
INDUSTRY INVENTORS INVESTORS
6TH ANNUAL
MedTech
PARTNERING CONFERENCE
TUESDAY MARCH 6, 2018
UCLA CAMPUS
UCLA TECHNOLOGY DEVELOPMENT GROUP

Conference Program

8:30 am	REGISTRATION/NETWORKING

MORNING SESSION

9:00 am	WELCOME Roger Wakimoto, Vice Chancellor, Research, UCLA
9:15 am	KEYNOTE – TRANSLATION OF INNOVATIONS IN PATIENT CARE AT UCLA HEALTH Johnese Spisso, President, UCLA Health and CEO, UCLA Hospitals and Clinical System
9:45 am	BREAK
10:15 am	INDUSTRY PANEL SetPoint Medical | Medtronic | Magstim Group | Cala Health
11:15 am	NEUROSTIMULATION: RESEARCH TO PATIENTS Nick Terrafranca – NeuroRecovery Technologies
12:00 pm	LUNCH

AFTERNOON SESSION

1:00 pm	KEYNOTE – TRENDS IN MEDTECH Eileen Coveney, Managing Director, L.E.K. Consulting
1:30 pm	INVESTOR PANEL Arkitekt Ventures | New Enterprise Associates | Truffle Capital | Action Potential VC | Johnson & Johnson Innovation
2:30 pm	BREAK
3:00 pm	STARTUP PITCHES
4:00 pm	WINE & CHEESE RECEPTION
5:00 pm	EVENT CLOSE

Contents

Anthony K. Arnold

President and CEO

SetPoint Medical

Tony is President and CEO of SetPoint Medical, a biomedical technology company developing a bioelectronic therapy for patients with debilitating IBD, RA and other chronic inflammatory diseases. Prior to assuming the role of CEO Tony served as COO for SetPoint.

Tony has 20 years of experience in the development and commercialization of high-tech medical devices. Prior to SetPoint, he founded Synapse Strategy to provide executive consulting services for leading device firms. Prior to Synapse, Tony served as VP, Marketing for BSC Neuromodulation. Tony was also Director of Marketing at Medtronic, responsible for the launch of the StealthStation® system. Prior to Medtronic, Tony held a variety of positions of increasing responsibility in marketing and R&D with Smith + Nephew.

Tony holds a bachelor's in mechanical engineering and attended the UCLA Anderson School of Management for medical marketing. Tony, his wife Rebecca and their three kids live in Valencia, California.

Enke Bashllari

Managing Director

Arkitekt Ventures

Dr. Enke Bashllari is a neuroscientist and venture investor. She is the Managing Director of Arkitekt Ventures, an early stage fund with investment focus on novel models of healthcare delivery and applications of frontier technology such as artificial intelligence, augmented reality and brain machine interfaces to medicine. Enke actively serves as advisor and mentor to many early stage technical founders. Enke is a member of the New York Academy of Sciences, earned her PhD from Columbia University and holds an MBA from Harvard Business School.

Tak Cheung

Principal

New Enterprise Associates

Tak Cheung MD, MBA is currently a Principal at New Enterprise Associates focused on medical device investments. Tak was previously a Venture Partner at the Merieux Development Venture Fund where he led all phases of investment for healthcare startups, including sourcing, diligence and investment approvals. Tak also co-founded Lexington Medical, a medical device startup in the gastrointestinal surgery space that began commercialization in 2017. Prior to Merieux and Lexington, Tak was VP of Business Development for the Global Surgical Division at Bausch & Lomb, and was responsible for all business development efforts for the ophthalmic surgical division. Tak has held various corporate and business development leadership roles at Edwards Lifesciences in the Heart Valve Therapy Division and Advanced Medical Optics (acquired by Johnson & Johnson).

Tak received a BS with Honors in Engineering and Applied Science from the California Institute of Technology, an MD from the University of California, Irvine, and an MBA from Harvard Business School.

Alain Chevallier

Life Science Partner

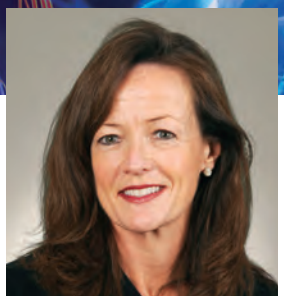
Truffle Capital

Alain is a Life Science Partner at Truffle Capital where he contributes to the fundraising efforts, leads deal sourcing and provides strategic support to portfolio companies.

He joined the firm in 2007 as a Venture Partner before being promoted to his current role in 2016. Among other projects, Alain successfully co-founded Splicos SAS (now Abivax) with Truffle Capital (2008), served as Chief Financial Officer of Deinove (2010) and Abivax (2013), and as Chairman of Carbios (2011). During his tenure, he successfully listed Deinove, Abivax and Carbios on the Euronext stock exchange, raising then more than 100 M USD of new money.

Alain was previously a senior executive at Sanofi where he spent 30 years developing the business globally. During his time with the firm, he served as CEO in Central America and in Japan and eventually CFO of Aventis Pharma SA then Sanofi Aventis France.

Alain holds an MBA in Finance and Accounting from HEC Paris (Ecole des Hautes Etudes Commerciales-Paris).



Eileen C. Coveney

Managing Director

L.E.K. Consulting

Eileen Coveney is a Senior Partner and Managing Director in the Global Life Sciences Practice of L.E.K. Consulting. Eileen has twenty-five years of experience advising global BioPharmaceutical companies in developing and executing growth strategies. Eileen has led L.E.K.'s U.S. Life Sciences Practice and from 2013–2015 was based in London to lead L.E.K.'s European Life Sciences Practice. Eileen sits on the firm's Global Investment Committee and Remuneration Committee.

Ms. Coveney has advised over 250 Biopharmaceutical and MedTech companies with critical issues such as product and franchise strategy, commercial go-to-market strategy, acquisitions strategy and valuation, partnering strategy, R&D prioritization and strategic planning.

Eileen is a leading advisor in the area of Royalty Monetization where she has advised numerous royalty holders including Biopharmaceutical companies, Medtech companies, Inventors, Academic Institutions, and Royalty Funds. She has developed an approach to product and portfolio commercial opportunity assessment that has facilitated over 60 global royalty monetization deals that have provided critical financing for these clients.

Prior to joining L.E.K. Consulting, Eileen gained 10 years of experience in the financial services sector in Investment Banking. Eileen earned her M.B.A. at Harvard Business School and holds a B.A. in Economics from College of the Holy Cross.

David Drasin

New Ventures Principal

UCLA Technology Development Group

David Drasin joined UCLA TDG in August 2017 as part of the New Ventures team. His primary focus as New Ventures Principal is to facilitate the advancement of projects from early data to market, through the UCLA Innovation Fund. In addition, through the Startup in a Box program, David supports UCLA entrepreneurs as they establish and grow their ventures. Prior to joining the New Ventures team, David was a consultant specializing in biopharma commercial strategy across a broad range of therapeutic areas. David received his B.S. from UCLA in Microbiology, Immunology and Molecular Genetics and his Ph.D. from the University of Colorado Anschutz Medical Campus in Molecular Biology, in addition to a postdoctoral training period at UCSF.

Steve Goetz

Engineering Director — Portfolio and Technology

Medtronic Brain Modulation

Steve has over 20 years of experience in various research and development roles with Medtronic Neuromodulation, contributing to development of products in the spinal cord stimulation, implantable pump, and deep brain stimulation therapies. Over the past 7 years, he has focused on brain modulation exclusively, first as chief engineer for DBS and most recently directing the product and technology portfolio for the therapy. He completed a master's degree in electrical engineering from the University of Minnesota, with an undergraduate degree in the same field from Rose-Hulman Institute of Technology.

Dave Harrison

Senior Associate, New Ventures

UCLA Technology Development Group

David Harrison joined UCLA TDG in September 2017 as a Senior Associate in the New Ventures group. In this role, he is responsible for advancing UCLA innovation with a focus on medical devices and digital health technologies. Dr. Harrison helps manage the UCLA Innovation Fund and works with entrepreneurs to develop their projects into startups or licensing opportunities. In addition to his role at TDG, Dr. Harrison is a practicing Emergency Medicine physician. He completed his residency at the LA County+University of Southern California Medical Center where he served as Chief Resident. Dr. Harrison earned a combined MD/MBA degree from Tufts University School of Medicine and a BA in Economics from Tufts University in Boston, MA.

Lothar Krinke

CEO

Magstim Group

Lothar has been the CEO of the Magstim Group since May 2017, a company that was formed through the merger of Magstim Ltd. and Technomed Medical Accessories. He has responsibility for establishing and executing a growth strategy for the transcranial magnetic stimulation and intra-operative nerve monitoring businesses globally.

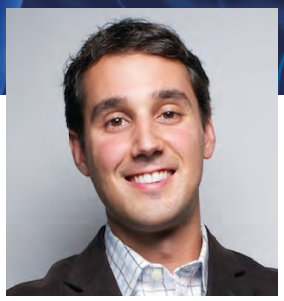
Lothar was named Vice President & General Manager of the Medtronic Brain Modulation (DBS) business in May 2011. In a prior role as Vice President, Research and Business Development at Medtronic Neuromodulation he was responsible for managing internal and external research programs. Prior to joining Medtronic in 2004 as Senior Director, Bioscience Technology Development, he served as Vice President for Business Development and executive team member of Endogeny Bio Corporation, a biotechnology startup company. Krinke has over 10 years of biomedical strategy expertise from top management consulting firms. He completed his postdoctoral as American Cancer Society Fellow at the California Institute of Technology and Krinke holds a Ph.D. in Molecular Biology from the University at Albany. He is a board member of the Brain Mapping Medical Research Organization – UCLA.

Emily Waldron Loughran

Senior Director of Licensing and Strategic Alliances

UCLA Technology Development Group

Emily Loughran joined UCLA TDG in 1994 as a technology transfer officer. Currently, as the Senior Director of Licensing and Strategic Alliances she manages the licensing group in the medical device and physical sciences space. She oversees these areas, large portfolio of invention disclosures, patents, and license agreements. Additionally Emily has launched many strategic initiatives for TDG; founding and developing branded and ongoing events such as the UCLA Annual MedTech Partnering Conference, the annual Code for the Mission App Competition, Pathways to Commercialization and First Fridays. Emily is also actively involved with the Innovation Fund initiative that TDG manages. Emily started in intellectual property administration at the City of Hope Medical Center where she was the Technology Transfer Manager responsible for patenting and licensing activities. Emily holds an M.B.A. from USC and a B.S. from UC Berkeley.



Juan-Pablo Mas

Partner

Action Potential VC

Juan-Pablo is a Partner at Action Potential VC (APVC), GSK's Bioelectronic Medicines fund in Palo Alto, CA. He invests in companies that are pioneering bioelectronic medicines (next generation neurostimulation). Juan-Pablo is currently a Board Member of Saluda Medical, SetPoint, Cala Health, Neuspera, and CVRx. He was previously an investor at Lightstone Ventures and Morgenthaler Ventures. There he was a Board Observer of Twelve, Nuvaira, Ardian, Cabochon, and Miramar Labs. Prior to investing, he led teams in R&D and Strategy at Medtronic, and Global Brand Strategy at Eli Lilly & Co.

Juan-Pablo has an MBA from Stanford GSB, an M.S. in Elect Eng from Stanford University, and a B.S. in Elect Eng from The University of Massachusetts — Amherst. He is on the Board of UCSF's Rosenmann Institute, on the Investor Committee for AdvaMed Accel, and the board of the nonprofit InnerCity Weightlifting.

Amir Naiberg

Associate Vice Chancellor, CEO & President

UCLA Technology Development Group

Amir Naiberg serves as Associate Vice Chancellor, and President & CEO of UCLA Technology Development Corporation. He leads the UCLA Technology Development Group, a campus wide resource that serves as a Gateway to Innovation, Research and Entrepreneurship at UCLA. Additionally, he leads the UCLA Technology Development Corporation as Chief Executive Officer and President, a non-profit technology company wholly-owned by UCLA focused on better protecting and optimizing the discoveries and inventions developed through UCLA research. Mr. Naiberg also works in concert with several on campus incubators and accelerators to further advance innovation, entrepreneurship and research at UCLA.

Prior to joining UCLA in August 2016, Mr. Naiberg worked at Yeda Research and Development Co, Ltd., In Rehovot, Israel, the technology transfer company of the Weizmann Institute of Science, ranked as one of the top three technology transfer organizations in the world. At Yeda, he served for ten years as CEO, following five years as General Counsel. Mr. Naiberg is one of the founders of the Israel Technology Transfer Organization (ITTN), a non-profit organization that unites various technology transfer offices throughout Israel. Before joining Yeda, he worked for a private law firm specializing in intellectual property, privacy and cyberspace law. Mr. Naiberg holds law degrees from the Hebrew University School of Law and the University of Connecticut School of Law.

Kate Rosenbluth

Founder and CEO

Cala Health

Kate Rosenbluth is the Founder & CEO of Cala Health, a company leading a new class of electrical therapies and backed by some of the biggest leaders in healthcare and technology. Prior to Cala, she developed data-driven therapeutic, diagnostic and surgical technologies with Brainlab, Autonomic Technologies, Genentech, and UCSF. She has authored more than 50 patents and peer-reviewed publications and is a committed educator, having launched programs including the Masters of Translational Medicine at UC Berkeley and the Accel Innovation Scholars at Stanford University. She sits on the Strategy Group of the Center for Healthcare Innovation and the McKinsey Women's Executive Roundtable. She received a Mechanical Engineering Bachelors from Stanford University and a PhD in Bioengineering from UC Berkeley and UCSF, where she also completed a Postdoctoral Fellowship in Neurosurgery.

Renee Compton Ryan

Vice President Venture Investments

Johnson & Johnson

Renee Ryan, Vice President, Venture Investments, joined Johnson & Johnson Innovation — JJDC, Inc. (JJDC) in 2011. She is based in Silicon Valley, California and primarily supports the strategic investment activities in medical devices.

Mrs. Ryan's background includes over 15 years of healthcare investment banking. Most recently, she ran the medical device investment banking effort at R.W. Baird & Co. Previously, she led the West Coast healthcare group at Jefferies & Co. and was in the healthcare investment banking groups at Goldman Sachs and Credit Suisse.

Mrs. Ryan received an MBA from Columbia Business School and a Bachelor's degree from Georgetown University. She was nominated for the Silicon Valley Business Journal "Women of Influence" in 2011 and participated in the Smith Tuck Global Leaders for Women Program in 2014. She recently was nominated to the Fierce Medical Devices Top Women in Medical Devices 2015 list.

Johnese Spisso

President, UCLA Health

CEO, UCLA Hospitals & Clinic System

Associate Vice Chancellor
UCLA Health Sciences

Johnese Spisso assumed the position of President of UCLA Health, CEO of UCLA Hospital System and Associate Vice Chancellor of UCLA Health Sciences in 2016. She is a nationally recognized academic healthcare leader with 30 years of experience, and oversees all operations of UCLA's hospitals and clinics as well as the health system's regional outreach strategy.

Before coming to UCLA, Johnese spent 20 years at UW Medicine where she was chief health system officer and vice president of medical affairs for the University of Washington. Prior to her years at UW Medicine, Johnese, a registered nurse, rose through the ranks at UC Davis Medical Center to direct critical care; trauma, burn and emergency services; and the Life Flight Air-Medical Program.

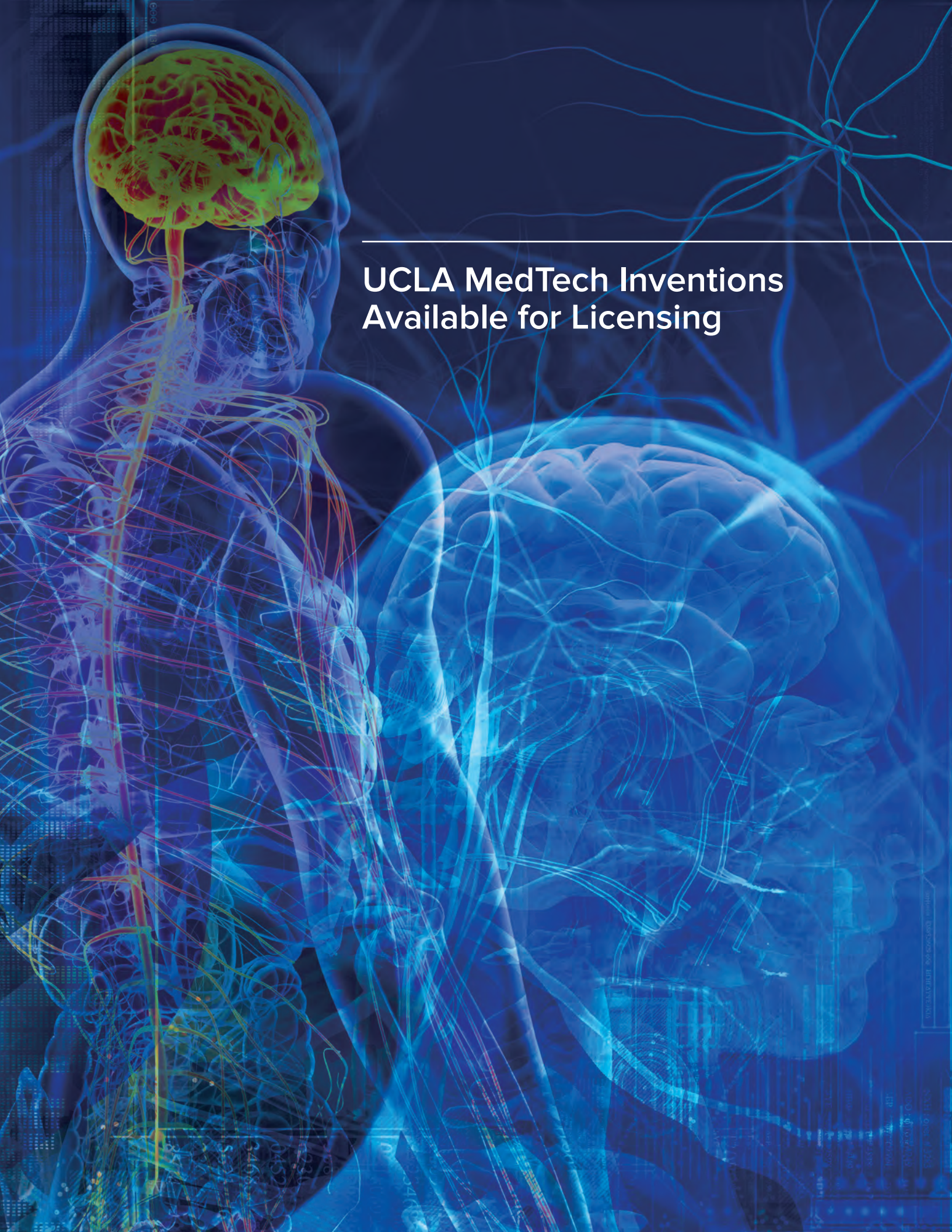
Johnese received a master's degree in health care administration and public administration from the University of San Francisco, and a bachelor's degree in health sciences from Chapman College. She earned her RN at the St. Francis School of Nursing. She is a published author and serves on several national boards.

Roger M. Wakimoto

Vice Chancellor, Research

UCLA

Roger Wakimoto is the UCLA Vice Chancellor for Research. He is an accomplished atmospheric scientist specializing in research on mesoscale meteorology, particularly severe convective storms and radar meteorology. He is a former member of UCLA atmospheric sciences faculty from 1983–2005, serving as department vice chair in 1993–96 and chair in 1996–2000. After his tenure at UCLA, he served as the director of the National Center for Atmospheric Research (NCAR) Earth Observing Laboratory from 2005–2010 and subsequently as director of NCAR from 2010–2013. He most recently served as assistant director of the National Science Foundation Directorate for Geosciences from 2013–2017, where he led a division that supported atmospheric, geospace, polar, earth, and ocean sciences with a $1.3 billion annual budget.



UCLA MedTech Inventions Available for Licensing

Neuromodulation and Recording Technologies

Wireless Implantable System to Restore Memory

Traumatic brain injury (TBI) may cause both anterograde and retrograde memory impairment. While implantable deep brain stimulation (DBS) systems are FDA-approved for the treatment of Parkinson's disease and epilepsy, there are currently no interventional therapies for memory restoration in TBI patients. UCLA researchers have developed a wireless, implantable DBS system that delivers electrical brain stimulation via specially designed electrodes in order to restore and enhance the memory of patients suffering from TBI.

UCLA Case No. 2014-959

Lead Inventor: Itzhak Fried

Patent Status: Pending
Pub. No. US 20170113046

Wireless Wearable Big Data Brain-Machine Interface

In order to improve the investigation, diagnosis, and treatment of brain activity, UCLA researchers have designed a user-friendly brain-machine interface (BMI) that consists of an implanted recording-and-transmitting module, a wearable receiving-and-forwarding module, and a mobile post-processing unit. Whereas previous systems designed to monitor neural activity are limited in data transfer rates and use physically connected wires, this newly designed BMI can wirelessly transmit data at an unprecedented rate of ~1 gigabit/second. This BMI could support research investigating brain activity mapping, the diagnosis of brain abnormalities, and the development of new treatments to prevent or cure brain-related illnesses.

UCLA Case No. 2014-495

Lead Inventor: Wentai Liu

Patent Status: Pending
Pub. No. US 20160323000

A Method for Deep Brain Stimulation Targeting Based on Brain Connectivity

Researchers at UCLA have developed a method to more effectively place the electrodes used in deep brain stimulation by using diffusion-tensor magnetic-resonance imaging (DTI) to customize the implantation protocol for each individual. This new method of precise targeting is based on tractography (i.e., a procedure for visualizing neural tracts) and uses DTI to map brain connections in individual patients. Therefore, the location of the most effective placement of the electrode can be identified for each individual. This methodology may also have significant implications for targeting new regions in the brain that have poor internal anatomical definition using standard imaging.

UCLA Case No. 2011-700

Lead Inventor: Nader Pouratian

Patent Status: US Patent Issued
#9,220,458

Site-Specific, On-Demand Deep Brain Stimulation for Enhancement of Memory in Humans

Researchers at UCLA have developed an advanced surgical procedure that utilizes electrical deep brain stimulation with intracranial electrodes to enhance memory function. In controlled human experiments, the procedure confers significant improvements in spatial learning tasks. The researchers discovered specific brain regions that improve memory task performance over others. The results of these studies suggest that deep brain stimulation is a highly translational and efficacious approach to treating memory and cognition disturbances in a variety of diseases.

UCLA Case No. 2011-330

Lead Inventor: Itzhak Fried

Patent Status: US Patent Issued
#9,403,010

Intelligent Flexible Spinal Cord Stimulators for Pain and Trauma Management through Neuromodulation

Professor Iyer and coworkers have developed a novel spinal cord stimulator (SCS) device that is small, flexible, and can autonomously adjust stimulation patterns for maximum efficacy. The SCS chip can be easily manufactured using microfabrication technology with a high density of electrodes (>1000 cm^2), significantly more than existing systems (32 cm^2). Batteries can be embedded onto the device, eliminating the need for leads and wires. Additionally, on-chip machine learning enables the optimization of stimulation patterns based on individual patient and posture for efficacious pain management.

UCLA Case No. 2018-385

Lead Inventor: Subramanian Iyer

Patent Status: Pending

A Highly-Efficient Near-Field Wireless Power Transfer System that is Immune to Distance and/or Coupling-Coefficient Variations

Power transfer technologies transfer power optimally at one specific distance. As a result, product designs may require a constant distance and therefore include things like magnets in cochlear products to align the implant and external earpiece. UCLA researchers from the Department of Electrical Engineering have developed a wireless power transfer system that can deliver stable power to the load over a large range of distances. Additionally, the circuitry is mainly built at the power transmitter side of the system, allowing the receiver end (e.g. biomedical implant) to remain very small.

UCLA Case No. 2016-390

Lead Inventor: Asad Abidi

Patent Status: Pending
Pub. No. US 20170353048

Autonomous Thermoelectric Energy-Harvesting Platform for Biomedical Sensors

To make thermoelectric energy harvesters (TEH) a truly autonomous energy source for size-constrained, wireless biomedical sensors and eliminate the need for batteries, it has been necessary to drastically improve their energy density and conversion efficiency. UCLA researchers from the Department of Electrical Engineering have developed an autonomous energy source for implantable biosensors by developing a TEH that can operate with a 68% end-to-end peak efficiency with <20 ms tracking time, and start-up voltages as low as 65 mV. A 645 µW regulated output power was harvested from the head of a rat (0.83 cm^2 surface area) with an implanted TEH device. The new TEH device achieves a 7.9x improvement in regulated power density and represents the first fully autonomous energy harvesting platform for energy-starved applications.

UCLA Case No. 2015-245

Lead Inventor: Dejan Markovic

Patent Status: Pending
Pub. No. US 20170338394

Silicon Microsystems for High-Throughput Analysis of Neural Circuit Activity

Functional MRI (fMRI) and electro-encephalography (EEG) techniques can provide coarse-grained pictures of neuronal activity in the brain; however, they are unable to provide information on rapidly changing activity of single neurons, which is key to unraveling how the brain codes information. UCLA researchers in the Department of Neurobiology have developed a unique electrode array capable of simultaneously mapping neural activity from two or more brain structures. This technology addresses major technical obstacles of recording single neuron activity and expands on the potential for neuronal monitoring by allowing single-cell-resolution measurements of activity from numerous networked brain structures. In addition to enhanced recording performance, these new electrode array-probes will be more cost-effective to manufacture, as well as smaller and hence less invasive.

UCLA Case No. 2013-039
Lead Inventor: Sotiris Masmanidis
Patent Status: Pending
Pub. No. WO 2014085787

Intracranial Implantable Mechanical Device for Housing Neurostimulators or Drug Infusion

Traditional implantable brain stimulators and drug infusion pumps require stimulation generators and drug pumps to be implanted in the patient's chest, with wires or catheter tubes running up through the neck. UCLA researchers in the Department of Surgery have developed a novel device described as the Skull Universal Indweller for Generators (SUIG) to house cranial energy or drug delivering apparatuses. A rigid mechanical enclosure houses an implantable electrical pulse generator (IPG) or drug infusion pump in the thickness of a removed portion of the skull, eliminating the need for wires and tubes tunneling through the neck. Enclosures can readily accommodate a range of commercially available IPGs and pumps.

UCLA Case No. 2008-616
Lead Inventor: Scott Krahl
Patent Status: US Patent Issued #9,421,363

Quantitative EEG Method to Identify Individuals at Risk for Adverse Antidepressant Effects

Antidepressant medication has demonstrated efficacy for the symptoms of depression, but some individuals may experience adverse effects on mood during antidepressant treatment that could result in harm to themselves or others. Researchers at UCLA have developed a method that identifies patients likely to experience adverse effects from antidepressant medication. A patient's response to the treatment is measured by using quantitative electroencephalographic recordings (QEEG). This method has been validated in a small double-blind placebo-controlled clinical trial with 97% accuracy. Patient response to medication was corroborated by using standard clinical checklists that diagnose adverse symptoms.

UCLA Case No. 2006-262
Lead Inventor: Aimee Hunter
Patent Status: US Patent Issued #8,521,270

Sensors and Patient Monitoring Devices

Wireless Remote Sensing of Changes in Fluid Filled Containers

Trials of remote sensing of patient metrics, such as blood pressure, have been successful in reducing hospital visits and medical costs by increasing the accuracy and amount of data, while lowering the amount of staff time necessary to take the data. However, for accurate fluid management, staff must measure and analyze the fluids, their flow rates, and their compositions in order to ensure quality care. UCLA researchers have developed a novel device and method for continuous and dynamic monitoring of patient fluids. This technology may extend beyond patient fluids to other medium such as evaluation of air (air leaks) following lung surgery or injury that guide timely management of drainage tubes. Wireless remote sensing technology may quickly detect changes in fluid or air measurements suggestive of complications before or after surgery enabling earlier discharge from the hospital and safer outpatient monitoring.

UCLA Case No. 2014-499
Lead Inventor: Dieter Enzmann
Patent Status: Pending

Automated Optical Chest Tube Air Leak Detection System

Researchers at UCLA have developed an air leak detection system that consists of a LED and photo-detector placed on the "waterseal chamber" portion of a chest tube drainage system that is normally used clinically to visibly detect air leaks. This system is connected to a computer system that generates a time log of the amount of air leaking out of the chest tube drainage system and allows for 24 hour monitoring. It also alerts hospital staff in case of irregular behavior.

UCLA Case No. 2016-049
Lead Inventor: Peyman Benharash
Patent Status: Pending

BigFoot: Analysis, Monitoring, Tracking, and Sharing of Biomedical Features of Human Appendages

Many diabetic patients suffer from peripheral neuropathy, a disorder that results in the loss of sensation in their extremities. Individuals with this condition may develop severe infections from sores on the soles of their feet without their knowledge, which can lead to the loss of limbs. BigFoot uses customized software integrated with a commercial flatbed scanner that enables easy image acquisition and analysis of feet abnormalities. For patients that find checking their feet difficult, this tool can easily monitor, track data and share image data in order to identify abnormalities early and prevent complications.

UCLA Case No. 2014-132
Lead Inventor: Aydogan Ozcan
Copyright Status: Pending

Multiplexed Sweat Extraction and Sensing Wearable Interface for Normalized and Periodic Analysis

A novel sweat extraction and analysis platform was developed to resolve the aforementioned bottle neck issues. This platform uses an innovative iontophoresis electrodes/hydrogel for sweat induction. This method made sweat samples accessible on-demand for analysis and doesn't threaten the sample integrity. The platform includes a total of 8 compartments for analysis and a wireless circuit board for control, signal processing and wireless transmission. The compartments consist of arrays of biomarker sensors and calibrating sensors such as pH, skin temperature and sweat rate.

UCLA Case No. 2017-881
Lead Inventor: Sam Emaminejad
Patent Status: Pending

Ultra-Low Cost, Transferrable and Thermally Stable Sensor Array Patterned on Conductive Substrate for Biofluid Analysis

Researchers at UCLA have developed a novel biosensor array that physically decouples the sensing layer and the electrode module. This innovative design consists of a thermally stable disposable sensor array that is fabricated on a conductive and adhesive substrate. This substrate can be easily mounted onto its electrode counterpart, making the electrode module reusable. This design especially benefits devices that require frequent sampling of fresh biofluid. Furthermore, the probe/enzyme activity in this novel sensor array is preserved through applying freeze-drying (lyophilization) technique. This approach enables extended sensing activity in uncontrolled environments, since the sensing reagents would stay in solid form and stay non-reactive at room temperature until coming in contact with body temperature biofluid.

UCLA Case No. 2017-882
Lead Inventor: Sam Emaminejad
Patent Status: Pending

In Situ Sweat Rate Monitoring for Normalization of Sweat Analyte Concentrations

Researchers at UCLA have developed a novel method to monitor sweat rate *in situ* to achieve a normalized measure of the target biomarkers. The sweat rate information allows for characterizing and decoupling the confounding effect of the influential secretion parameters in the transport of the target biomarkers into sweat. The sweat rate information is also a useful measure of hydration status, temperature, and oxygen regulation. Normalization methodology helps mitigate the dependency of the sweat readings on secretion parameters. This sweat rate monitoring method can be incorporated into a wearable device, or it can be integrated into existing consumer electronic devices to provide valuable physiological insight.

UCLA Case No. 2018-218
Lead Inventor: Sam Emaminejad
Patent Status: Pending

Wireless *In Situ* Sensors in Stents for the Treatment and Monitoring of Chronic Obstructive Lung Disease (COPD)

Researchers led by Professor William Kaiser have invented a novel wireless, passive, and biocompatible sensor that can sense flow in bronchoscopically implanted stents *in situ* and in the absence of specialized equipment. This invention can be used as a straightforward electromechanical upgrade to current stent fabrication methods and can be used in place of current stents. This technology offers a safe and convenient method for effectively guiding COPD rehabilitation and treatment that has not been previously available and could potentially be used for other biosensing applications, such as orthopedic and dental implants as well as wearable fabrics (i.e. smart patches).

UCLA Case No. 2009-406
Lead Inventor: William Kaiser
Patent Status: Pending
Pub. No. US 20170319096

Oral Microsensor Arrays for Remote Monitoring of Salivary Electrolytes for Precision Healthcare

This microsensor system is an integrated network composed of a miniature electrochemical microsensor, a smart toothbrush for data collection and power supply, and a remote analysis and feedback system (ROHAS) for personal health monitoring and disease prevention. The microsensor is an RFID-based sensing system bonded to a molar tooth, which conditionally activates during chewing and dynamically measures sodium and potassium levels in the saliva. The toothbrush handle contains a reader that retrieves the measurement data, which is then transmitted to a central cloud server for analysis and monitoring via a smartphone. The toothbrush head is a near field charger that replenishes power supply for the molar bonded microsensor. This solution leads to long-term, unobtrusive and dynamic monitoring of dietary sodium and potassium intake that provides paramount insights into dietary electrolyte effects on disease prevention and progression.

UCLA Case No. 2017-854
Lead Inventor: Vivek Shetty
Patent Status: Pending

The Method of Enhanced Pressure Sensing Performance for Pressure Sensors

UCLA Researchers in the Department of Materials Science & Engineering have developed conductive microstructured air gaps that can be used to create the higher pressure sensitivity, fast response time, and pressure sensing tenability of capacitance-based, transistor-based, or related pressure sensors. Compared to conventional microstructure air-gap devices, these sensors exhibit relatively higher pressure sensitivity and fast response time due to their (i) more compressible dielectrics, (ii) thinner profile, and (iii) inherent viscoelastic behavior of elastomers.

UCLA Case No. 2017-501
Lead Inventor: Xiangfeng Duan
Patent Status: Pending

NMR Probe for Detection of Microstructures

Nuclear Magnetic Resonance (NMR) spectroscopy is a widely-utilized method for analyzing small molecule compositions. However, NMR sensitivity is too poor for diagnostic purposes, limiting its use to academic research. A key component responsible for the sensitivity is the NMR probe, which holds the sample as it is inserted into the magnetic field. UCLA researchers developed an NMR probe with sensitivity superior to current designs. It contains a novel noise reduction mechanism, making it the most sensitive probe of its kind. These properties allow the detection of metabolites at the single cell level. Additionally, the probe has a planar configuration, making it ideally suited for microfluidic chips used for diagnosis and prognosis. It is also made with an ultra small detection region, 0.08 mm length by 0.05 mm width by 0.05 mm height, for samples of small volume and low concentration (such as biological samples).

UCLA Case No. 2012-550
Lead Inventor: Louis Bouchard
Patent Status: Pending
Pub. No. US 20150137807

Robotic Surgery Systems

Multi-Modal Haptic Feedback System

Researchers at UCLA have developed multi-modal haptic feedback systems (HFSs) that are capable of providing benefits for many different robotic surgical applications. Having inherited an existing tactile feedback system designed for reducing crush injuries in robotic surgical procedures, multi-modal HFSs integrate additional modalities of feedback including kinesthetic force feedback, vibration feedback, and various critical enhancements for pneumatic normal force tactile feedback, and design of a highly configurable software architecture allowed the application of the multi-modal HFS in several different RMIS applications. The multi-modal HFSs not only improve upon the previously developed unimodal tactile feedback systems with regards to reduction of grip force in RMIS, improvements to the sensing technology such as design of shear sensing mechanisms also help expand the application of haptics beyond grip force reduction.

UCLA Case No. 2017-877
Lead Inventor: Ahmad Abiri
Patent Status: Pending

Robotic Micro-Surgery System

Researchers at UCLA have developed a robotic system that performs complete micro-surgical procedures by exactly mimicking the motion of a joystick controlled by a surgeon. The system incorporates multiple arms, which can be moved separately or in unison. Each arm holds a surgical instrument that is moved in real time, has high range of motion, and has access to a universal cartridge that facilitates connections for multiple utilities. The instrument precision is further refined by filtering and removing the natural tremor of the surgeon's hand. Additionally, because micro-surgery requires the instrument to mechanically maintain a fixed-point of rotation at the site of penetration, the system incorporates an integrated tracking system that allows the robot to compensate for patient movement. The tracking system also triggers automatic termination in the event that the patient moves beyond a determined threshold.

UCLA Case No. 2009-300
Lead Inventor: Tsu-Chin Tsao
Patent Status: US Patent Issued #9,283,043

Laser-Assisted Intraocular Surgical Alignment

UCLA researchers have developed an automated method to align a remote center of motion (RCM) to a surgically relevant point for robot-assisted surgeries. To assign the RCM, two lasers are mounted on the desired surgical instrument carriage with the RCM as their point of intersection. This intersection point can then be aligned to the desired incision site by combining control of the stage with computerized visual feedback. This automated alignment procedure takes less than two minutes per surgery and requires no physical contact with the patient. Positional accuracy of the alignment technique was within 0.6 mm.

UCLA Case No. 2017-500
Lead Inventor: Tsu-Chin Tsao
Patent Status: Pending

Rapid and Precise Tool Exchange Mechanism for Intraocular Robotic Surgical Systems

Researchers at UCLA have developed a rapid and precise tool exchange mechanism to improve intraocular procedures that is compatible with any intraocular surgery platform. The system consists of a series of tool mounts for receiving surgical instruments, a set of tool collars for universal fitting and a tool-constraint element that secures the tools while also allowing for low force tool removal. This system is also equipped with a rotational actuation method and a translational actuation method that drive the rotational and translational motions of the surgical instrument. This setup allows fast, precise and repeatable tool exchange during surgery. The locking mechanism allows for a single tool to be precisely placed into mounts at the exact same location repeatedly, which dramatically cuts down time spent in tool alignment during surgery. The small form factor of this tool exchange system also allows space to accommodate surgical tubing and wiring, diminishing obstructions between stationary and moving components during surgery.

UCLA Case No. 2018-213
Lead Inventor: Tsu-Chin Tsao
Patent Status: Pending

System and Method for Automated Image Guided Robotic Intraocular Surgery

Professor Tsao and coworkers have developed a robotic surgical platform that incorporates optical tomography for autonomous cataract removal. Highly accurate 3D models are generated and used to automate cataract lens removal, with real-time monitoring and potential intervention by a supervising surgeon. Evaluation of progress can be achieved at regular intervals to ensure complete cataract removal. Robot-guided motion prevents inadvertent contact of the tool tip to the artificial lens capsule, minimizing the most common surgical complications.

UCLA Case No. 2018-214
Lead Inventor: Tsu-Chin Tsao
Patent Status: Pending

Docking System to Stabilize Eyeball during Intraocular Surgery

Researchers at UCLA have developed a novel docking system that can be used to secure an eyeball during intraocular surgery and constrain it relative to an imaging-system probe. The docking system contains a rigid support structure that serves as an interface between the sterile and non-sterile field. The system is also designed with a flexible port that fits over the imaging system probe while securing the eyeball in place relative to the imaging device. A flexible cannula allows insertion, extraction, and tangential movement of the surgical instrument during the surgical procedure. A separate fluid port allows lubricating fluid to flow into the cavity between the interface (separating the sterile and non-sterile surgical field) and the patient's eyeball to maintain lubrication of the eye. The fluid also improves the imaging quality of systems that require a fluid medium, such as for an OCT probe.

UCLA Case No. 2018-215
Lead Inventor: Tsu-Chin Tsao
Patent Status: Pending

Intraoperative Assessment of Implant Positioning

Researchers from the Departments of Mechanical Engineering and Ophthalmology led by Matthew Gerber have developed a modified intraocular lens (IOL) and surgical implantation procedure to treat glaucoma and astigmatism. They have created an imaging system and an algorithm to precisely calculate the position and adjustments needed for correct placement of the IOL. The adjustments can be made by the surgeon or dictated to a robotic surgical interface. They have developed an IOL that pairs with their surgical procedure that allows for ease of position tracking with specialized marks on the IOL and rivets for ease of physical manipulation by the surgeon or robot.

UCLA Case No. 2018-371
Lead Inventor: Jean-Pierre Hubschman
Patent Status: Pending

Surgical Tools

A Video-Guided Chest Tube Insertion System

Dr. Robert Cameron, Professor of Clinical Cardiothoracic Surgery and Surgical Oncology in the Department of Surgery at UCLA, has designed a novel trocar system that supports real-time visual monitoring of chest tube placement. Thousands of chest tubes are placed annually into the pleural space of patients who have excessive air and/or fluid collapsing the lung. Currently, chest tube placement involves either an extremely painful "medieval" incision and clamp technique or a trocar/dilator system, both of which are "blind" procedures often leading to poor tube position, organ damage, and even death. Dr. Cameron's device capitalizes on existing medical video technology to provide real-time monitoring and guidance of anatomical position of the chest tube during placement.

UCLA Case No. 2012-287
Lead Inventor: Robert Cameron
Patent Status: Pending
Pub. No. US 20150342699

IVC Filter Web Retrieval Device

UCLA researchers have developed a new IVC filter retrieval system that can be used for extraction of the web component of an inferior vena cava (IVC) filter, a device designed to stop a blood clot from traveling to the heart and lungs. Generally, the filter is removed when the patient is no longer thought to be at risk for future thromboembolic disease, due to the risk of potential complications associated with longer filter dwell times (including caval thrombosis, IVC or adjacent vessel perforation, and filter migration). Despite that, filter retrieval rates remain low, ranging from 20% to 60%, as IVC filter retrieval requires a trans-jugular approach, and these techniques cannot be used for secure and reliable retrieval of the web component. This device can be used for secure and reliable retrieval of the web component of IVC filters, which cannot be achieved by other filter retrieval systems. After web retrieval, the frame remains in the IVC.

UCLA Case No. 2016-639
Lead Inventor: Bashir Tafti
Patent Status: Pending

Expandable Vascular Sheath for the Removal of Foreign Objects in the Vasculature

Researchers at UCLA have developed a vascular sheath whose diameter can be increased temporarily to allow for capture and retrieval of various foreign objects such as IVC filters. Whereas other vascular sheaths are limited by inflexible tips, this new technology has an expandable feature that allows for adjustment to the irregular size and shape of foreign objects.

UCLA Case No. 2015-167
Lead Inventor: Bashir Tafti
Patent Status: Pending
Pub. No. US 20160302908

Bidirectional IVC Filter

Researchers at UCLA from the Department of Radiology have developed an improved IVC filter with better filtering performance that is easily retrievable. Their filter is specially designed to have minimal contact with the vessel, which makes retrieval simple. Unlike other filters, this new design offers flexibility in that it can be implanted and retrieved from either the jugular or femoral veins. It also has a finer mesh that offers more protection than other filters. In the future, this design can also incorporate a drug eluting component for even better results.

UCLA Case No. 2014-422
Lead Inventor: Bashir Tafti
Patent Status: US Patent Issued
#9,289,280

Image-Guided Irrigating Suction Cannula for Removal of Intracerebral Hemorrhage and Other Lesions

Intracerebral hemorrhages (ICHs) are potentially life-threatening conditions that occur when a blood vessel ruptures within the brain and causes an accumulation of blood. Dr. Neil Martin at UCLA has designed a simple multifunctional cannula system for performing minimally invasive image-guided evacuation of ICHs. After making a small burr hole in the skull, the cannula system is inserted toward areas of localized bleeding to both evacuate excess blood and irrigate the wound site until hemostasis is reestablished. With multiple instrument adapters, this system is capable of performing visual endoscope guidance, stereotactic image guidance, MRI image guidance, and computerized tomography image guidance. Additionally, Dr. Martin's instrument may be adapted to allow the use of a rotational clot or tissue fragmentation device for hematomas with higher levels of blood clotting.

UCLA Case No. 2014-320
Lead Inventor: Neil Martin
Patent Status: Pending
Pub. No. US 20170197017

Innovation of the Cerebral Shunt System

Researchers at UCLA have developed a blockage-free cerebral shunt system to prevent obstruction in the CSF drainage system. A common cerebral shunt consists of a distal part (distal catheter), a valve and a proximal part (ventricular catheter), which attributes to 30.4% of the obstruction. The innovative cerebral shunt design features an outer porous tube that allows continuous flow of CSF, and an inner air tube that uses pressurized air to push away debris accumulated at the pores of the outer tube. The air is generated under pressure in a cyclical fashion by a motor that is fitted on top of the shunt system. The blockage-clearing air pulse is generated once or more daily based on the amount of debris accumulated around the outer tube. Once the debris is cleared, the CSF can flow into the drainage tube again through the pores without obstruction, and the system stops generating pressurized air. This novel self-clearing design can prevent obstruction in the proximal part of the cerebral shunt system, reducing complication symptoms in hydrocephalus patients and extending cerebral shunt lifetime.

UCLA Case No. 2018-009
Lead Inventor: Thirusivapragas Subramaniam
Patent Status: Pending

Organ Resuscitation Solution and System for Enhanced Liver Transplantation

Researchers in the Department of Surgery and UCLA Pfleger Liver Institute have developed a novel solution and system to minimize the tremendous degree of ischemia and reperfusion injury (IRI) associated with liver transplantation. The invention serves to replenish exhausted nutrients and resuscitate the organ before revascularization. In a swine model, use of the novel solution and system demonstrated enhanced liver function and improved survival compared to conventional approaches. This system may salvage livers, deemed to have incurred severe degree of ischemic injury and discarded, to transplantable organs. A solution and system to alleviate organ damage from IRI would have significant consequences on patient outcomes as well as the availability of transplantable organs.

UCLA Case No. 2012-292
Lead Inventor: Johnny Hong
Patent Status: Pending
Pub. No. US 20140329221

Lung Isolation System

Researchers at UCLA have invented a novel system that achieves reliable lung isolation using a standard large bore single lumen endotracheal tube, which maximizes compatibility with other devices. The system enables true dual lumen lung isolation/ventilation thus enabling all the benefits of both a double lumen tube and a bronchial blocker (the current methods of treatment) without the downsides of either. It also incorporates a video visualization system, thus precluding the need for traditional fiberoptic bronchoscopy.

UCLA Case No. 2011-739

Lead Inventor: Nir Hoftman

Patent Status: US Patent Issued #9,744,323

Novel Surgical Device for Scleral Buckling Retinal Detachment Repair

UCLA researchers Michael Klufas and Jean-Pierre Hubschman and colleagues have invented a novel surgical tool that aids in the placement of scleral buckles for the treatment of detached retinas. The compact tool allows the surgeon to directly visualize the sclera during the procedure, allowing for more accurate and acceptable placement of both the scleral buckle and drains. Currently, placement of subretinal fluid drains is done 'blind' in most clinics. The device requires no electronics and can be used with standard ophthalmic equipment. It can also be utilized as a teaching aid for new ophthalmic physicians.

UCLA Case No. 2016-99K

Lead Inventor: Michael Klufas

Patent Status: Pending

Diagnostic Tools

Multi-Modal Depth-Resolved Tissue Status Monitor

Researchers at UCLA have developed a portable tissue status monitor that sits on the surface of the skin and can provide depth-resolved information about tissue health status, which is of paramount importance where tissue is very thin or consists of multiple layers. The monitor uses a variety of sensors to perform not only near-infrared spectroscopy, but also ultrasound, pressure, temperature and stretch sensing. In providing depth-resolved physiologic information, the technology may be used to monitor tissue after vascular surgery, during prolonged surgeries, or after mastectomy. In addition, the device can fit easily under surgical dressings or casts, and operates wirelessly, making it rather simple to use.

UCLA Case No. 2013-527

Lead Inventor: Warren Grundfest

Patent Status: Pending
Pub. No. US 20160022223

Fine Needle Device for the Measurement of Material Properties

Researchers at UCLA have utilized a needle device that allows for the *in vivo* cancer diagnosis of solid tumors such as thyroid, breast, and liver by mapping the quantitative insertion forces that occur during needle insertion.

UCLA Case No. 2014-513

Lead Inventor: James Gimzewski

Patent Status: Pending
Pub. No. WO 2016025389

A Device for *In Vivo* Characterization of Body Fluids

The rheological properties of certain fluid reservoirs in the body, such as the vitreous humor of the eye, hold clinical value for monitoring a variety of disorders as well as evaluating effects of therapeutic treatments. However, no devices currently exist to rapidly assess fluid properties in humans *in vivo*. Dr. Pirouz Kavehpour, Professor in the Department of Mechanical & Aerospace Engineering at UCLA, and colleagues have developed a needle-like probe to directly quantify the rheological properties of human body fluid in real time. Dr. Kavehpour's work has demonstrated that the physical properties of human body fluid can be informative in determining macromolecular structure and organization within an organ and that this information may be useful for detecting and monitoring disease. This probe has the advantages of being minimally-invasive and can measure fluid properties *in vivo*, obviating the need for fluid extraction. Thus, this device can be used to diagnose the risk or the presence of a degenerative or pathologic state through measurement of body fluid.

UCLA Case No. 2011-208

Lead Inventor: Pirouz Kavehpour

Patent Status: Pending
Pub. No. US 20150148649

A Non-Intrusive and Portable System for Assessment of Sleep Apnea

Researchers at UCLA have designed a novel non-intrusive, remote health monitoring system for assessing sleep apnea. Studies have shown that OSA is associated with dysfunction in cardiovascular regulation of blood pressure and blood circulation. This sleep apnea screening system aims at predicting the sleep apnea by triggering and observing cardiovascular responses in participants. This system consists of a mobile phone, a Bluetooth-enabled blood pressure monitor, a Bluetooth-enabled pulse oximeter and a Valsalva box. During the test, the Android application implements a 20-minute protocol that guides users through a series of challenges that have been medically shown to trigger cardiovascular responses. Based on the user's blood pressure, heart rate and blood oxygen saturation measurements, all collected by the application, advanced feature selection and machine learning algorithms are used to identify the user's key contextual features and build effective prediction models that help identify OSA patients.

UCLA Case No. 2015-501

Lead Inventor: Majid Sarrafzadeh

Patent Status: Pending

Spatio-Temporal Pacing and Recording for Evaluation, Induction, and Mapping of Arrhythmias

Researchers led by Marmar Vaseghi from the David Geffen School of Medicine at UCLA have developed a high density electrode array to evaluate, induce, and map arrhythmias. This new electrode array has greater contact with the heart than previous arrays, which allows for more reliable stimulation and recording. Their electrode array has a high density of electrode contacts to create a detailed electrical map of the heart and extract electrical properties that makes it easier to locate sources of arrhythmia. Additionally, this new array can stimulate using multiple electrodes at once or in sequential order, rather than using only one site like current electrode arrays. This makes the induction of arrhythmias for diagnostic purposes more efficient and can even be used while the patient is under anesthesia. Their arrays can be delivered through open chest surgery, a catheter, or an endoscope depending on which part of the heart the cardiologist wants to observe.

UCLA Case No. 2018-375

Lead Inventor: Jeffrey Ardell

Patent Status: Pending

Homogenous Entropy-Driven Biomolecular Assay (HEBA)

Professor Di Carlo and colleagues have developed a novel biomolecule detection assay utilizing small oligonucleotides which immediately generates signal in the presence of a specific analyte. HEBA is a single-pot assay capable of detecting the presence of a biomolecule in relevant bio fluids at room temperature in 10 minutes. HEBA overcomes multiple limitations of current molecule detection assays as it does not require washing steps or temperature cycling, is enzyme independent, does not require immobilization at a surface, and is sensitive to the attomolar range in a microfluidic digital assay platform. Compared to current assay methods HEBA improves the level of detection of analyte, is performed as a homogeneous assay and requires only ten minutes for detection.

UCLA Case No. 2015-579
Lead Inventor: Dino Di Carlo
Patent Status: Pending

Drop-Carrier Particles for Digital Assays

UCLA researchers led by Prof. Dino Di Carlo have developed a new low-cost multi-material particle that acts as a shuttle or carrier for a desired drop for digital assays. Each particle has a hydrophilic core for substrate or analyte binding, surrounded by a hydrophobic exterior. These types of dual-material particles can be designed with 3D shapes such that they can encapsulate, support, and stabilize water drops in the interior of the particles while being suspended in an oil phase to prevent coalescence of drops needed for digital assays.

UCLA Case No. 2017-533
Lead Inventor: Dino Di Carlo
Patent Status: Pending

Imaging Tools

Non-Invasive Optometric Medical Diagnostic Device

UCLA researchers have created a fast, low-cost, and non-invasive approach for diagnosing various skin-related diseases. The technology takes advantage of the temporal response of endogenous fluorophores to a pulse of excitation light. A non-invasive optometric device is used to measure skin autofluorescence which depends on the health of the patient. The optometric device can be used to diagnose any disease affecting the auto-fluorescence of the skin. Examples include hyper-pigmentation diagnosis of non-melanoma skin cancer, photo-aging caused by UV, and monitoring utriculus. It can also be used to determine the depth and size of a cancerous lesion and changes in skin morphology. The device could be used for—but is not limited to—monitoring diabetes, skin-related disorders, cancer, acne, and photo-aging.

UCLA Case No. 2004-657
Lead Inventor: Laurent Pilon
Patent Status: US Patent Issued #7,904,140

Rapid, Portable and Cost-Effective Yeast Cell Viability and Concentration Analysis Using Lensfree On-Chip Microscopy and Machine Learning

UCLA researchers led by Prof. Aydogan Ozcan have developed a novel portable lab-on-chip lens free microscope system to monitor yeast cell viability and concentration. Furthermore, the device utilizes machine learning algorithms to process images, eliminating user subjectivity, and reducing acquisition and analysis time. These dual developments have allowed for the development of the Automated Yeast Analysis Platform technology which yields data that agrees well with current gold-standard technologies.

UCLA Case No. 2017-093
Lead Inventor: Aydogan Ozcan
Patent Status: Pending

Quantitative Fluorescence Sensing Through Highly Autofluorescent and Scattering Media Using Cost-Effective Mobile Microscopy

UCLA researchers have developed a novel method for quantitative fluorescence sensing through highly autofluorescent and scattering media. The inventors have created a compact and cost-effective fluorescence microscope to perform quantitative measurement of the concentration of a target fluorescent dye embedded inside a tissue phantom that mimics the autofluorescence and scattering characteristics of human skin. Then, a spatial Fourier transform-based image-processing method is used. This method takes advantage of the spatial modulation of the excitation beam. It digitally separates the signature of the target fluorescent signal from tissue autofluorescence although they severely overlap in space and optical spectrum.

UCLA Case No. 2016-833
Lead Inventor: Aydogan Ozcan
Patent Status: Pending

Demosaiced Pixel Super-Resolution for Multiplexed Holographic Color Imaging

UCLA researchers have developed a new high-resolution color microscopy technique, which solves Bayer CFA related spatial sampling limitations and color artifacts of previous color de-multiplexing approaches, significantly improving the performance of holographic high-resolution color imaging. This D-PSR approach first captures a plurality of raw holograms on a Bayer color sensor chip using simultaneous multi-wavelength illumination, where the sensor plane is shifted by small increments. Then it performs pixel super-resolution based on these sub-pixel shifted raw holograms to digitally synthesize smaller pixels (e.g., by a factor of ~3 fold) for each element of the Bayer CFA. Using the pre-calibrated spectral cross-talk matrix of each filter of the Bayer CFA at the selected illumination wavelengths, this approach de-multiplex three color channels, each of which is also pixel super-resolved.

UCLA Case No. 2016-802
Lead Inventor: Aydogan Ozcan
Patent Status: Pending

Mobile Phone Based Fluorescence Multi-Well Plate Reader

UCLA researchers working with Dr. Aydogan Ozcan have developed a fluorescence microplate reader integrated onto the optical camera interface of a mobile phone. This device uses a cost-effective fiber optic bundle to create the microplate reader.

UCLA Case No. 2017-440
Lead Inventor: Aydogan Ozcan
Patent Status: Pending

Corneal Hydration Sensing with THz Illumination

Proper corneal hydration levels are critical to maintaining optical vision. Researchers at UCLA have developed an imaging system to detect corneal hydration levels by illuminating the cornea with low power, low energy, terahertz (THz) frequency light and measuring the magnitude of the reflected THz signal. The system is capable of resolving 0.18% changes in the water concentration of the cornea *in vivo* and results suggest a ~3x increase in dynamic range over ultrasound-based pachymetry. This system can be used for detecting inflammation, immune responses, edema, or other disease in the cornea.

UCLA Case No. 2012-100
Lead Inventor: Martin Culjat
Patent Status: US Patent Issued #8,690,331

An MR-Compatible System for Motion Emulation

Researchers at UCLA from the Departments of Mechanical Engineering and Radiological Sciences have developed a magnetic resonance- (MR-) compatible device that can emulate respiratory motion. Unlike other devices on the market, the lack of ferrometallic or electromagnetic components makes this device completely MR-compatible. This device can move 25 mm in one direction to mimic human respiration, but an amplifier can increase this range to 50 mm to mimic larger respiratory profiles. Their invention can emulate pre-recorded respiratory profiles from patients with less than 2% error and sub-millimeter error with amplification.

UCLA Case No. 2017-506
Lead Inventor: Tsu-Chin Tsao
Patent Status: Pending

Device Materials

Flexible Fan Out Wafer Processing and Structure: FlexTrate™

Researchers led by Professor Subramanian Iyer have developed a novel method to fabricate flexible electronics using FOWLP. Unlike conventional technologies, which use large chips with rigid substrates, this technology utilizes small dielets on flexible substrate in order to provide flexibility. Not only can this invention be processed at a wafer-level, but various device dielets with different thicknesses can be integrated and biocompatible resins, such as PDMS, can be used, thus providing heterogeneous integration. These innovative biocompatible flexible devices will have numerous applications, such as wearable sensors and implantable electrodes.

UCLA Case No. 2017-212
Lead Inventor: Subramanian Iyer
Patent Status: Pending

Flexible and Stretchable Interconnects for Flexible Systems and FlexTrate™

Researchers led by Arsalan Alam from the Department of Electrical Engineering at UCLA have developed a novel fabrication technique to create stretchable electronics. The innovation behind their fabrication is two-fold. Their fabrication embeds dies in a proprietary flexible substrate called flextrate that allow their electronics to bend, twist, and roll up. Second, they have created a way to make rigid, metal interconnects robust to stretching and bending. These two facets combine to make their electronics robust to over 500 cycles of stretching and rolling without having any broken connections and while maintaining their efficiency of electrical conduction.

UCLA Case No. 2018-219
Lead Inventor: Subramanian Iyer
Patent Status: Pending

Platform Technology for Customizable Nanoscale Wound Management Tools

UCLA researchers in the Departments of Chemistry, Physics, and Bioengineering, led by Dr. Tim Deming of the Bioengineering department, have developed a platform to create and modify nanoscale vesicles and hydrogels for use in wound management. The poly-peptide based platforms created by the Deming group are customizable in nearly all physical characteristics, can be tailored in size, be loaded with hydrophobic, hydrophilic, or cellular payloads, adaptable to specific delivery locations, low toxicity, are fully synthetic, possess highly reproducible properties, and are inexpensive to prepare compared to solid-phase peptide synthesis. The platform can be used to create novel, need-based nanoscale vesicles or injectable hydrogels, and can be used to augment existing material systems.

UCLA Case No. 2015-124
Lead Inventor: Timothy J. Deming
Patent Status: Pending
Pub. No. US 20170296672

Graphene-Based Catalysts for Biomimetic Generation of Antithrombotic Species

Thrombogenicity (the tendency for blood to adhere to a material's surface) has remained a major challenge for implanted medical devices since their inception. UCLA researchers from the Departments of Chemistry and Materials Science and Engineering have developed a graphene-based catalyst for generating HNO, an antithrombogenic species, for biomedical applications. This material greatly extends the lifetime of antithrombogenicity by using endogenous and abundant glucose and L-arginine for the production of HNO. The graphene-based conjugates can be incorporated into polymer coatings that can be applied to biomedical devices.

UCLA Case No. 2014-521
Lead Inventor: Xianfeng Duan
Patent Status: Pending
Pub. No. US 20160339154

A Novel Polymer Platform for Drug Delivery

Aggressive surgical resection and chemoradiation therapy (CRT) are the dominant treatment course for patients with Head and Neck Squamous Cell Carcinoma (HNSCC), but these approaches often negatively impact patient quality of life, including disfiguration and loss of facial mobility in some cases. UCLA researchers have developed a novel implantable drug delivery device that reproducibly reduces tumor growth *in vivo*, bypassing the traditional HNSCC treatment course. The technology combines biocompatible polymer sheets with anti-tumor drugs and immune-boosting proteins that can be implanted to the surgical bed after debulking of the tumor. These layers of sheets are highly customizable, as they can incorporate multiple drugs at different concentrations and release rates.

UCLA Case No. 2014-235
Lead Inventor: Benjamin Wu
Patent Status: Pending
Pub. No. US 20150094518

Bidirectional Hyperelastic Covers for Woven Stents

Current stent designs frequently result in hazardous wrinkling of the cover upon deployment, substantially increasing the risk of stent failure, and subsequent morbidity. UCLA researchers have developed a novel hyperelastic thin film nitinol (HE-TFN) that can be used to cover medical stents. This porous film maintains a deformation ratio that matches the commercial stent distortion during deployment. As a result, potentially dangerous kinks and folds that arise from the crimping/expanding process are substantially avoided. This ensures the conformal stent delivery and deployment. Furthermore, the design strategy and the hyperelastic material allow customization of the cover to different deformation ratios, making the novel cover widely applicable to various types of commercial stents.

UCLA Case No. 2013-238

Lead Inventor: Greg Carman

Patent Status: Pending
Pub. No. US 20150366686

Surface Modification of Endovascular Devices

Current endovascular procedures for the treatment of vascular diseases use a number of metallic devices including guidewires, stents and coils. Although these materials are commonly used, they have several limitations, such as friction generated during the installation procedure and the need to be on blood thinning medication for a long time after implantation. Researchers at UCLA have discovered a method of treating NiTi, “nitinol,” sheets, wires, or stents that overcomes these limitations. The devices are treated with a type of light, causing them to take on super hydrophilic properties. This conversion increases the affinity between the device and vascular tissue, resulting in the acceleration of the healing process and a reduction in clotting. The hydrophilic device also demonstrates less friction during insertion and delivery.

UCLA Case No. 2008-007

Lead Inventor: Satoshi Tateshima

Patent Status: US Patent Issued
#8,487,284

Improvement of Dental Resins: Decreased Toxicity and Improved Biocompatibility

Resin-based and resin-containing materials are routinely used in dental practice as direct filling materials, fissure sealing agents, and as bonding resins or resin cements for metal, porcelain, resin inlays, veneers, crowns, and bridges. While the use of resin-containing materials is beneficial to the appearance of patients, these materials carry the risks of cytotoxicity and allergy often through resins such as HEMA or TEGDMA. UCLA investigators have discovered that the presence of a chemical inhibitor (CI) can inhibit HEMA- and TEGDMA-mediated apoptosis (cell death) in numerous human cell lines. Not only was cell death inhibited, but the presence of the CI also led to an increased viability and function of treated cells. The results indicate that the CI prevents adverse effects mediated by HEMA, TEGDMA and bleaching agents and may be incorporated into additive resin materials.

UCLA Case No. 2005-379

Lead Inventor: Anahid Jewett

Patent Status: US Patent Issued
#8,481,005

A Fast-Setting Moisture-Tolerant Root Canal Retrofilling and Repair Material

Professor White and colleagues have developed a new endodontic root-end filling, repair, obturating, and pulp capping material. The filling material has none of the disadvantages of currently used materials, such as mineral trioxide aggregate (MTA) and resin-modified glass-ionomers. Yet, it boasts additional advantages such as moisture friendliness, a quick light-cure command set, wide clinical application, and low cost. The technology has applications in dental offices as an alternative to existing materials for root end-filling during root canal surgery and other dental procedures.

UCLA Case No. 2013-309

Lead Inventor: Shane White

Patent Status: Pending
Pub. No. US 20160045403

A Novel Way to Activate Implant Materials

UCLA researchers have developed a novel and inexpensive method to augment the biocompatibility of titanium implants. The method involves a rapid, pre-surgical treatment of the titanium implant that improves osteoblast adherence to the implant surface. Because the treatment has been established as a safe and inexpensive physiochemical treatment for other metallic instruments, the technology will immediately provide a significant technical advantage in clinical and commercial application.

UCLA Case No. 2011-871

Lead Inventor: Takahiro Ogawa

Patent Status: Pending
Pub. No. US 20140119987

Orthopedic Devices and Biomechanics

Tendon-Driven Actuation Module for Robotic Hands

Researchers, led by Dr. Veronica J. Santos in the UCLA Biomechatronics Lab, have developed a compact actuation module that can deliver fast, forceful, high-precision control of any tendon-driven robotic manipulator. The design is based on a rotary motor unit that can exert either uni- or bi-directional (“push-pull”) control of any tendon-driven rotational joint, thereby enabling independent, high-performance control of each individual active degree of freedom in a robotic hand, including a palmar flexion degree of freedom.

UCLA Case No. 2015-071

Lead Inventor: Veronica Santos

Patent Status: Pending
Pub. No. US 20150352725

Soft Shear Force Resistive Sensor Embedded Artificial Skin

The inventors have developed a shear sensing artificial skin using bioinspired, thin and flexible liquid metal filled resistive microchannels. The PDMS based sensor skin is wrapped around a finger-shaped effector and fixed at the location of the nail bed. When the skin is subjected to shear force it results in one side of the skin in tension and the other side in compression that buckles and bulges similar to a human fingertip. The tension and compression are measured by embedded liquid metal strain gauges adjacent to the nail bed, away from the point of finger-object contact. The sensing philosophy can be expanded to provide spatially resolved tactile information and correlations can be acquired via machine learning processes.

UCLA Case No. 2017-841

Lead Inventor: Veronica Santos

Patent Status: Pending

Functionalized Titanium Implants and Related Regenerative Materials

Researchers at UCLA have developed novel titanium surfaces with enhanced bioactivity. The modified surface uses electrostatic interactions to increase adherence to negatively charged proteins and cells. This surface modification enables direct interaction between proteins and cells. The enhanced protein adsorption and cell attachment increases titanium's application in tissue integration and regeneration. Immediate broad applicability is possible because this titanium surface processing is simple, highly effective, and inexpensive.

UCLA Case No. 2009-254

Lead Inventor: Takahiro Ogawa

Patent Status: US Patent Issued #9,872,735

Titanium Plates for Bone Regeneration

UCLA researchers led by Prof. Takahiro Ogawa have developed a new titanium plate optimized for bone regeneration. These new plates have optimized surface properties not only for bone generation but also easy separation from bone once it needs to be removed. This may provide a new opportunity for titanium-plate-assisted bone regeneration.

UCLA Case No. 2017-527

Lead Inventor: Takahiro Ogawa

Patent Status: Pending

Titanium Implants with Novel Roughness

UCLA researchers led by Prof. Takahiro Ogawa have developed new titanium implants optimized for bone regeneration. These new implants have optimized hierarchical surface properties generated by multi-scale (meso, micro, and nano) machining to promote bone growth. These implants with hierarchical roughness and design have demonstrated greater strength of bone-implant integration than titanium implants with micro-scale roughness alone. Titanium implants with this new design may address limitations and problems associated with current implant technologies.

UCLA Case No. 2017-529

Lead Inventor: Takahiro Ogawa

Patent Status: Pending

Wearable Real-Time Gait Analysis and Sensory Feedback System for Gait Rehabilitation and Biomechanical Optimization

Researchers at UCLA have developed a wearable sensory feedback system, which combines real-time gait analysis via fully wearable sensors with time-discrete instructive feedback designed specifically to correct specific features of gait. Based on real-time motion analysis derived from the sensor data, this system is able to guide users to achieve a more symmetrical or better-aligned gait. This system can improve the effectiveness of physical therapy by providing physical therapists with more quantitative tools to assess and guide patients in real-time. It could also improve patient participation and compliance by giving time-discrete feedback that reinforces positive changes and discourages negative ones in real-time. This wearable feedback system can be used by the patient in the absence of direct physical therapist oversight, thereby expanding the access of patients to high-quality gait coaching.

UCLA Case No. 2018-387

Lead Inventor: Warren Grundfest

Patent Status: Pending

Objective, Real-Time Acoustic Measurement and Feedback for Proper Fit and Fill of Hip Implants

Orthopedic surgeons currently rely on manual assessment of the fit of implants in bone, leaving the procedure prone to technical errors that require revision surgeries. The present invention helps improve implant fit by aiding surgeons' senses during the broaching procedure by analyzing and classifying acoustic features generated from hammering the broach into cancellous bone. The method monitors the impact between the femoral component of a hip prosthesis with the patient's femur. The impact data is decomposed by a data acquisition and analysis device. Metrics based on a number of acoustic features are calculated to determine the fit and stability of the broach in the femur. Results are classified and output to a user interface to assist the surgeon.

UCLA Case No. 2014-935

Lead Inventor: George Hafzalla

Patent Status: Pending
Pub. No. US 20170112634

Cardiovascular Devices

System and Method for Improved Treatment of Metabolic Acidosis

Professors Thomas Mason and Jeffrey Kraut in UCLA's Department of Chemistry and School of Medicine, respectively, have developed improved materials and methods of treating acute metabolic acidosis, a condition in which pH within a patient has become abnormally acidic and can be life-threatening. The inventors have developed more effective base-treatment solutions involving a strong base, such as disodium carbonate, mixed with a weak base, such as sodium bicarbonate to raise both intracellular and extracellular pH while beneficially consuming dissolved carbon dioxide. Additionally, the investigators have conceived new methods of delivering these formulations in a time- and spatially-varying manner, thereby optimizing the solution's mixing ratio and rate of delivery based on past and present measurements of a patient's blood-gas parameters, including pH.

UCLA Case No. 2013-076

Lead Inventor: Thomas Mason

Patent Status: Pending
Pub. No. US 20150196708

Novel Application of Laser Lithotripsy for Treating Vascular Calcification

Traditionally, vascular bypass surgery has been considered the "gold standard" of treatment for peripheral arterial disease. However, surgery is associated with significant morbidity and mortality, and 40% of these patients are not eligible for surgery. Percutaneous Transluminal Angioplasty (PTA) has been introduced as an alternative to surgical revascularization demonstrating favorable clinical outcomes, but still carries its own limitations. To overcome the limitations of PTA, UCLA researchers have developed a special endovascular catheter that can be used for laser-assisted angioplasty under direct visualization. This method also allows for irrigation and extraction of ablation-induced debris, thus reducing the risk of distal embolization. This method is based on Holmium laser and provides a higher energy and repetition rate for smoother cutting and faster, more efficient tissue ablation.

UCLA Case No. 2012-565

Lead Inventor: Bashir Tafti

Patent Status: Pending
Pub. No. US 20150150442

Novel Catheter for Precise Stent Delivery

Current therapeutic strategies for the management of cerebrovascular disease (CVD) include endovascular stents to expand a narrowed or blocked artery. The flexible nature of the stent that permits expansion and enables passage through tortuous blood vessels also imposes a technical challenge, known as foreshortening, to the accurate placement of the stent. Foreshortening describes the change in length of the stent as it elongates to fit the confines of the delivery catheter and shortens following its expansion within the target vessel—leaving the surgeon to estimate precise placement. UCLA clinician Dr. Satoshi Tateshima in the Division of Interventional Neuroradiology has developed a novel catheter to help anticipate the degree of foreshortening during stent deployment. The present technology overcomes the inherent limitations of the widely used braided and laser cut stents—providing a superior device with increased placement accuracy and ease of use.

UCLA Case No. 2012-218

Lead Inventor: Satoshi Tateshima

Patent Status: Pending
Pub. No. WO 20150238278

Unobstructing Microdevices for Self-Clearing Implantable Catheters

Implanted medical catheters are now an integral part of clinical care. However, many chronically-implanted catheter systems are plagued with reduced performance as a result of accumulating biological debris. Dr. Jack Judy and colleagues in the Department of Bioengineering at UCLA have developed an unobstructing microdevice for self-clearing catheters that alleviates flow obstruction. The researchers designed micro-mechanical mechanisms to disrupt the accumulation of biological material and keep catheter pores clear of debris. This device may be directly integrated into commercially available catheter systems for use in existing surgical techniques (e.g. chronically implanted catheters).

UCLA Case No. 2010-175

Lead Inventor: Jack Judy

Patent Status: US Patent Issued
#9,604,039

Dual Rotational Stent

Researchers at UCLA invented a novel dual rotational stent device for the endovascular treatment of cerebral aneurysm without the need for placing coils in the aneurysm lumen. The adjustable and variable struts density pattern of the new stent device allows it to cover the orifice of the aneurysm. This is advantageous for causing blockage of blood flow to the occluding aneurysm while sparing blood flow to perforators or side branches near the aneurysm neck. Specifically, the new compound stent has two main, but separate components; one for being positioned and stabilized in the parent vessel spanning the neck of the aneurysm, and another for controlling the degree of blood flow into the aneurysm.

UCLA Case No. 2009-668

Lead Inventor: Dieter Enzmann

Patent Status: US Patent Issued
#9,763,812

Bioactive Endovascular Coils

Researchers at UCLA have developed a detachable endovascular coil system with increased biological activity. These coil materials are inherently bioactive and can be further coated with, or act as a delivery vehicle for, bioactive or therapeutic agents, such as drugs to control the inflammatory reaction inside an aneurysm. The innovation maintains the mechanical flexibility of the coils, ensuring that they are highly effective at preventing blood flow. These improvements will accelerate aneurysmal healing and minimize their rate of recurrence.

UCLA Case No. 2011-135

Lead Inventor: Benjamin Wu

Patent Status: Pending
Pub. No. US 20140180395

Brain Collateral Perfusion Augmentation by Cerebral Venous Pressure Modulation

UCLA researchers have developed a novel method and device to improve cerebral blood flow to about 50% of normal baseline value, thereby treating acute or chronic ischemia associated with stroke. The device and corresponding method uses applied pressure to artificially achieve collateral circulation in the brain. To increase cerebral venous pressure and thereby, redirect maldistributed blood flow, the device creates an occlusion of one or more veins coupled to the collapsed vessel. The device consists of an elongated tubular member with proximal and distal ends for insertion into a patient's superior vena cava (or other vein), an expandable occluder located at the distal end of the tubular member (the occluder has an expanded and a collapsed state), a device to measure pressure at the distal end of the tubular member, a device to measure cerebral blood flow in the patient, and a controller programmed to actuate the expandable occluder as a function of the measured venous pressure and the measured cerebral blood flow.

UCLA Case No. 2009-224

Lead Inventor: David Liebeskind

Patent Status: US Patent Issued
#9,833,598

Fully Implantable Artificial Heart

Professor Grundfest and coworkers have developed a totally implantable artificial heart. Requiring no protruding tubing, the heart does not use hydraulic fluid, but instead uses a design based on the human lung. A motor is attached to a synthetic membrane, which pushes blood through the ventricles via a connected, fluid-filled cavity. This enables the heart to be lighter and smaller, with subsequent reduced power consumption. The artificial heart may be able to function with no external power supply, and the completely implantable system minimizes risk of infection from protruding tubing.

UCLA Case No. 2018-389

Lead Inventor: Warren Grundfest

Patent Status: Pending

Artery Finder

Dr. Rejai has proposed a novel device to assist with arterial cannulation which provides the benefits of ultrasound (greater sensitivity and success rate) with the ease-of-use of traditional palpation (lack of cumbersome setup). The new device concept combines a pressure sensing layer that detects arterial pressure which is in turn reported by a visual output utilizing either a color changing material or LED component. Combining these two components allows for the visualization of the artery as defined by the arterial pressure being exerted at the time of cannulation, ultimately allowing the practitioner to find the artery and obtain best visual cues by refining the image as displayed on the visual component.

UCLA Case No. 2016-269

Lead Inventor: Sepehr Rejai

Patent Status: Pending

Radiation Oncology

A Breast Immobilization Device to Improve Radiation Therapy Dosimetry

Breast setup and immobilization is a difficult problem for external beam radiation therapy of breast cancers. A lack of setup reproducibility with breast tissue results in sub-optimal dosimetry and tissue toxicity in non-targeted, healthy tissues. Dr. Ke Sheng, Associate Professor in UCLA's Department of Radiation Oncology, has developed a novel breast immobilization device that allows for more comfortable support as well as a robust radiation dosimetry improvement in breast tissue without the skin dose build-up effect that has plagued existing methods. The device is low-cost and modifiable for the desired breast morphology.

UCLA Case No. 2013-077

Lead Inventor: Ke Sheng

Patent Status: Pending
Pub. No. US 20150272682

Magnetic Resonance Imaging (MRI) Device for Improved High-Dose-Rate (HDR) Brachytherapy Treatment Planning

Internal radiation therapy (brachytherapy) involves the positioning of tiny, radiation-emitting sources within tumor tissue by using delivery devices such as catheters, needles or other hollow conduits. Dr. Daniel Ennis, Dr. Jeffrey Demanes, and colleagues in UCLA's Department of Radiological Sciences have developed a device that allows for the effective imaging of the radiation-delivering catheter and the surrounding tissue. Under MRI, the device can be detected with high contrast, thereby providing valuable positioning information of the treatment catheters relative to the tumor and normal tissue. The device will allow optimal positioning of the radiation source for the purpose of radiation therapy. This device has utility in visualizing catheter placement in the body where brachytherapy is the preferred treatment strategy and where catheters are used as brachytherapy conduits.

UCLA Case No. 2012-546

Lead Inventor: Daniel Ennis

Patent Status: Pending
Pub. No. US 20160030768

Device for Global and Targeted Delivery of Brachytherapy to the Bladder Lumen

UCLA researchers have developed a device capable of delivering local radiation to the bladder lumen while essentially eliminating radiation exposure to the rest of the body. The device significantly reduces the potential for overtreatment or misses in an organ whose size, shape, and location change constantly. Furthermore, the device may be modified to accommodate concurrent administration of other types of therapy such as hyperthermia, chemotherapy, and immunotherapy. Despite being an effective therapy, radiotherapy has thus far been rarely used to treat early-stage bladder cancer. By facilitating localized radiation treatment, this device has the potential to shift treatment paradigms and enable use of brachytherapy as an effective treatment for early-stage bladder cancer.

UCLA Case No. 2016-093

Lead Inventor: Robert Chin

Patent Status: Pending

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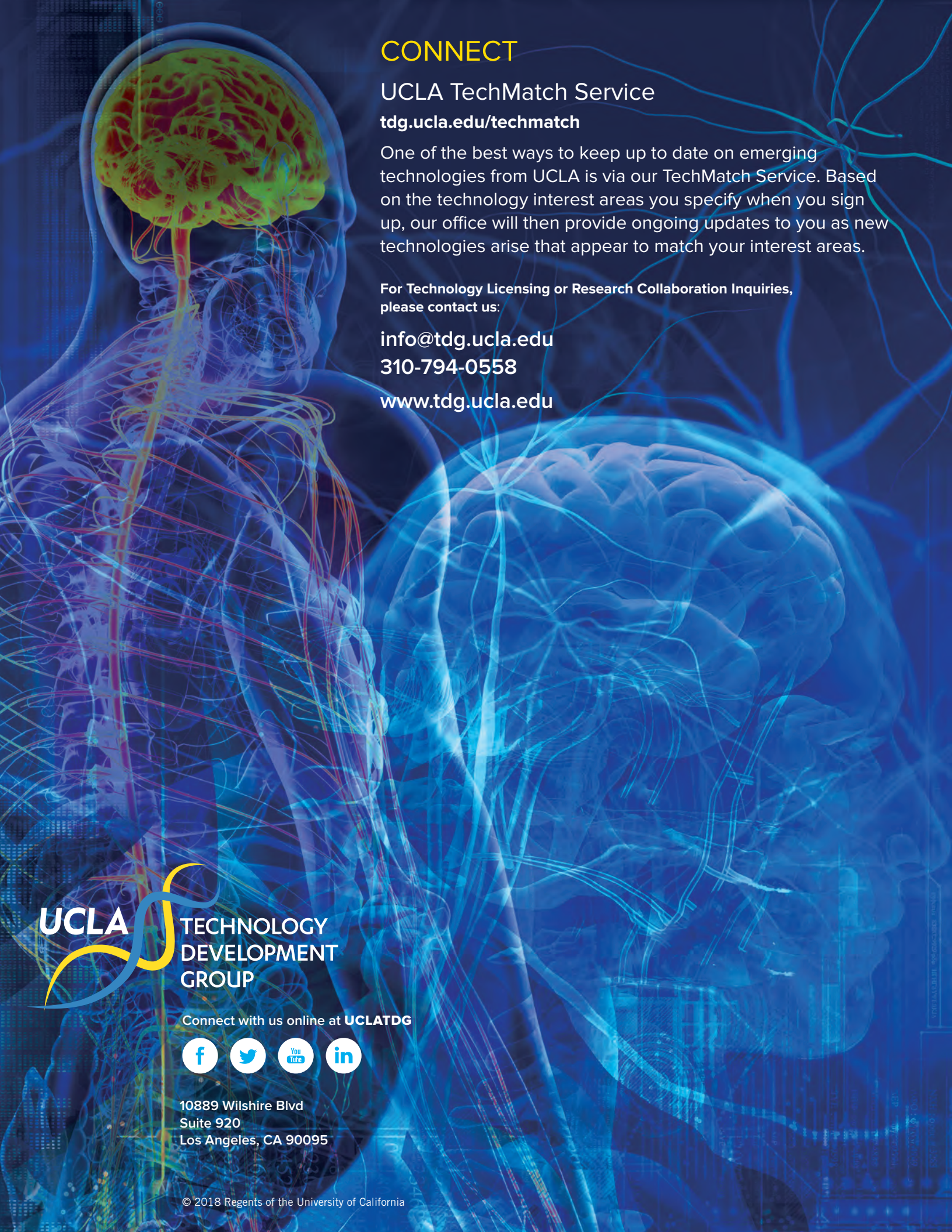

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