and expand the product lineup. We're planning on a very bright future for Orthosciences!" **IM**

Sri Kosuri

Courtesy of Octant

Octant raises $30M in Series A

OCTANT

OCTANT WAS STARTED BY SRI KOSURI, an assistant professor at UCLA College of Chemistry and Biochemistry.

For decades, biotechnology and the development of drugs has focused on increasing the specificity of drugs against singular targets or genes.

Octant challenges the status quo by shedding this methodology for a new approach of applying synthetic biology to drug discovery.

"We believe the future of treating complex disease will require rational approaches to understand and engineer *polypharmacology* – drugs that simultaneously alter the activity of multiple drug targets and pathways. Multi-targeted drugs can solve some of the most vexing problems in drug discovery today, such as on-target toxicity, cell-type specificity, avoiding off-target effects, and widening therapeutic windows. We have been building a platform that combines large-scale synthetic biology in human cell lines, high throughput chemical synthesis and screening, informatics and machine learning – all in an effort to understand and engineer polypharmacology at unprecedented scales". (Octant website)

> "We believe the future of treating complex disease will require rational approaches to understand and engineer – *polypharmacology*"
>
> *– Octant*

By taking this new path, Octant hopes to help treat some of the most common societal diseases such as obesity, psychiatric disorders and cardiovascular diseases.

Based in Emeryville, CA, the startup has raised $30M in Series A financing with investments from a16Z, 8VC, SV Angel, Allen & Co and other private investors. **IM**

Tom Novak

Courtesy of Autobahn

Autobahn Labs and UCLA announce partnership

AUTOBAHN LABS

SAMSARA BIOCAPITAL, a leading life sciences investment firm, Evotec SE, a global drug discovery alliance and development partnership company, and KCK Ltd., a family investment fund, announced the launch of Autobahn Labs, a novel virtual incubator partnering with top academic and research institutions to catalyze early-stage drug discovery and development. Autobahn Labs also announced a first-in-kind strategic collaboration with UCLA Technology Development Group to identify and advance the most promising areas of scientific research with the greatest potential for patient therapies.

"Autobahn Labs was created to be a catalyst for translational research, working with academic scientists and institutions to design and execute an accelerated path to deliver transformational new therapies," said Thomas Novak, PhD, Chief Scientific Officer of Autobahn Labs. "We are very excited to partner with UCLA, a university with a premier reputation for innovation in the life sciences, to realize the potential of that innovation for patients."

"UCLA TDG's mission is centered on innovation, research, teaching and entrepreneurship to benefit society," said Amir Naiberg, Associate Vice Chancellor, CEO & President of UCLA Technology Development Group. "TDG is exploring new models for Tech Transfer, this novel strategic collaboration with Autobahn Labs allows us to partner with industry experts earlier than ever before. We believe this will enable us to accelerate the transformation of our early scientific research into new drugs."

> "We are very excited to partner with UCLA, a university with a premier reputation for innovation in the life sciences, to realize the potential of that innovation for patients."
>
> *– Tom Novak*

Built on a model of long-term partnership and collaboration, Autobahn Labs invests earlier than traditional venture financing models, providing intellectual, financial and physical capital to efficiently and effectively advance new scientific discoveries from novel concept to preclinical drug candidate. Working in partnership with leading scientists and university tech transfer offices, the incubator identifies and de-risks early-stage research projects with significant therapeutic potential. Autobahn Labs creates jointly-owned new companies and invests up to $5M per project. This model provides Principal Investigators with scientific and operational strategy as well as direct and immediate access to Evotec's state-of-the-art drug discovery and development technologies and capabilities, including more than 3,000 scientists with proven drug discovery expertise.

Read full press release here. **IM**

Reed Hutchinson/UCLA

Dr. Steven Jonas, Jason Belling and Paul Weiss

A step toward a more efficient way to make gene therapies to attack cancer, genetic disorders

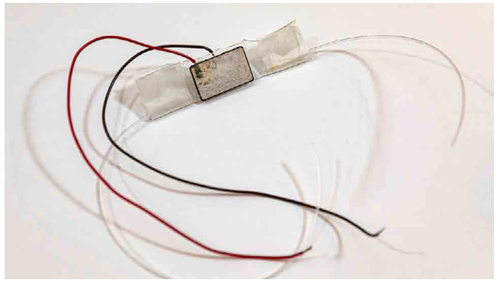
A UCLA-LED RESEARCH TEAM today reports that it has developed a new method for delivering DNA into stem cells and immune cells safely, rapidly and economically. The method, described in the journal Proceedings of the National Academy of Sciences, could give scientists a new tool for manufacturing gene therapies for people with cancer, genetic disorders and blood diseases.

The study's co-senior author is Paul Weiss, a UCLA distinguished professor of chemistry and biochemistry, of bioengineering and of materials science and engineering. "We are figuring out how to get gene-editing tools into cells efficiently, safely and economically," he said. "We want to get them into enormous numbers of cells without using viruses, electroshock treatments or chemicals that will rip open the membrane and kill many of the cells, and our results so far are promising."

In current practice, cells used for genetic therapies are sent to specialized labs, which can take up to two months to produce an individualized treatment. And those treatments are expensive: A single regimen for one patient can cost hundreds of thousands of dollars.

"We hope our method could be used in the future to prepare treatments that can be performed at the patient's bedside," Weiss said.

The method could be used with CRISPR, the genetic engineering technique that enables DNA to be edited with remarkable precision. However, using CRISPR efficiently, safely and economically in medical therapies has proven to be a challenge — one this new method may be able to solve.



Reed Hutchinson/UCLA

A prototype of the acoustofluidic device developed by UCLA researchers.

The technique uses high-frequency acoustic waves coupled with millions of cells that flow through an "acoustofluidic device" in a cell culture liquid. The device was invented by the research team as part of the study; inside of it are tiny speakers that convert electrical signals to mechanical vibrations that are used to manipulate the cells.

That procedure opens up pores along the cells' membranes that allow DNA and other biological cargo to enter the cells, and it enables the researchers to insert the cargo without the risk of damaging the cells by contacting them directly.

Dr. Steven Jonas, the study's co-senior author and a UCLA clinical instructor in pediatrics, likened the soundwaves' ability to move cells to the experience when audience members actually feel the sound at a concert.

"At a concert hall, you can feel the bass — and if you can feel the sound, the cell can feel the acoustic wave," said Jonas, a member of the California NanoSystems Institute at UCLA, the UCLA Jonsson Comprehensive Cancer Center and Eli and Edythe Broad Center of Regenerative Medicine and Stem Cell Research at UCLA. "We can engineer the acoustic waves to direct the cells as needed."

The researchers delivered short strands of DNA called plasmids into human blood cells and blood-forming stem cells that were intended specifically for laboratory research, and pumped millions of such cells through the acoustofluidic device. Once inside a cell, a plasmid can be made into a protein that may be missing or damaged, or it can give the cell new capabilities.

"When combined with new gene-editing approaches, the method enables us to correct a DNA sequence that is miscoded in a disease," said Weiss, who also is a member of CNSI.

Plasmids used as templates for gene editing can make the correction because they have the right coded sequence for the desired protein, he explained.

Reed Hutchinson/UCLA

Jason Belling holding a prototype of the device.

Lead author Jason Belling, a UCLA graduate student in chemistry and biochemistry, was able to insert plasmids into the model cells used for testing about 60% of the time, without using any chemical and physical treatments.

"The viability is very high compared with other techniques," Weiss said, "but we still want higher efficiencies and are working toward that."

Jonas — whose expertise is in treating childhood cancer and blood disorders — said the research has the potential to benefit adults and children with cancer, immune system disorders and genetic diseases.

"If the delivery works, and it seems to, this research is an important step toward bringing new therapies more broadly to the patients who need them," Jonas said. "Traditionally, we have treated cancers with chemotherapy, surgery, radiation and bone marrow transplantations. Now, we're at an amazing era of medicine, where we can use different types of gene therapies that can train the immune system to fight cancer."

Jonas said some existing treatments can take a patient's T cells and adapt them with a gene that encodes for a receptor that allows it to target the cancer.

"We want to be the delivery service that gets these therapeutic packages to the cells," he said. "I want to treat my patients with cells that are engineered in this way."

For the technique to lead to viable treatments for disease, it would need to allow doctors to process at least a couple hundred million cells — and in some cases, billions of cells — safely, rapidly and cost-effectively for each patient.

The new approach is still the subject of research and is not available to treat human patients.

The study's other co-authors include Duke University professor Tony Huang, a pioneer of acoustofluidics and a UCLA alumnus; Dr. Stephen Young, distinguished professor of medicine and human genetics at the David Geffen School of Medicine at UCLA; and Dr. Satiro De Oliveira, a UCLA assistant professor of pediatrics.

The study was funded in part through a National Institutes of Health Director's Early Independence Award for Jonas; the University of California Center for Accelerated Innovation; and Belling's predoctoral fellowship through the National Heart, Lung, and Blood Institute. Jonas also has received young investigator awards from the Alex's Lemonade Stand Foundation for Childhood Cancer Research, Hyundai Hope on Wheels Foundation for Pediatric Cancer Research, and the Tower Cancer Research Foundation. UCLA's Technology Development Group Innovation Fund also provided funding.

Weiss' research group has applied for patents on the acoustofluidic device and related devices, working with the Technology Development Group. **IM**

Stuart Wolpert | April 27, 2020, Printed from UCLA Newsroom

Andrew Leuchter *UCLA*

BBA Health moves forward

BBA-HEALTH CREATES INNOVATIVE TOOLS FOR PHYSICIANS that will help in the battle against depression. Their work is enabled by technology created at UCLA.

A chance, one-hour flight from SoCal to Northern California brought together Dr. Andrew Leuchter, a Professor of Psychiatry, and Chip Goodman, a serial entrepreneur. The two had been introduced by Goodman's wife who helped start Friends of Semel Institute where Leuchter served as an advisor. Goodman was traveling for business and Leuchter was traveling for his work with the UC Academic Senate.

The pair started discussing Leuchter's development of biomarkers to inform diagnosis and treatment for patients suffering from depression, and the challenges, starts, and stops of getting research out of the lab and into clinical practice. After Goodman reviewed Leuchter's study results, he found the work very promising and together they founded BBA Health in 2012. It is the specific and customized measures to guide depression treatment that make BBA Health's technology unique.

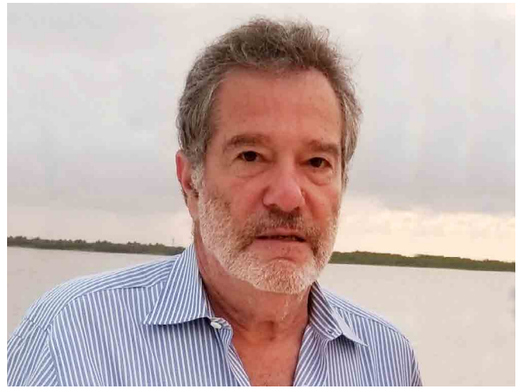
Once biomarkers are recorded and data collected, the physician is better informed and can provide treatment through the use of transcranial magnetic field stimulation or Transcranial Magnetic Stimulation (TMS). TMS is noninvasive procedure that stimulates nerve cells in the brain using magnetic energy. It typically is used when other depression treatments haven't been effective.

> "If we can get TMS to work almost every time and make it work more quickly than medication, then it will become a more cost-effective treatment." *– Andrew Leuchter*

TMS was approved by the FDA in 2008 for adults with depression, and Leuchter began his research in this area soon after. "We started working on TMS biomarkers shortly after FDA approval. It took us two to three years to realize that it is a remarkably effective treatment. About 60% of patients get substantially better with TMS, even those who have not benefitted from medication," said Leuchter.. Asked why more patients don't opt for TMS treatment, Leuchter explains, "It works just fine as a first line treatment for depression. But it's not as cost effective as medications. So generally, patients will start with medication prescribed by a primary care physician or psychiatrist and then only once they have failed to benefit from medications usually several, would they then consider going to a second line treatment such as TMS."

Leuchter believes that UCLA's biomarker technology can get TMS to work more rapidly and boost treatment response rates. "The trial-and-error nature of antidepressant treatment is a continual source of frustration for patients. And that's one of the ways that we think our technology can help. If we can get TMS to work almost every time and more quickly than medication, then it will become a more cost-effective treatment," says Leuchter.

To address the frustrations suffered by most depressed patients, discreet BBA biomarkers help shorten the path to an effective medication or TMS therapy treatment in weeks, rather than months.



Chip Goodman *Courtesy of Chip Goodman*

Goodman adds "In our arrangements with TDG, they're full partners in the program that encompasses this life cycle of depression treatment."

Now that BBA Health has grown, Goodman discusses the next steps. "As we move into more research facilities and we move into formal clinical trials with strategic partners, we'll be in a position to again demonstrate efficacy on a larger scale. I think the new paradigm really is again, biomarkers that will help get a patient to the correct treatment a heck of a lot faster than is currently done."

Leuchter notes, "We are talking about a paradigm shift in how we approach illness. We are moving away from simply trying different treatments until we see something that works. We want to have treatments that are planned from the outset, and find the right treatment, for the right patient, at the right time." He goes on to conclude, "I'm extraordinarily grateful to Chip for his partnership and support over these many years in trying to bring this technology out of the lab and into the clinical setting. One of the great things about UCLA is that it's a very entrepreneurial and creative place. Still, we need private partnerships in order to make this work. We are excited about moving this approach forward so that we can use it to help patients." **IM**

LABEST Presents COVID-19 Spotlight Series Webinar, June 8, 2020

UCLA TDG webinar wrap-up

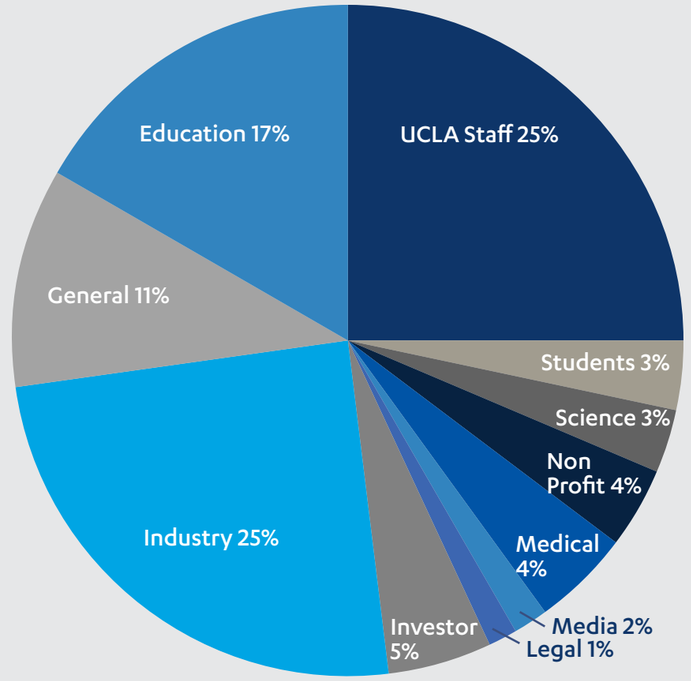
ON MARCH 16, UCLA staff gathered their items and left their offices in order to comply with stay at home orders due to COVID-19. Similar to many other companies and organizations, work life moved completely on-line with the use of video conferencing software, ZOOM. UCLA Technology Development Group moved quickly to create a series of webinars that would address several challenges facing the tech transfer industry. Also with the cancellation of the LABEST (Los Angeles Bioscience Ecosystem Summit Twenty-twenty) event, the LABEST Presents COVID-19 Spotlight Series emerged. The series featured a dozen leading UCLA researchers who took time out of their busy schedules to update and inform our audience about their work to fight COVID-19.

Date	Chronological List of Past UCLA TDG Webinars
4/10	T3PO: Tech Transfer and Telecommuting: Productivity and Operations
4/22	LABEST Presents COVID19 Spotlight Series: Multi-Faceted Approach
5/01	Virtual First Friday with Brian Bordley UC Berkeley SkyDeck
5/06	LABEST Presents COVID19 Spotlight Series: Therapeutics and Vaccines
5/07	University Accelerators – Bridging the Gap
5/12	Investments in a Post-COVID World
5/13	Nuts & Bolts: Industry Research Contracts & Material Transfer*
6/01	Economic Impact of COVID19
6/03	LABEST Presents COVID 19 Spotlight Series: Clinical Research
6/05	Virtual First Friday with Azar Nazeri NSF I-CORPS Program**

** Nuts & Bolts was an invitation only webinar and it was not recorded on video*
*** Due to technical difficulties, we were not able to capture the video but the presentation is available*

Total	UCLA TDG Webinars by the Numbers
2,123	Total Registrations to Date
716	UCLA TDG E-Newsletter Sign Ups

Attendees by type All Webinars combined*



** This does not include Nuts & Bolts Webinar since it was an invitation only event*

Breakdown	
Education	271
General	173
Industry	402
Investor	80
Legal	25
Media	29
Medical	75
Non Profit	63
Science	50
Students	56
UCLA Staff	402
TOTAL	1626

The UCLA TDG webinar series created value for both the organization and the audience. A total of 2123 people registered resulting in over 700 sign-ups for the UCLA TDG E-Newsletter. The webinars were highly attended by Industry (25%), UCLA Staff (25%), and Education (17%). Other attendees were categorized as General (11%) which were those who did not self-identify, Investors (5%), Non-Profits (4%), Medical (4%), Science (3%), Students (3%), Media (2%) and Legal (1%).

All webinars can be seen on the UCLA TDG YouTube Channel. **IM**

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UCLA TDG team members bonding over a weekly game of Kahoot!

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For more information, please visit: TDG.UCLA.EDU

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