
INDUSTRY INVENTORS INVESTORS
4TH ANNUAL
UCLA MEDICAL DEVICE PARTNERING CONFERENCE
TUESDAY MARCH 8, 2016
CNSI—UCLA CAMPUS
#UCLAMedDevice
UCLA / OIP-ISR

Conference Program

9:30 am	REGISTRATION/NETWORKING
9:45 am	WELCOME—Emily Waldron Loughran

MORNING SESSION

10:00 am	INVESTOR PANEL J&J Innovation | Life Science Angels | TitanMed Capital | Seroba Life Sciences | Enterprise Ireland | WSGR
11:15 am	FACULTY PRESENTATIONS Kalyanam Shivkumar | Reggie Edgerton | Nader Pouratian | Jeffrey Ardell | Itzhak Fried
12:30 pm	LUNCH

AFTERNOON SESSION

1:30 pm	INDUSTRY PANEL St. Jude Medical | SetPoint Medical | Action Potential | Boston Scientific | Medtronic | Allergan | RCT Ventures
2:45 pm	UCLA BUSINESS OF SCIENCE CENTER
3:05 pm	NETWORKING BREAK
3:30 pm	UCLA STARTUP PITCHES HyTek Medical | KASH Scientific | Hypothermia Devices
4:00 pm	NETWORKING/EVENT CLOSE

Contents

Michael Ackermann, Ph.D.

Vice President, Neurostimulation
Allergan, Plc

Michael is currently Vice President, Neurostimulation for Allergan, Plc, and most recently CEO of Oculeve, Inc., which was acquired by Allergan in August 2015. He has eleven years of experience in medical technology development in both academic and industrial settings in the fields of ophthalmology, chronic pain and movement disorders. He received a B.E. degree, magna cum laude, in biomedical engineering from Vanderbilt University, M.S. and Ph.D. degrees in biomedical engineering from Case Western Reserve University, is a graduate of the Stanford University Biodesign fellowship, and Vision Research Fellow at Stanford. He has numerous patents and peer-reviewed publications.

Jeffrey L. Ardell, Ph.D., FAHA

Professor of Medicine/Cardiology
Director, UCLA Neurocardiology Research Center of Excellence
UCLA Cardiac Arrhythmia Center

Dr. Ardell is the founding Director of the UCLA Neurocardiology Research Center of Excellence and on faculty in the UCLA Cardiac Arrhythmia Center. Previously, he was Professor of Biomedical Sciences at the Quillen College of Medicine in Johnson City, Tennessee. Dr. Ardell received his doctorate at the University of Washington, with post-doctoral training at Michigan State University and at Loyola University of Chicago. He is a fellow of the American Heart Association and is one of the principal investigators in the field of neurocardiology. Dr. Ardell has served on multiple national research and advisory committees for the National Institutes of Health and the American Heart Association.

His laboratory has been at the forefront in defining the neural circuits of the cardiac nervous system in normal and pathological states and how they regulate cardiac electrical and mechanical function. Recent work from his group has demonstrated that targeting select elements within this neural network, using bioelectric therapies, can lead to efficacious results in select cardiac disease states, including atrial arrhythmias, myocardial infarction, and congestive heart failure.

Anthony Arnold

President and CEO
SetPoint Medical

Tony is President and CEO of SetPoint Medical, an early stage medical device company developing a novel implantable bioelectronic medicine therapy to improve the lives of patients with debilitating inflammatory diseases such as Crohn's and rheumatoid arthritis.

Tony brings 18 years of experience in the development and commercialization of high-tech medical devices. Prior to joining SetPoint, he founded Synapse Strategy and provided consulting services for leading device firms, FDA and professional organizations to help commercialize products, develop public health campaigns, assess opportunities and develop strategic plans. Prior to Synapse, Tony served as VP of Marketing for Boston Scientific where he launched the Harmony® Bionic Ear. Tony was also Director of Marketing at Medtronic, responsible for the industry leading StealthStation® neuro-navigation platform. Prior to Medtronic, Tony held a variety of positions in marketing and R&D with Smith + Nephew.

Tony holds a Bachelors in Mechanical Engineering and graduated the UCLA Anderson School of Management executive program for medical marketing.

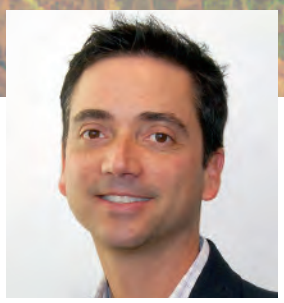
Allen W. Burton, M.D.

Medical Director of Neuromodulation, Movement Disorders and Pain
VP of Clinical Affairs
St. Jude Medical

Dr. Allen W. Burton is a Board-Certified Anesthesiologist, with added Certification in Pain Medicine. He was formerly the Chairman of the Department of Pain Medicine at the University of Texas MD Anderson Cancer Center from 2000–2011. He helped train many pain fellows during that time. He then spent 4 years with Houston Pain Associates, where he directed clinical research and participated in many clinical trials. Dr. Burton joined St. Jude Medical in September of 2015 as Medical Director of Neuromodulation, Movement Disorders and Pain, and VP of Clinical Affairs.

Dr. Burton obtained his Bachelor of Science at the University of Notre Dame, Medical Doctorate at Baylor College of Medicine, and residency at Brigham and Women's Hospital, Harvard Medical School. Dr. Burton has published more than 50 peer-reviewed articles in the pain literature and authored two textbooks. Dr. Burton teaches and lectures nationally and internationally. He has served in leadership roles in pain societies, and serves on many editorial boards. His practice includes the use of pharmacologic, interventional, and behavioral pain management techniques. Dr. Burton is an active researcher and has started a pharmaceutical company in the pain space, Vapogenix (www.vapogenix.com).

Dr. Burton lives with his wife and three sons in Houston. He spends his small amount of free time running, cycling, swimming, and watching sports.



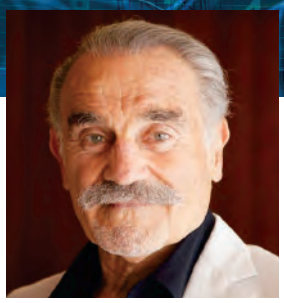
Rafael Carbunaru, Ph.D.

Vice President,
Research & Development
Boston Scientific Neuromodulation

Rafael Carbunaru leads the Research and Development Neuromodulation Division for Boston Scientific Corporation located in Valencia, CA. He is focused on developing a portfolio of neuromodulation products and technologies, and creating a culture of meaningful innovation and high performance. His team has developed breakthrough products in spinal cord stimulation for the treatment of chronic pain and deep brain stimulation for movement disorders. Rafael's mission is to transform lives through innovative medical technologies.

Prior to this role, Rafael was the Research & Development Director for Emerging Indications. He led the development of micro stimulation and MRI-compatible technologies as well as supported clinical trials in migraine and overactive bladder, among others.

Rafael holds a Ph.D. and M.Sc. in Biomedical Engineering (with emphasis in neurostimulation and electromagnetism) from Case Western Reserve University and an Electrical Engineering degree from Universidad Simon Bolivar (Venezuela). He currently holds over 50 U.S. and International patents.



Roy Doumani

Executive Director,
UCLA Business of Science Center
Professor, UCLA David Geffen School of Medicine

Roy Doumani is a professor at the David Geffen School of Medicine at the University of California, Los Angeles (UCLA) and Executive Director of the UCLA Business of Science Center. He serves as Co-Chairman of the Zhejiang California NanoSystems Institute in the People's Republic of China (PRC) and is a Director of the first joint venture bank in the PRC, Xiamen International Bank of which he has an equity position. Mr. Doumani has been involved with numerous financial institutions: Director of First Los Angeles Bank, Chairman of First Interstate Bank of Hawaii, Chairman of World Trade Bank, Los Angeles, Executive Director of HonFed Bank, and a Founder of Agensys, Inc. He is presently Chairman of Neural Analytics and a Founder and Director of Kite Pharma. He earned a degree from UCLA in Business and Finance and a law degree from the University of Southern California.

V. Reggie Edgerton, Ph.D.

Distinguished Professor, UCLA Neurosurgery, Integrative Biology and Physiology, and Neurobiology
Director, UCLA Neuromuscular Research Laboratory
Member, UCLA Brain Research Institute

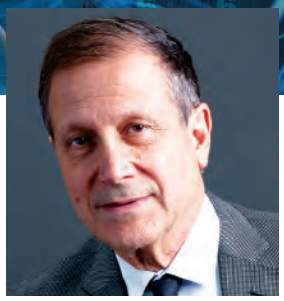
Dr. V. Reggie Edgerton received his Ph.D. in Exercise Physiology from Michigan State University, Masters from University of Iowa and B.S. from East Carolina University. He is the Director of the Neuromuscular Research Laboratory and Distinguished Professor of the Departments of Integrative Biology and Physiology, Neurobiology and Neurosurgery and a member of the Brain Research Institute at UCLA. He has been teaching and conducting research at UCLA for over 45 years. His research is focused on how the neural networks in the lumbar spinal cord of mammals, including humans, regain control of standing, stepping and voluntary control of fine movements after paralysis, and how these motor functions can be modified by chronically imposing activity-dependent interventions after spinal cord injury. Many of these projects are being performed with national and international collaborators and he has published over 480 peer-reviewed papers on topics in this area. Dr. Edgerton is also the President and Chairman of the Board for NeuroRecovery Technologies Inc.

Jeffrey Erb

Senior Director of Strategy, Business Development and Alliance Management
Medtronic PLC, Neuromodulation

Jeff Erb is Senior Director of Strategy, Business Development and Alliance Management for Medtronic Neuromodulation. Jeff is responsible for leading portfolio strategy including the annual strategic planning process; identifying, investing in and acquiring external opportunities of strategic importance; and managing external partnerships.

Jeff joined Medtronic in 2002 in Medtronic's Corporate Development group where he was responsible for driving mergers and acquisitions across the company. Jeff also served as the Chief Financial Officer for two of Medtronic's portfolio companies, including Medtronic's joint venture with Genzyme, MG Biotherapeutics, in which he also served as the Medtronic Collaboration Manager. In 2006, Jeff moved to Medtronic's CardioVascular business where he was Director of Pricing and Contracts, Director of Strategy and Director of Marketing. In 2010, Jeff moved to Neuromodulation where he continues to serve. He has undergraduate degrees in economics and business administration from the University of Pittsburgh and an M.B.A. from the University of Michigan.



Itzhak Fried, M.D., Ph.D., FACS

Professor, UCLA Neurosurgery
Professor, UCLA Psychiatry and Biobehavioral Sciences

Itzhak Fried is the Director of the Adult Epilepsy Surgery Program in the Department of Neurosurgery at UCLA as well as the Co-Director of the Seizure Disorder Center. The epilepsy surgery program at UCLA is recognized as a world leader in this field. He is the Director of the Cognitive Neurophysiology Laboratory which is recognized worldwide as the leader in studies of human cognition at the level of the single neuron, using the opportunity of intracranial electrodes implanted in epilepsy patients for surgical evaluation. More recently, his lab has been at the forefront of the study of deep brain stimulation for enhancement of cognitive function in general and memory in particular.

Norm Gitis, Ph.D.

Managing Partner, Lymo Ventures
MedTech Committee,
Life Science Angels
Screening Committee,
Band of Angels

Norm Gitis obtained his Ph.D. in Engineering from the USSR Academy of Sciences in Moscow. Upon immigration to the U.S., he was a visiting professor at MIT until IBM moved him to San Jose.

Norm founded and ran two profitable test-instrumentation companies, Center for Tribology, Inc. in Mountain View (1994–2000) and CETR in Campbell (2000–2011). He was twice named by the Business Journal the CEO of Top 20 Fastest Growing Private Companies in Northern California. Upon successful exit, Norm was VP of Bruker, a leading manufacturer of test instrumentation for life sciences and other applications.

Norm has authored over 150 scientific papers, three books and over two dozen patents, chaired and organized over three dozen international scientific conferences.

Over the past three years, Norm has been pursuing his passion of helping med-tech start-ups with funding, IP and business development. His investment portfolio includes twelve med-tech startup companies. Norm chairs a device screening committee of Life Science Angels and serves on a screening committee of the Band of Angels, both in Silicon Valley.

Paul M. Grand

Managing Director,
Pacific Coast Office
RCT Ventures

Grand has more than twenty-five years experience in venture capital and the founding and management of early-stage companies in technology and healthcare. He is responsible for sourcing RCT's investments in medical devices and representing RCT on the boards of its portfolio companies. Since 1990, Grand has built, operated, recruited management and raised financing for eight high technology, medical device and biotechnology companies.

Grand is actively involved in programs to encourage innovation and technology commercialization and is a frequent speaker, moderator and panelist at healthcare conferences. He serves as producer and emcee for the MedTech Innovator accelerator and competition, which identifies and rewards outstanding early-stage medical device companies. Grand is on the Oversight Committees for the Coulter Translational Research Partnership Programs at USC and University of Washington. He has lectured, served as a reviewer for proof of concept and commercialization-focused funding programs, and mentored students and scientists at numerous universities, including UCLA, Stanford, USC, UCSF, University of Utah, the Keck Graduate Institute and University of Colorado. Grand served as an investment advisor to the LARTA NIH Commercialization Assistance Program for SBIR program awardees.

Tom Kelly, M.Sc., MIE, Ph.D.

Head of Division
Industrial, Lifesciences & Consumer
Enterprise Ireland

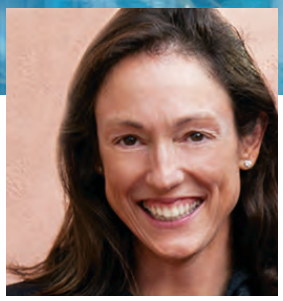
Tom Kelly is Head of Enterprise Ireland's Industrial, Lifesciences and Consumer Division. Enterprise Ireland is the government body with the responsibility for the development of Ireland's indigenous and natural resource based industries.

He has responsibility for developing and implementing the organisations' strategies in Life Sciences, Engineering, and related sectors. He is recognised as a "thought leader" on manufacturing and is a member of key government fora looking at the future of manufacturing in Ireland.

He is based at Enterprise Ireland's offices in East Point Plaza, Dublin 3, and is a member of its Executive Committee, and is Chairman of its Finance, Job Expansion and Capital Investment Committees. He is also a member of the Governing Body of Dublin Institute of Technology and a member of the Board of NIBRT (The National Institute for Bioprocessing Research and Training).

Prior to taking up his current assignment he was senior manager within the Scaling Division, leading a team of specialists in business development and innovation management, working directly with a select group of fast growth client firms.

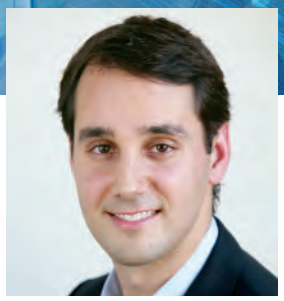
Earlier in his career he was Head of Enterprise Ireland's Technology Development Division, assisting firms to adopt best manufacturing and business practices and fostering innovation particularly through new product and process R&D and technology transfer.



Emily Waldron Loughran

Senior Director of Licensing
UCLA OIP-ISR

Emily Loughran joined UCLA's OIP-ISR in 1994 as a technology transfer officer. Currently, as the Senior Director of Licensing, she manages the licensing and patent prosecution groups, and oversees the office's large portfolio of invention disclosures, patents, and license agreements. 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 MBA from USC and a BS from UC Berkeley.



Juan-Pablo Mas

Partner
Action Potential Venture Capital

Juan-Pablo is a partner at Action Potential Venture Capital in Palo Alto, CA, and invests in companies that are pioneering bioelectronic medicines and other enabling technologies. Juan-Pablo is on the Board of Directors of SetPoint Medical. He was previously an investor at Lightstone Ventures and Morgenthaler Ventures, where he focused on therapeutic medical devices, mobile health, and biopharmaceutical investments. There he served as a Board Observer at Ardian (acquired by Medtronic), Twelve (acquired Medtronic), Holaira, Miramar Labs, Cabochon Aesthetics (acquired by Ulthera/Merz), and SetPoint Medical.

Prior to investing, Juan-Pablo led efforts in R&D and Strategy in Medtronic's CardioVascular Division, including Pipeline Strategy, White-Space expansion, Business Development, and M&A integration efforts. He was named "Medtronic Inventor of The Year" in 2008, and has 30+ patents, granted or pending. Juan-Pablo also launched Effient (prasugrel) during his tenure on the Global Brand Strategy team at Eli Lilly & Co.

Juan-Pablo earned an MBA from Stanford Graduate School of Business. He also conducted research in the Neurology Department at Stanford Hospital, while completing an M.S. in Electrical Engineering at Stanford University. There he worked on biometric signal processing applications such as neural-prosthetics, EMG-driven feedback systems, and improved ICD detection algorithms.

Juan-Pablo currently serves on the Board of Directors of SetPoint Medical, and the Boston-based non-profit, InnerCity Weightlifting.

J. Casey McGlynn

Partner
Wilson Sonsini Goodrich & Rosati

J. Casey McGlynn formed the Life Sciences Group at Wilson Sonsini Goodrich & Rosati in 1990. It is a nationally recognized practice representing startups and emerging growth companies in the life sciences field—Medical Devices, Digital Health, Diagnostics and Biotechnology. Mr. McGlynn has formed, sold and taken public many of the most important medical device companies formed during the last 30 years. Mr. McGlynn has extensive hands-on experience in helping entrepreneurs form, build, fund and sell their companies. He has close working relationships with an unparalleled list of entrepreneurs, doctors, investors, engineers and managers in the life sciences field.

Jennifer McMahon, M.Sc., B.Sc.

Associate
Seroba Life Sciences

Jennifer McMahon joined the team of Seroba Life Sciences in 2011. She graduated from University College, Dublin with an honours degree in Pharmacology in 2010. Jennifer then entered a Master's degree programme in Biotechnology and Business to further her interest in the interface of biomedical science with commercialisation. Having placed first in her Master's degree in 2011, Jennifer then joined Seroba Life Sciences' Investment Team as an Investment Analyst. Jennifer is a member of and Dublin-hub Ambassador of the Thousand Network (formerly the Sandbox network), a global community for "exceptional innovators." In October 2015 Jennifer was recognised as one of Ireland's "Top 30 Under 30," shaping the future of business in the country. She guest-lectures on venture capital at University College Dublin, Trinity College Dublin and the Royal College of Surgeons, Ireland. Jennifer was promoted to Senior Analyst in 2014.

Seroba Life Sciences is a European life sciences venture capital firm, focused on investing in breakthrough healthcare technologies that promise to improve lives and make a difference worldwide. Headquartered in Ireland, they work with some of Europe's best entrepreneurs developing innovative medical devices, diagnostics and therapeutic drugs.

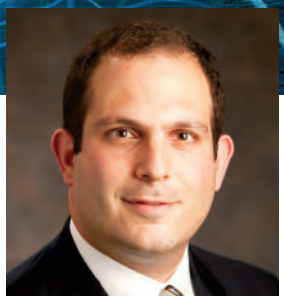
Widya Mulyasasmita

New Ventures
Johnson & Johnson Innovation

Widya is part of the New Ventures team at Johnson & Johnson California Innovation Center, where she supports deals and collaborations across consumer, medical device and pharmaceutical sectors.

Widya comes to Johnson & Johnson from McKinsey & Company, where she was a management consultant advising clients in healthcare and other industries on corporate strategy, lean operations, and organizational health topics. Prior to McKinsey, Widya worked at GE Ventures Healthcare and she also co-founded a medical device startup called Lap IQ, where she served as Chief Scientist developing biodegradable wound closure devices.

Widya is a bioengineer with expertise in biomaterials, drug delivery, and regenerative medicine. She received her B.S. in Materials Science Engineering and Bioengineering from the University of California Berkeley and her Ph.D. in Bioengineering from Stanford University where she was a Siebel Scholar.



Nader Pouratian, M.D., Ph.D., FAANS, FACS

Associate Professor
UCLA Neurosurgery

Dr. Pouratian is an Associate Professor of Neurosurgery and Radiation Oncology and affiliated faculty in Bioengineering and Neuroscience. He earned his bachelors, medical, and Ph.D. degrees at UCLA before completing his neurosurgical training and specialty training in functional neurosurgery at the University of Virginia. He has broad yet in-depth training in both functional neurosurgery and the acquisition and comprehensive analysis of multiple brain mapping modalities and has published extensively in the field of human brain mapping, comparing human brain mapping signals from multiple modalities, including functional MRI, optical imaging, evoked potentials, electrocortical stimulation mapping, electrocorticography, local field potentials, and single unit recordings. As a neurosurgeon, neuroscientist, and bioengineer, he has the unique perspective and training to integrate these fields and take advantage of the unparalleled opportunities presented by neurosurgery to study human brain function and design novel neurotechnologies. His current focus is understanding the network basis of disease and designing novel network-based interventions to address neurological and psychiatric disease.

Kalyanam Shivkumar, M.D., Ph.D., FHRS, FACC

Professor of Medicine, Radiology & Bioengineering
Director, UCLA Cardiac Arrhythmia Center & EP Programs
Director & Chief, Interventional Cardiovascular Programs, UCLA
Research Faculty, Molecular, Cellular and Integrative Physiology IDP

Dr. Shivkumar is a physician scientist who serves as the director of the UCLA Cardiac Arrhythmia Center & EP Programs since its establishment in 2002. His field of specialization is interventional cardiac electrophysiology, and his research work relates to mechanisms of cardiac arrhythmias in humans and the neurovisceral sciences. Dr. Shivkumar and his colleagues are actively involved in human mechanistic studies, development of new intellectual property, and medical technology for cardiovascular therapeutics. He serves as a section editor of the society journal "Heart Rhythm," associate editor of "Trends in Cardiovascular Medicine," is on the editorial board of the journals "JACC," "PACE," "JACC-Clinical EP," and is a peer reviewer for several basic science and clinical journals and for the NIH in evaluating cardiac arrhythmia and neuroscience research. Dr. Shivkumar has received several teaching awards and has been nominated to serve the board of examiners for Clinical Cardiac Electrophysiology of the ABIM (American Board of Internal Medicine). He has been elected to the membership of the American Society of Clinical Investigation (ASCI) and serves as the institutional representative of UCLA for the ASCI. Dr. Shivkumar received his M.D. from the University of Madras, India in 1991 and his Ph.D. from UCLA in 2000.

Lei (Eric) Tang, Ph.D., J.D.

Managing Partner
TitanMed Capital

Dr. Tang is the Managing Partner of TitanMed Capital, an international healthcare venture capital firm with offices in Beijing, Hangzhou, and Los Angeles. The firm, together with its strategic partners, provides funding and industry resources to emerging companies focused on medical devices, biotechnology, and healthcare services. Prior to co-founding TitanMed Capital, Dr. Tang co-founded ZD Medical, a medical device company focusing on providing medical imaging as well as ophthalmic solutions to addressing unmet healthcare needs. Dr. Tang holds a Ph.D. degree in Biochemistry and Cell Biology and J.D. degree, and worked for many years as a patent attorney for major law firms in the U.S. before co-founding ZD Medical.

Startup Company Profiles

Founded in 2012 by UCLA physicians and engineers, HyTek Medical developed the sOLVe Tube (***S***implified ***O***ne ***L***ung ***V***entilation for ***E***veryone) to transform the space of One Lung Ventilation and satisfy an unmet need. Packed with both evolutionary and revolutionary innovations, this novel device solves **ALL** the clinical shortcomings of the current double lumen tubes without requiring new physician training or increasing cost. HyTek Medical is poised to disrupt a space dominated by multi-billion dollar companies.

PneumoGel is a hydrogel product developed at UCLA and delivered on the surface of the lung during lung biopsies to seal the needle tract. PneumoGel serves to limit the rate of pneumothorax from lung biopsies, a common and expensive complication which can be seen in up to 40% of patients. Medicare data have shown a 10-fold increase in the cost of lung biopsy to $35K when complicated by pneumothorax. KASH Scientific Inc. has licensed PneumoGel, the delivery system and the process from UCLA, and is in the process of performing preclinical animal trial. PneumoGel is patented in the U.S., Europe, China and India. KASH Scientific is looking for strategic partners in field to fund the animal trial and FDA 510K clearance.

Hypothermia Devices, Inc. (“HTD”) designs and manufactures digitally controlled and non-invasive cooling/heating devices for a wide range of medical applications, including devices for the treatment of patients who suffer a cardiac arrest. HTD’s heat exchange system is a substantial improvement over current hypothermia devices as it is the first to use thermoelectric coolers as direct cooling agents to create hypothermia. Our devices are capable of cooling and heating tissue very quickly and with a level of precision that, until now, has been impossible to attain. Moreover, unlike current systems, HTD’s system is: (1) battery operated; (2) portable; (3) compact; and (4) lightweight. It can be used both by first responders and in the hospital setting. Current cooling devices use technology that has existed for decades to cool patients.

HTD’s mission is to bring medical cooling into the digital age.

UCLA Medical Device Technologies Available for Licensing

Neuromodulation and Recording Technologies

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

A High Dynamic-Range Sensing Front-End for Neural Signal Recording Systems

The ability for neuromodulation systems to simultaneously stimulate and record deep brain areas is currently only achievable in bulky wall-plugged systems that can capture tiny signals in the presence of large stimulation artifacts. Implantable devices are low power, but have inadequate input signal range. UCLA researchers from the Department of Electrical Engineering have designed a technology that achieves sufficient signal range and power levels that are suitable for implants. This enables concurrent sensing and stimulation in natural living environment, thereby greatly improving the ability to provide timely and efficacious therapeutic response.

UCLA Case No. 2016-100
LEAD INVENTOR: Dejan Markovic
Patent Status: Pending

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 <20ms tracking time, and start-up voltages as low as 65mV. A 645μW regulated output power was harvested from the head of a rat (0.83cm^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

Method, Apparatus, and Circuit to Monitor Cardiac Disease, Control Arrhythmias and Function by Modulating the Nervous System

Most heart conditions are characterized by detectable abnormalities of electrical (neural) heart function, but currently there exists very limited technology for the prolonged active monitoring and early stage treatment of these abnormalities. Dr. Kalyanam Shivkumar's technology is a neural recording and analysis system for the diagnosis, continuous monitoring, and treatment of heart disease. The system records heart neurons using electrodes implanted in or around the heart wherein the electrodes can deliver neuro-modulatory stimulation to correct for functional abnormalities.

UCLA Case No. 2015-093
LEAD INVENTOR: Kalyanam Shivkumar
Patent Status: Pending
EVENT SPEAKER

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 (UCLA Case No. 2014-287) 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
EVENT SPEAKER

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 Giga-bit/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

Saturation-Tolerant Electrophysiological Recording Interface

Weak electrophysiological input signals (EEG, ECG, EMG) are often detected by digitizing them using a large voltage gain in order to achieve a low background noise level. However, in noisy environments, the loud signals from motion artifacts, unrelated biological signals, or man-made interferers saturate the input signal and prevent their detection. Researchers at UCLA have designed an electrophysiological signal processing device that can measure EEG, ECG, and EMG signals with high sensitivity in noisy environments that would otherwise drown out weak signals. An on-chip system has been developed that shows a 20x improvement for saturation tolerance over existing systems of similar power, noise, and area.

UCLA Case No. 2014-404
LEAD INVENTOR: Dejan Markovic
Patent Status: Pending

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

Method of Cardiovascular Control with Non-Invasive Stimulation of Specific Regions of the Central Nervous System

Researchers at UCLA have developed a novel method of stimulating brain regions to control blood pressure and heart rate. The technology encompasses a non-invasive electrophysiological method of modulating central nervous system activity in order to control cardiovascular function. Using trans-cranial, non-invasive stimulation of specific brain regions, researchers have demonstrated significant changes in blood pressure and heart rate in physiological models.

UCLA Case No. 2011-737
LEAD INVENTOR: Antonio A. F. De Salles
Patent Status: Pending

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: U.S. Patent Issued #9,220,458
EVENT SPEAKER

Systems, Devices, and Methods for Treating Medical Disorders and Conditions through Stimulation of Multiple Nerves

Vagus nerve stimulation is ordinarily practiced by surgically implanted electrical nerve stimulator systems, with all the attendant risks of surgery adjacent to major blood vessels and of anesthesia. Trigeminal nerve stimulation, as developed at UCLA, involves the placement of electrodes on the surface of the face. Here, a polycranial nerve stimulation system includes externally applied electrodes placed on the skin over the desired nerve dermatomes (e.g., skin of the ear and/or ear canal) where gentle electrical signals are used to stimulate the nerve to treat individuals experiencing epilepsy, depression, fatigue, tinnitus, or other conditions.

UCLA Case No. 2012-639
LEAD INVENTOR: Ian Cook
Patent Status: Pending

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: Pending
EVENT SPEAKER

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: Pending
Pub. No. 20130030368

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: U.S. Patent Issued #8,521,270

Cardiovascular Devices

Method and Device for Continuous Non-Invasive Blood Pressure Measurement

Current methods to measure blood pressure fall into two categories: sphygmomanometer (inflatable cuff) or arterial line blood pressure monitor. Inflatable cuffs are non-invasive, but are prone to operator/device error and yield single readings at the time of measurement. On the other hand, arterial line blood pressure monitors provide real-time blood pressure monitoring but require an invasive insertion through the skin into an artery, risking infection, arterial damage and clotting. UCLA researchers have designed a method and device that provides non-invasive, continuous and accurate blood pressure measurements by utilizing ultrasound technologies via an ultrasound probe externally applied to the arm.

UCLA Case No. 2015-899

LEAD INVENTOR: Dino Di Carlo

Patent Status: Pending

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

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. WO/2013/184697

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/2014/042900

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: Pending
Pub. No. US 2011/0313340 A1

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: Pending
Pub. No. WO/2014/028913

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 2014/0180395 A1

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: Pending
Pub. No. US 2010/0318114 A1

Method and Device for Treating Intracranial Vascular Aneurysms

Inventors at UCLA have developed a device, and a method, for the therapeutic management of intracranial vascular aneurysms. This technology involves the use of intravascular catheters that can directly image the aneurysm, and can occlude the entire lumen of the aneurysm sac using liquid sealing agents. The intracranial catheters are designed in various configurations so that they can be used to treat aneurysms regardless of their neck size or location within the intracranial vascular system.

UCLA Case No. 1996-528

LEAD INVENTOR: Tarik Massoud

Patent Status: U.S. Patent Issued
#5,776,097

Neuro-Endovascular Ultrasound Thrombolysis

Researchers at UCLA have developed a new method of treating stroke using ultrasonic energy. There are several advantages of this method over conventional fibrinolytic therapy: (1) ultrasound can recanalize arteries much quicker than fibrinolytic therapy, (2) ultrasound does not cause bleeding complications, and (3) ultrasound can be more economical than fibrinolytic therapy in itself and in overall hospital costs.

UCLA Case No. 1995-593

LEAD INVENTOR: Cheng Ji

Patent Status: U.S. Patent Issued
#6,024,718

Device Materials

Biodurable and Bioselective Coatings for Dental Implants

The oral cavity is a complex ecosystem of microbial organisms, some being harmful and some beneficial. However, modern medicine has introduced materials and implants that may disrupt the natural equilibrium and lead to oral health problems. UCLA researchers are developing a series of materials that prevent the attachment and growth of harmful bacteria, but allow selected neutral or beneficial flora to grow at endogenous levels; much like the normal environment of healthy oral cavities. The benefits of this new paradigm for oral healthcare are realized by new materials that support bio-beneficial and selective environments for preventative care, rather than treating diseases after the fact.

UCLA Case No. 2015-463

LEAD INVENTOR: Wenyuan Shi

Patent Status: Pending

UCLA Inventors Create Platform Technology to Create 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

Poly(p-xylylene) Polymer-Based Microfilms for Oral Delivery of Therapeutics

Poly(p-xylylene), trade name Parylene, is an FDA-approved material used as a protective coating for medical devices, but its elution capabilities in pharmaceuticals are less exploited. UCLA researchers have utilized semi-porous poly(p-xylylene) film as a stand-alone vehicle for the intraoral delivery of pharmaceuticals with predetermined time scales and dimensions. The film is synthesized as a semi-porous patch to be placed in the mouth for long-term (greater than 1 month) storage and delivery of therapeutic compounds. Due to the benign synthesis process of the Parylene film, a variety of therapeutic compounds can be incorporated, including small molecule drugs and proteins for anti-inflammatory, anti-cancer and anti-mucosal ulcer therapies.

UCLA Case No. 2014-555
LEAD INVENTOR: Dean Ho
Patent Status: Pending

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

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

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

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: U.S. 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: U.S. Patent Issued #8,481,005

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

A Rectal Mucosa Sampling Tool

Obtaining a sample of the rectal mucosa is key to millions of diagnostic procedures performed each year, including those for colorectal and cervical cancer. Physician-scientists at the UCLA David Geffen School of Medicine have developed an improved device for sampling the rectal mucosa. The device design eliminates the need to completely insert the tube into the rectum. This substantially reduces the discomfort associated with the procedure. In addition, other novel design implements make the tool more efficient, more precise, and safer for the patient.

UCLA Case No. 2012-535
LEAD INVENTOR: Jonathan Braun
Patent Status: Pending

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

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: U.S. Patent Issued #7,904,140

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. WO/2014/055753

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

A Novel Device for Quantifying Rotational Stability of the Knee

The current standard for determining anterior cruciate ligament (ACL) reconstruction effectiveness, the Lachman test, only measures translational stability. For rotational stability, the pivot shift test is widely accepted, though it lacks an objective means of quantification and current devices are large, fixed-position constructs that are impractical for clinical use. Dr. Petrigliano and colleagues in UCLA's Department of Orthopaedic Surgery have developed a novel microelectromechanical system (MEMS) gyroscope with specific software architecture to quantitatively assess both rotational and linear stability of the knee. Non-invasively applied to a patient's lower extremity, it provides an objective measurement of the axial rotation of the tibia relative to the femur during the pivot shift exam.

UCLA Case No. 2012-519
LEAD INVENTOR: Frank Petrigliano
Patent Status: Pending
Pub No. WO/2013/123263

Radiation Therapy and 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. WO/2014/074602

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

Sensors and Patient Monitoring Devices

Non-Invasive System for Classification of Individual's Intake

UCLA researchers have developed a method for processing data from piezoelectric sensors worn around the neck in order to more accurately assess what foods an individual has ingested. Algorithms are being refined that employ a spectrogram analysis towards multiple piezoelectric sensor data. This method could greatly improve monitoring of food intake in an effort to better meet weight management goals.

UCLA Case No. 2015-108
LEAD INVENTOR: Majid Sarrafzadeh
Patent Status: Pending

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

Prediction of Clinical Deterioration

Dr. Scott Hu at UCLA has developed a method to predict clinical deterioration of patients, which could warn clinicians of impending clinical deterioration before its occurrence. This predictive method is able to detect rare events of patient deterioration with high sensitivity and improve results as more samples are entered. This method had a positive predictive value that was 50% greater than traditional statistical models. It is currently being used to predict sepsis in leukemia patients, but is being adopted to predict respiratory failure, myocardial infarction and other common critical care aliments.

UCLA Case No. 2014-445
LEAD INVENTOR: Scott Hu
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

Method to Non-Invasively Determine Respiration Rate Using Pressure Sensors

UCLA researchers in the Department of Electrical Engineering have developed a noninvasive method for measuring respiratory rate. Although not required, the system is intended to be used when the patient is sleeping, either at home or in a clinical setting. While the user is lying on top of the mattress embedded with pressure sensors, the system calculates and displays the breathing rate of the user, which can be used to identify irregular breathing patterns. Of particular note is that the system can detect episodes of apnea and subsequently alert a medical professional or caregiver. The graphical user interface developed as part of the invention provides several additional features.

UCLA Case No. 2013-009
LEAD INVENTOR: Majid Sarrafzadeh
Patent Status: Pending

Networked Sensor Systems for Remote Patient Monitoring

Current methods to monitor sleep require patients to go to Sleep Monitor Centers with large electrophysiology, respiratory measurement, and motion measurement systems. UCLA researchers have developed an innovative Wearable-to-Enterprise Sleep Monitoring System to serve the market demand for Out of Center Sleep Testing (OCST) in adult patients. This technology combines monitoring, data archiving, reporting, usage assurance, and subject guidance. The system is comprised of wearable head, chest, and leg units. These units contain sensors for airflow, electroencephalography (EEG), electrooculography (EOG), electrocardiography (ECG), respiratory effort and rate, electromyogram (EMG), sleep time, motion, blood oxygen, auditory sensing, and actigraphy sensing measurements.

UCLA Case No. 2013-008
LEAD INVENTOR: William J. Kaiser
Patent Status: Pending
Pub. No. WO/2014/066059

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 and has limited 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. WO/2014/011937

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: U.S. Patent Issued #8,690,331

Exercise-Based Entertainment Controller

To help combat childhood obesity, UCLA researchers in the Department of Electrical Engineering have developed an exercise-based entertainment controller system. The system allows children to use entertainment appliances, such as the television or computer, based on the amount of physical activity they have done throughout the day, recorded via a pedometer. When a child plugs the pedometer into their PC, the software retrieves data from the pedometer, and allots a time budget for the child to use entertainment appliances. When the time budget is exhausted, the power control module shuts off the corresponding appliance via an RF signal.

UCLA Case No. 2009-496
LEAD INVENTOR: Majid Sarrafzadeh
Patent Status: Pending
Pub. No. US 2013/0090213

Surgical Tools

Percutaneous Catheter for Lung Assist Device

Some patients with severe lung disease need to be treated with ECMO systems that oxygenate the blood using extracorporeal, bedside machines. The currently used catheters for ECMO systems suffer from two primary disadvantages: blood that has already been oxygenated often gets re-circulated through the system; and the catheter's strong dependence on position results in inefficiencies when a patient inevitably moves. Dr. Ardehali has designed a catheter that overcomes these inefficiencies in ECMO catheter design by having both more stability during use and a better fluid flow design that reduces re-circulation.

UCLA Case No. 2014-642
LEAD INVENTOR: Abbas Ardehali
Patent Status: Pending

Device for Creating Stoma with Desired Characteristics

An ostomy is the surgical process of creating an opening (i.e. stoma) between a hollow organ and the skin. The opening can be used to treat certain diseases of the digestive or urinary systems, or it can be used to remove an organ. Currently, the skin defect for an ostomy is created freehand by the surgeon using a knife or cutting electrocautery and often is irregularly shaped and inappropriately sized. Even when a template is used to mark the defect, intrinsic skin tension due to collagen fiber still introduces imperfection in the opening. Physicians from UCLA Department of Surgery conceptualized a device for creating clean stomata that involves a circular saw and a mechanism for stretching the skin to specific tension. The invention can tailor to the appropriate size of the patient and the size of the hollow viscous. This easy-to-use instrument can assist in reliably and consistently creating optimal stoma.

UCLA Case No. 2014-597
LEAD INVENTOR: Jonathan Sack
Patent Status: Pending

Covalt Uterine Removal System

When a hysterectomy is performed due to the presence of cervical cancer, the risk of causing cancer cells being pushed into neighboring tissue and possibly growing into new malignant tumors is great. While specimen retrieval bags have been used in conjunction with uterine manipulators to avoid the spillage of cancer cells, some studies have reported that spillage still occurs over 10% of the time. Dr. Cohen has designed a specimen retrieval bag that utilizes air compression technology and attaches to the uterine manipulator in order to further reduce the spillage of cancer cells during hysterectomies and other tumor removal processes.

UCLA Case No. 2014-395
LEAD INVENTOR: Joshua Cohen
Patent Status: Pending

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

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 2014/0329221

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

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: Pending
Pub. No. WO/2013/188845

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: Pending
Pub. No. WO/2011/088400

Expandable Mechanical Distension Device for Hollow Organ Growth

Short gut syndrome is a condition in which patients have insufficient length of intestine to maintain normal digestion and absorption. In the United States, over 100,000 patients suffer from the disease each year. Researchers at UCLA have developed a device to mechanically stretch out the intestine through the application of longitudinal force. The device is made of shape memory materials such as nickel-titanium or biocompatible polymers. During implantation, the device is collapsed to its minimum size, followed by deployment into the intestinal tract via a push rod. The structure then binds to a particular location, and slowly expands over a period of several weeks. In doing so, it applies longitudinal force, resulting in the lengthening of the intestine.

UCLA Case No. 2009-227

LEAD INVENTOR: Greg Carman

Patent Status: Pending
Pub. No. WO/2010/124126

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