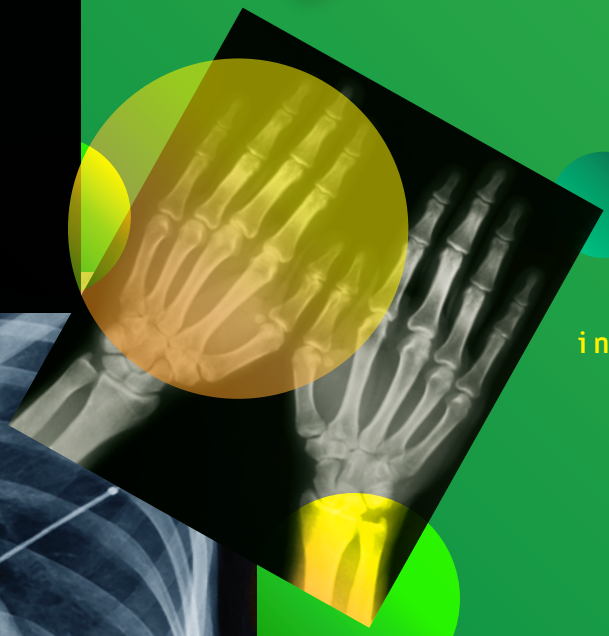
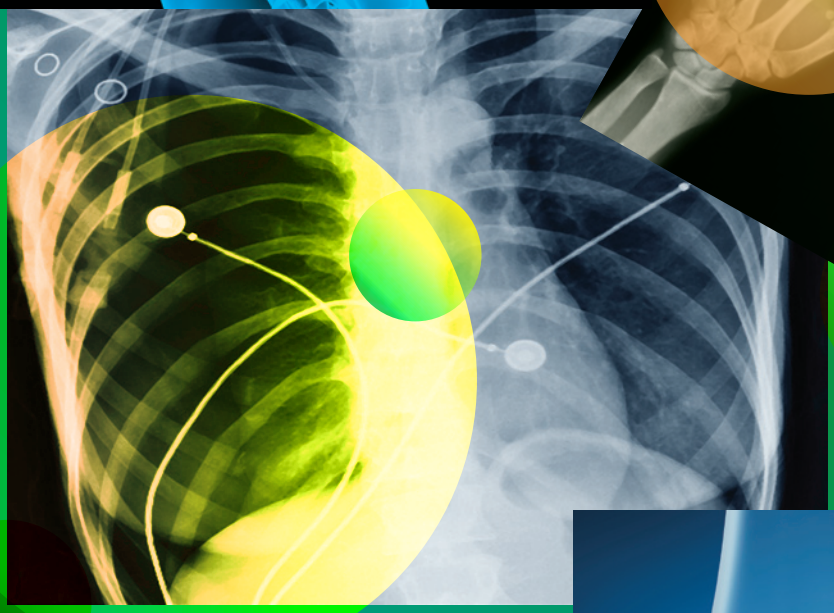
FIRST ANNUAL

UCLA Medical Device Partnering Conference



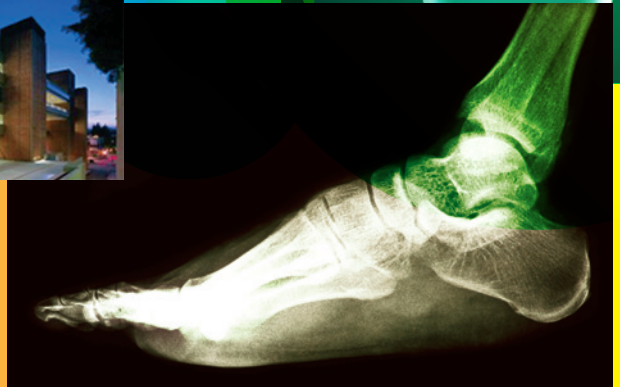
investors



medical device companies

clinical faculty

CNSI
Friday March 15, 2013
10am–2pm



UCLA Office of Intellectual Property & Industry Sponsored Research

I would like to welcome you to UCLA's 1st Annual Medical Device Partnering Conference. UCLA has a well-established history of developing innovative medical devices that have been successful both commercially and for the advancement of patient care. We are excited to have you join us for this opportunity to share, first-hand, the continuing efforts to address new challenges and unmet medical needs.

We hope that this event will highlight the tremendous caliber of research at UCLA, and provide a venue for you to connect with our researchers and your peers. We aspire to make this an ongoing event that will open new avenues for creativity and commercialization.

Sincerely,

Brendan Rauw

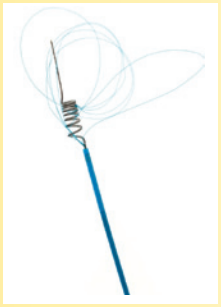
Associate Vice Chancellor and Executive Director of Entrepreneurship

Conference Program

9:30 am	Registration
10:00am	**Emily Waldron Loughran** Welcome/Introductions
10:10am	**Mr. Jason Jolly**, ABI (Advancing Bioengineering Innovation) New Program for Identifying Clinical Need, Crafting Patentable Solutions, and Prototyping
10:20am	**Dr. Greg P. Carman** and **Dr. Erik P. Dutson** CASIT—Research Capabilities and Translational Support
10:40am	Networking Break
11:00am	**Dr. Zach Taylor** Optical Technologies for Diagnostics and Treatment
11:20am	**Mr. Martin Burns** Overview—Wireless Health Institute
11:40am	**Dr. Fernando Vinuela** Technical Developments in Interventional Neuroradiology; Stroke: Influence of Industry and Translational Research
12:00 pm	Catered Lunch
12:20–12:40pm	Speaker: **Dr. Kalyanam Shivkumar** Innovation in Cardiology
1:00pm	**Dr. Steven D. Schwartz** Minimally Invasive Robotic Micro-Surgery; Overview of the Jules Stein Eye Institute
1:20pm	**Dr. Harry A. McKellop** Orthopaedic Research Center of the Orthopaedic Hospital/UCLA: Overview and Potential Future Development of Orthopaedic Devices
1:40pm–2:00pm	Networking Break Conference Conclusion

Highlights of UCLA Medical Device Commercialization

UCLA has a history of success in the development of medical devices that have been brought to the marketplace for the benefit of the public. This history started with the Nicotine Patch developed by Murray Jarvis and Jed Rose of UCLA, which was first commercialized in 1992. The patch was followed closely by the hugely successful GDC® Coil (Guglielmi Detachable Coil) developed by Dr. Guido Guglielmi from the Department of Radiology. Innovation in the area of stroke continued with the MERCI® clot retriever coil developed at the UCLA Stroke center.



MERCI
Clot Retriever

Other examples of UCLA devices that have made it to the market are the ductal lavage catheters for early detection of breast cancer and a blood coiling device used in emergency room settings.

The innovation continues today with a next generation of products which have received regulatory approval and are ready to enter the marketplace. Examples are the TNS Stimulation Device for treating depression, which recently received a CE mark in Europe and the Air Bloc™ system to prevent fatal air embolisms in left heart procedures.

Contents

Jason Jolly

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Jason Jolly is the Managing Director of the UCLA Business of Science Center (BSC), which assists university faculty and physicians in commercializing their research, prepares graduate students for careers in industry, and serves as a catalyst for increased industry support and involvement on campus. Prior to joining the BSC, Jason was Chief Operating Officer at the Sports Concussion Institute, a clinical neuropsychology office focused on treating mild traumatic brain injuries. Jason's experience also includes marketing at Abbott Laboratories, product development and manufacturing at Hewlett-Packard, and engineering at a semiconductor startup. Jason holds a BS in Mechanical Engineering from Cal Poly-San Luis Obispo and an MBA from the UCLA Anderson School of Management.

Greg P. Carman, Ph.D.

Professor
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Professor Greg P. Carman's research is on understanding the multi-physics behavior of active materials such as piezoelectric and magnetostrictive materials for a wide range of applications including medical devices. He is the Director of the new National Science Foundation Engineering Research Center focused on Translational Applications of Nanoscale Multiferroic Materials TANMS and is the Co-Executive Director of the Center for Advanced Surgical and Interventional Technology CASIT in the Department of Surgery at UCLA. Professor Carman was awarded the "Adaptive Structures and Material Systems Prize" from the American Society of Mechanical Engineers in 2004.

Erik P. Dutson, M.D., FACS

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Erik Dutson is the executive medical director of the Center for Advanced Surgical and Interventional Technology at UCLA. As a clinician and researcher, Dr. Dutson uses his own experience in the operating room to drive his work in the lab. A current focus of his work and that of his research team is computer-mediated minimally-invasive surgery and surgical training technologies. By interweaving technology and information between the surgeon, surgical tools and patient—for instance the data from an MRI or CT scan—he can, virtually, give surgeons augmented vision resulting in better surgical outcomes. His work is funded by the National Institutes of Health, the National Science Foundation and the Department of Defense.

Zachary Taylor, Ph.D.

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Zachary Taylor is the engineering director of the Bio-photonics Laboratory in the Dept. of Bioengineering and a medical engineering investigator at the Center for Advanced Surgical and Interventional Technology in the Dept. of Surgery, UCLA. Dr. Taylor received his B.S. degree in electrical engineering from UCLA in 2004, and his M.S. and Ph.D. in electrical engineering from UCSB in 2006 and 2009 respectively. Dr. Taylor has been successful in obtaining NIH grants for novel imaging and sensing modalities from the NIBIB and NEI. He is currently conducting biomedical THz imaging research in collaboration with the departments of Electrical Engineering, Pathology, General surgery, and Ophthalmology at UCLA.

Fernando Vinuela, M.D.

Professor of Radiology
Director, Division Interventional Neuroradiology
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Dr. Viñuela has had a distinguished 20+ years career in Neuroradiology. He is co-Director of UCLA Stroke Center (1995–present) and previously was the Director of the Leo G. Rigler Research Center at UCLA (1987–2011). He helped develop the hyperselective balloon embolization with a new latex calibrated balloon for use in intracranial and extracranial circulation. He has researched the use of multiple embolic materials in intracranial lesions, the morphological and hemodynamic computer analysis of arteriovenous malformations, the use of platinum detachable coils and electrothrombosis in the endovascular / endosaccular occlusion of intracranial aneurysms and the changes in blood flow, pressure and resistance after intravascular occlusions. He continues researching and developing other embolic materials and techniques.

Dr. Viñuela has contributed 38 chapters to books and published three books. He has also published more than 300 scientific articles, and over 500 abstracts/scientific presentations. He has been invited to more than 400 lectures worldwide.

Kalyanam Shivkumar, M.D., Ph.D.

Professor of Medicine & Radiology
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Kalyanam Shivkumar MD PhD is a practicing interventional cardiac electrophysiologist and physician-scientist. Dr. Shivkumar's research work deals with mechanisms of cardiac arrhythmias in humans including the role of the autonomic nervous system. His group is also actively involved in new approaches to complex catheter ablation, and development of new IP and medical technology for cardiovascular therapeutics. He serves on the editorial board of several journals and is a peer reviewer for several basic science and clinical journals in cardiology. He also serves as a peer reviewer for the NIH in evaluating cardiac arrhythmia research.

Steven D. Schwartz, M.D.

Ahmanson Professor of Ophthalmology
Chief, Retina Division
Jules Stein Eye Institute
Professor of Ophthalmology

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Dr. Schwartz's primary areas of research include early diagnosis and treatment of diseases such as macular degeneration, retinopathy of prematurity (ROP), and diabetic eye disease. Additionally, his focus includes development and evaluation of novel medical device technologies, imaging technologies, surgical equipment (including surgical robots), and drug delivery systems, with particular emphasis on diagnostic and treatment applications. Dr. Schwartz's clinical research focuses on trials of novel pharmacotherapeutic agents to discover treatments for both wet and dry age-related macular degeneration, ROP, and diabetic retinopathy.

Through innovative teleophthalmological approaches to screen for eye diseases (such as diabetic retinopathy and ROP), Dr. Schwartz is dedicated to improving both the quality of and access to specialized ophthalmology care.

This year, Dr. Schwartz led two new clinical trials testing the use of stem cell-derived retinal pigment epithelial cells to address vision loss in people suffering from Stargardt's macular dystrophy and dry age-related macular degeneration.

Harry A. McKellop, Ph.D.

Professor: UCLA & Orthopaedic Hospital Dept. of Orthopaedic Surgery and Dept. of Bioengineering
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Harry A. McKellop received BS and MS degrees in Mechanical Engineering from UCLA in 1970 and 1973, respectively, and his PhD in Biomechanics from USC in 1988. He has conducted research in a variety of orthopaedic fields, including joint replacement and treatment of fractures. His particular specialty is analyzing the causes of wear of artificial joints, and developing more wear-resistant materials to extend their useful lifespan in the patient.

Dr. McKellop joined the J. Vernon Luck Sr., M.D., Orthopaedic Research Center in 1980. He was appointed Director of the Biomechanics Laboratory in 1985, Director of the Luck Center in 1993, and Vice President of Research in 1996. He also is a professor in the UCLA/Orthopaedic Hospital Department of Orthopaedic Surgery. He led a team that developed a highly wear resistant polyethylene for use in artificial hips and knees that has been awarded numerous patents in the US and internationally, and has been implanted in nearly one million patients.

Martin Burns

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Martin spent more than fifteen years as a management consultant in the US and Europe at Deloitte Consulting and PricewaterhouseCoopers. During the past seven years, Martin led corporate strategy, innovation, operations, quality and regulatory, M&A and global expansion assignments for medical device and life sciences companies.

Emily Waldron Loughran

Director of Licensing

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Emily Loughran joined UCLA's OIP-ISR in 1994 as a technology transfer officer. Currently, as the 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 M.B.A. from USC and a B.S. from UC Berkeley.

UCLA Medical Device Technologies Available for Licensing

Silicon Microsystems for High-Throughput Analysis of Neural Circuit Activity

There is an increasing appreciation for mapping brain activity in the central nervous system, particularly as it pertains to disease and injury. Functional MRI (fMRI) and electroencephalography (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. As a result, our understanding of neuronal brain circuitry and its relationship to disease has been limited by the resolution of current technology.

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 of 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.

LEAD INVENTOR: Sotiris Masmanidis, Ph.D.

UCLA Case No. 2013-039

Patent Status: Provisional application filed

Algorithm for Continuous Brain Assessment Using Intracranial Pressure Measurements

Intracranial pressure (ICP), as used in clinical applications, is either measured as the pressure in brain fluids or tissues, both of which are measurements that are achieved through invasive procedures. ICP is useful to monitoring physiological changes, especially following incidents such as traumatic brain injury, brain aneurysm rupture, and stroke, as these patients are at high risk for secondary insults. Currently, the average value of the ICP is the only metric that commercial devices deliver to clinicians; although, there is much more information that can be extracted from processing ICP recordings.

Researchers at UCLA have identified an algorithm - Morphological Clustering and Analysis of Intracranial Pressure Pulse (MOCAIP)—for extracting various morphological features of ICP pulses. For patients who are suffering from a brain-related health condition, this data would be useful in characterizing dynamic physiological changes such as spasms of blood vessels in the brain (cerebral vasospasm) and changes of brain ventricle size. This algorithm provides a steady state indicator of ICP that is robust to noise and artifacts because of its built-in legitimate ICP pulse recognition.

LEAD INVENTOR: Xiao Hu, Ph.D.

UCLA Case No. 2013-242 & 2008-036

Patent Status: Provisional application filed

A Cell Phone-Based Electrical Biosensor

Researchers at UCLA have developed the first cell-phone-based disposable biosensor for rapid disease detection and diagnosis. The device consists of two elements: a circuit board, which plugs into a cell phone via the USB port and a disposable microfluidic chip, which plugs into the board. The disposable biosensor chip is fully self-contained and self-pumping and is comprised of inlets/outlets, fluidic channels, and an electrochemical sensor. The circuit board contains the electrical components required for the detection process and enables for data transfer to the cell phone. Additionally, the collected data can be easily transmitted wirelessly to a nearby hospital, clinic or heath center for treatment and disease tracking. This invention will greatly improve the availability of medical diagnostics and lead to various other tests and devices that utilize cell phones. The technology also circumvents the need for bulky and expensive external components (i.e., pumps, microscopes, power supplies), helping to make medical diagnostics widely available.

LEAD INVENTOR: Peter Lillehoj, Ph.D.

UCLA Case No. 2011-207

Patent Status: Provisional application filed

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 to 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 be 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.

LEAD INVENTOR: Hossein Priouz Kavehpour, Ph.D.

UCLA Case No. 2011-208

Patent Status: Provisional application filed

***Prototype on display**

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. Such sampling is also needed for detailed microbial, proteomic, and metabolic analyses integral to clinical research. Current procedures for sample collection, like biopsy and endoscopic lavage, entail the use of bulky anoscopes and rectal tubes, respectively. For a more comfortable alternative, some physicians have resorted to adapting ophthalmic "eye spears" to sample rectal mucosa. Although these modified tools are less bulky, they were originally designed for the eye, requiring improvisational procedures to implement. Thus, there is a need for a better, more streamlined sampling device designed specifically for the rectum.

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.

LEAD INVENTOR: Jonathan Braun, M.D., Ph.D. & Peter Anton, M.D.

UCLA Case No. 2012-535

Patent Status: Provisional application filed

A Method and Device to Allow Middle Ear Pneumatic Equalization and Drainage

Otitis media *or* infection of the middle ear has a high frequency and impact in the pediatric population. Fifty percent of children will have otitis media before reaching 1 year of age. Further, nearly 5 million school absences and 500,000 operations occur annually as a result of otitis media. Even without infection, otitis media with effusion (OME)—a condition where fluid accumulates in the middle ear—can develop. While most cases of otitis media resolve spontaneously within 3 months, some cases may persist for months to years. Chronic OME can lead to permanent hearing impairment or loss. To prevent accumulation of fluid, a tympanostomy tube can be inserted into the eardrum to keep the middle ear aerated. However, the benefits of tympanostomy tubes remain controversial as their ability prevent hearing loss or further infection has not been well documented. Also, they frequently fall out and impose water immersion restrictions. Thus, new approaches and devices are needed to prevent hearing loss from chronic and severe middle ear infections.

Dr. Gary Duckwiler of UCLA's Department of Radiology has developed a novel method and device to drain fluid build-up associated with otitis media with effusion. The device would restore the normal drainage pathway in the inner ear and obviates the need for more invasive surgery, including adenoidectomy and tonsillectomy. Placement of the device would be minimally invasive, easily reversible, and safer as it would be positioned where it would not be likely to perforate the tympanic membrane.

LEAD INVENTOR: Gary Duckwiler, M.D.

UCLA Case No. 2006-437

Patent Status: Provisional application filed

Neuro-Endovascular Ultrasound Thrombolysis

Stroke is the most common life-threatening neurologic disease and is the leading cause of death in the United States after heart disease and cancer. Among the current U.S. population, some 11 million people have or will have brain aneurysms, which constitute the main cause of non-traumatic subarachnoid hemorrhage. If not treated immediately, stroke can cause permanent neurological impairments and death. The current method of reestablishing blood flow in the blocked arteries involves the use of either systemic or local intra-arterial fibrinolytic therapy. Although there are many reports of successful recanalizations, these methods are not ideal.

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 that fibrinolytic therapy, (2) ultrasound does not cause bleeding complications, and (3) ultrasound can be more economical that fibrinolytic therapy in itself and in overall hospital costs.

LEAD INVENTOR: Cheng Ji, M.D.

UCLA Case No. 1995-593

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

Method and Device for Treating Intracranial Vascular Aneurysms

Approximately 6-8 percent of all strokes results from non-traumatic subarachnoid hemorrhage, a condition where blood leaks from the cerebral vasculature into the subarachnoid space. About 8 percent of subarachnoid hemorrhages result from rupture of an intracranial aneurysm. Ruptured intracranial aneurysms are associated with a high rate of mortality. Approximately 15% of the patients die soon after the initial rupture. An additional 20 to 30% of the patients die during the first 2 weeks following the initial rupture. Rebleeding is one of the major causes of death in the patients who survive the initial hemorrhage. In addition to the high mortality rate associated with ruptured intracranial aneurysms, there is also a high morbidity rate among patients who survive the rupture long term. Almost two-thirds of patients well enough to be discharged after surgical obliteration of the aneurysm have a residual neurological deficit.

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.

LEAD INVENTOR: Tarik Massoud, M.D., Ph.D.

UCLA Case No. 1996-528

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

Self-Clearing Catheter Device for Surgically Implanted CSF Shunts

Hydrocephalus, a condition in which increased intracranial pressure is caused by the pooling of cerebrospinal fluid (CSF) in the brain, can be caused by outflow blockage, reabsorption, or overproduction of CSF. Elevated intracranial pressure can impact brain function, resulting in altered behavior and thought. The only treatment available for hydrocephalus is the surgical implantation of a shunt. The shunt—consisting of ventricular catheter, valve, and distal catheter—allows CSF to be redirected to other cavities in the body where the fluid could be reabsorbed. However, the shunt can be prone to complications; catheter obstruction due to gradual cell accumulation is one of the primary causes of malfunction. On average, 85% of people with shunts have at least two shunt-revision surgeries during their lifetime. A minority of patients struggle with recurrent shunt obstructions, requiring over 100 shunt revisions. Each surgery introduces additional risks of brain injury, as well as shunt infection. With over 25,000 shunt operations completed each year in the U.S. alone, a self-clearing catheter is of great relevance to extending the useful life of catheters and reducing the necessity for repeated invasive procedures.

The shunt system currently being developed at UCLA has a unique capability to clear cellular obstruction from its catheter flow holes. Rather than using surface layer coatings, the new approach uses micro-mechanical mechanisms to maintain the normal flow of the catheter. As the clearing mechanism is activated, the cellular obstruction is swept off of the catheter surface. Periodic activation of the mechanism would allow routine maintenance of CSF flow, which would prevent the formation of complete occlusion. The system can be operated by the patient, who will be able to perform the maintenance as part of their daily activities.

LEAD INVENTOR: Marvin Bergsneider, M.D. and Jack Judy, Ph.D.

UCLA Case No. 2005-053 & 2010-175

Patent Status: Provisional application filed

Dual Rotational Stent

Stents are small metal coils used to open up clogged arteries Stents help prop the artery open and decrease the chance of it narrowing again. Currently available intracranial stent devices have been developed as an adjunctive technique for coil embolization. These stents are deployed across the neck of a cerebral aneurysm, and coils are placed inside the lumen of the aneurysms to prevent the protrusion or escape of these coils. However, all of these stents are designed with a low struts density to allow the placement of coils through them, resulting in difficulties preventing blood flow from getting into aneurysms.

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 aneurysm and the other one for controlling the degree of blood flow into the aneurysm.

LEAD INVENTOR: Dieter Enzmann, M.D.

UCLA Case No. 2009-668

Patent Status: Provisional application filed

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 use applied pressure to artificially achieve collateral circulation in the brain. The method and device both capitalize on a biological phenomenon where flow rate through a collapsible tube will depend only on an upstream pressure at the feeding segment and will be independent of pressure downstream. 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. This method and device are intended to treat patients suffering from blood flow diversion due to vessel collapse and rapidly restore CBF to about 50% of normal.

LEAD INVENTOR: David Liebeskind, M.D.

UCLA Case No. 2009-224

**Patent Status: Pending, US and CA –
Publ. No. US 2010/0318114 A1**

Self-Navigating Intracardiac/Intravascular Catheter

Navigating catheters within the vascular system and the heart of a patient presents numerous challenges. While fluoroscopy is frequently used to localize catheters within the body, its performance is limited by the radiation exposure, space, and noise and blurring effects of the X-ray and acquisition system. Thus, catheter-based procedures — particularly those that require high precision, such as accessing the coronary sinus — are limited by fluoroscopy and technical operator skills as are other imaging modalities.

To address the challenges of catheter placement, Dr. Peyman Benharash of UCLA's Division of Cardiothoracic Surgery and colleagues have designed a self-navigating catheter that contains sensors to determine its own position in the body. To date, the catheter design has been tailored to accessing the coronary sinus, a common site for interventional therapies. Sensors and other self-contained imaging modalities will provide inputs to either an operator or an automated system that will drive the catheter to the appropriate location. The catheter may be coupled to a robotic navigation system that advances the catheter at branch points in the vascular system and heart. This technology would provide easier access to the coronary sinus to implant pacemakers and do other complex intracardiac device interventions, which are rapidly increasing in number and type.

LEAD INVENTOR: Peyman Benharash, M.D.

UCLA Case No. 2012-108

Patent Status: Provisional application filed

Novel Application of Laser Lithotripsy for Treating Vascular Calcification

In the United States, 12 million people suffer from symptomatic Peripheral Arterial Disease (PAD), wherein blood flow to the lower extremities is significantly reduced by atherosclerotic plaques. Traditionally, vascular bypass surgery has been considered the "gold standard" of treatment for PAD. However; not only is surgery associated with significant morbidity and mortality, but also 40% of these patients are not eligible for surgery. Percutaneous Transluminal Angioplasty (PTA) with or without stenting has been introduced as an alternative to surgical revascularization. Despite acceptable clinical outcomes; PTA is not flawless and suffers from major technical challenges. One of the most important limitations of PTA is Chronic Total Occlusion (CTO). Further, pulsed-wave excimer laser catheters have been developed to ablate fibrous plaques, yet they too have been challenged by low user visibility and incomplete clearance of debris.

To overcome these limitations, 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. In fact, Holmium laser systems have already been used for vaporization and complete ablation of heavily calcified urinary and biliary stones with great success rates. However, this laser had not been used for ablation of vascular chronic occlusions to date.

LEAD INVENTOR: Bashir Tafti, M.D.

UCLA Case No. 2012-565

Patent Status: Provisional application filed

Ultrasound-Guided Endoscopic Instrument

Hysteroscopically-guided procedures are becoming increasingly common in gynecologic practice. Among these operations are a number which, to a variable extent, are compromised by the inability of the surgeon to see deep into the area of dissection or resection. Included in this list of procedures are endometrial resections, adhesiolyses for Asherman's syndrome and transcervical myomectomies for leimyomas with intramural components. In each of these procedures, the risk of perforating the uterus compromises the ability of the surgeon to adequately complete the procedure. Efforts to guide or monitor such procedures with concomitant laparoscopy have generally been expensive and unrewarding. The laparoscope may aid in the early diagnosis of perforation but it is relatively useless in prevention.

Using endoluminal ultrasonic technologies with current resection techniques, researchers at UCLA have developed a new method to overcome many of the obstacles listed above. This novel technology may expand the types of procedures possible and enhance the quality of procedures performed under hysteroscopic guidance.

LEAD INVENTOR: Malcom Munro, M.D.

UCLA Case No. 1994-528

Patent Status: U.S. Patent Issued - # 5,957,849

A New Non-Invasive Technique to Record Human Cerebral Metabolites *In Vivo*

Magnetic Resonance Imaging (MRI) and Magnetic Resonance Spectroscopy (MRS) are anatomical and biochemical imaging techniques, respectively, which depend on the interaction of molecules with static and radio-frequency magnetic fields. MRI relies upon mapping the proton (^{1}H) concentration of water molecules, while MRS records the ^{1}H concentration of several water-soluble metabolites, lipids and water. Although they use different techniques, MRS can be performed with the same MRI scanner by using identical hardware and slightly modified software platforms. Because MRS can also record metabolites consisting of other nuclei, such as carbon (^{13}C), phosphorous (^{31}P), fluorine (^{19}F), and sodium (^{23}Na), it can be used to record the metabolite levels in different areas of the human body for which MRI provides the spatial coordinates for the volume locations. However, current versions of the localized one-dimensional (1D) MR spectroscopic sequences (STEAM, PRESS, ISIS, etc.) result in severe overlap of spectral peaks in the MR spectra and ambiguous assignments of metabolites.

UCLA scientists have developed a new version of the L-COSY sequence which uses only three radio-frequency (rf) pulses for localizing the voxel (CABINET sequence as an 1D analog) and recording the two-dimensional MR spectra (L-COSY: 2D analog). This added second dimension improves resolution, decreases the overlap of the peaks, and detects additional brain metabolite resonances close to the most dominant water peak. This technology has applications in the diagnosis and treatment of neurological disorders and therapeutic evaluation of brain, breast, and prostate tumors.

LEAD INVENTOR: Albert Thomas, Ph.D.

UCLA Case No. 2000-331

Patent Status: U.S. Patent Issued - # 7,200,430

Computer-Aided Detection of Implantable Man-Made Devices in Medical Images

Man-made devices are used more and more frequently as medical implants to replace, support, or enhance biological structures in patients. The failure to monitor these implants accurately could threaten the life of patients depending on the critical nature and position of the implantable devices. Unfortunately, there have been no techniques developed for detecting and classifying implanted man-made devices (IMDs) for medical imaging except for modeling surgical dental implants for simulation and planning purposes. Detection and surveillance of IMDs is required on a large number of images for within the same imaging modality and within different modalities. Currently the presence and location of IMDs are assessed visually by a radiologist solely. It is a time-consuming and sometimes challenging task for physicians, and is therefore expensive for healthcare.

Researchers at UCLA have developed a computer-aided detection system (CAD) to detect and assess an IMD for medical imaging. The system is implemented as a computer software package. Following detection and classification of an IMD, the system can automatically generate a detailed report about the images. In detail, a report will include information for automatically determining: (a) location, (b) number, (c) category, manufacturer, and characteristics; (d) comparison to manufacturer's specifications; (e) movement between serial images; (f) safety verification and recall. This technology can detect a variety of IMDs such as pacemakers, pumps, stents, plates, coils, tubes, catheters, clips, nails, screws, and microchips and is applicable to many medical imaging modalities, including X-ray, MR, ultrasound, nuclear, and optical.

LEAD INVENTOR: Dieter Enzmann, M.D.

UCLA Case No. 2007-218

Patent Status: Pending, U.S. and Foreign – Publication # WO/2012/106580

3D Transurethral Ultrasound System for Prostate Imaging

Focal therapy and needle-based procedures on the prostate are challenging due to the high potential for off-target side effects. These side effects, which include severe pain, incontinence, and impotence, could be mitigated by more accurate visualization of the boundaries of prostate. While CT and MRI provide anatomical information of the prostate, they cannot readily provide real-time imaging information during a procedure.

Dr. Martin Culjat, Professor in UCLA's Department of Bioengineering, and colleagues have developed a transurethral catheter-based ultrasound system for imaging the prostate in real-time. The system offers the advantage of 3-dimensional imaging through electronic steering. This feature reduces motion errors in the image and allows reliable registration of the ultrasound image to CT and MRI scans of the patient. Real-time registered images would provide a highly accurate anatomical map of the prostate that could be exploited for prostate cancer therapy (brachytherapy, external beam radiation) as well as diagnostic biopsy (for lesion targeting with MRI).

LEAD INVENTOR: Shyam Natarajan, Ph.D.

UCLA Case No. 2012-068

Patent Status: Provisional application filed

Automated System for Scoring Changes in Quantitative Interstitial Lung Disease

Increasing evidence supports that the extent of interstitial lung disease is an important predictor of prognosis for idiopathic pulmonary fibrosis (IPF) and scleroderma. The median survival of IPF patients is 2-5 years. Visual, semi-quantitative scoring is the current standard to evaluating the stage of disease. However, semi-quantitative scoring systems are limited by the requirement of expert radiologists and by inter-observer variation, so they tend to be unreliable for assessing changes in disease status.

Professor Hyun Kim and colleagues from UCLA's Department of Radiology have developed a new, fully-automated Computer Aided Diagnosis (CAD) scoring system that provides quantitative, repeatable, and retraceable measures of interstitial lung disease (ILD). The system provides increased sensitivity and consistency over visual scoring and can reliably estimate transitional changes in the levels of fibrotic reticulation, ground glass patterns, and normal, healthy patterns. These transitional scores of change are a sensitive metric for testing treatment efficacy in IPF and other disorders causing ILD. This technology has commercial application in monitoring patient disease and in clinical trial testing.

LEAD INVENTOR: Hyun Kim, Ph.D.

UCLA Case No. 2013-078

Patent Status: Provisional application filed

Improved Cardiac Imaging for Patients with Cardiac Devices

Late gadolinium enhancement (LGE) MRI is the clinical gold standard for *in vivo* myocardial tissue characterization and is useful for assessing tissue viability in patients with ischemic heart disease, myocarditis, cardiomyopathies, as well as other heart conditions. LGE MRI is also playing an increasing role in guiding catheter ablation treatments for arrhythmia. Cardiac pacemakers and implantable cardioverter defibrillators (ICDs), which are often implanted into patients with such heart conditions, impair the utility of LGE MRI by producing disruptive imaging artifacts. These artifacts manifest as bright contrast signals, image distortions, or signal voids. Combined, these artifacts drastically limit a physician's ability to determine if scar tissue is present. Thus, novel methods or approaches are needed to clarify LGE MRI images for these at-risk patient populations.

Dr. Peng Hu in the Department of Radiological Sciences at UCLA's David Geffen School of Medicine has developed an approach to eliminate the image quality distortions associated with pacemakers and ICDs in LGE MRI. The technique has been tested in healthy volunteers and a number of patients having an implanted ICD. Given that over 500,000 patients are implanted with ICDs or pacemakers every year in the U.S., this technology significantly improves on the diagnostic potential of LGE MRI.

LEAD INVENTOR: Peng Hu, Ph.D.

UCLA Case No. 2013-310

Patent Status: Provisional application filed

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. The precise positioning of the radiation source is vital to delivering a high, therapeutic dose of radiation to tumor tissue while simultaneously minimizing damage to surrounding normal tissue. CT imaging has been employed to visualize brachytherapy catheters, but it is not optimal in all imaging circumstances for visualizing tumors and certain normal adjacent organs. MRI is preferred by clinicians for imaging tumors, but it inadequately displays brachytherapy devices. Thus, a technology that could provide better visualization of both the tumor, normal tissue, and brachytherapy devices on MRI imaging would enable more accurate treatment planning and effectiveness of cancer therapy.

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. This application includes, but is not limited to prostate, breast, gynecological, sarcomas, head, neck, anal, and rectal cancers.

LEAD INVENTOR: Daniel Ennis, Ph.D. & Jeffrey Demanes, M.D.

UCLA Case No. 2012-546

Patent Status: Provisional application filed

***Prototype on display**

A Novel Approach for Lower Energy Dynamic Cardiac Imaging with MRI

MRI scanning has conventionally been operated under low, static magnetic field strength (at or below 1.5 Tesla). For certain clinical applications, low-field MRI has been found to be suboptimal in providing an informative image due to the lower availability of signal. In turn, high-field MRI scanners—3 Tesla (3T) or greater—have been developed and are providing the benefits of higher signal-to-noise and contrast-to-noise ratios, as well as better spectral resolution. While high-field scanners have improved the diagnostic potential of MRI for numerous applications, including tumor detection and angiography, the high magnetic field does bring additional technological and safety limitations for other applications. In particular, cardiac CINE imaging—which is used to evaluate cardiac function, coronary arteries, and vascular anatomy and cannot be optimally resolved by 1.5T MRI—is limited by the high rate of energy absorption associated with 3T MRI. Increased energy absorption by tissues can lead to tissue heating and damage and is especially a concern for pediatric populations and patients with implanted devices. Previous MRI methods have been developed to address the safety concerns of high-field MRI, but not for cardiac CINE imaging. Thus, the development of new low-energy MRI techniques is necessary to reap the benefits of high-field MRI for cardiac indications.

Dr. Daniel Ennis and colleagues in UCLA's Department of Radiological Sciences have developed a novel MRI protocol that allows 2D and 3D cardiac CINE imaging with high-field MRI. The unique scheme maintains image contrast using 3T MRI while reducing the rate of tissue energy absorption by up to a factor of 3.5, thereby overcoming the safety concerns of tissue heating. Computer simulations and tests in humans have demonstrated that the new scheme can be used to produce high resolution images.

LEAD INVENTOR: Daniel Ennis, Ph.D.

UCLA Case No. 2013-038

Patent Status: Provisional application filed

An Improved Cast for Bone Fracture Healing

The healing of a bone fracture often requires extended immobilization of the affected area. This immobilization is typically accomplished with the use of a cast, an approach that has not significantly changed for decades. However, traditional plaster casts are heavy, uncomfortable, and commonly cause skin irradiation and pressure point pain. Casts are also subject to molding and degradation by water and sweat. Such retention of moisture in casts can promote infection of a wound or surrounding skin. Thus, new devices that can support fracture healing while reducing water retention would greatly improve patient comfort and potentially mitigate losses of productivity and mobility during fracture healing.

Researchers from UCLA's Office of Intellectual Property and from the Department of Bioengineering have developed an improved layered cast using lighter, synthetic materials that allow greater water permeability than existing casts. The new cast also allows for reversible hardening of the cast to allow for adjustments and removal of pressure points over the course of application. This new cast advances bone fracture treatment by improving the hygiene associated with cast-wearing and by increasing patient comfort through its adjustability and enhanced mobility.

LEAD INVENTOR: Emily Loughran, Benjamin Wu, Ph.D., Jeffrey Wang, M.D.

UCLA Case No. 2012-755

Patent Status: Provisional application filed

Device for the Treatment and Prevention of Radiation Induced Proctitis

Over 300,000 patients undergo pelvic radiotherapy annually in Europe and the U.S. Although pelvic radiotherapy is effective, it can severely damage the lining of the nearby rectum in about 10%-40% of patients. This leads to "radiation proctitis," a condition marked by chronic rectal bleeding, anemia, fecal incontinence, pain, and diminished quality of life. There are about 20,000 cases of radiation proctitis in the U.S. annually and the management of radiation proctitis is cumbersome. Current treatments of proctitis, including burning the rectum with high energy heater probes, can be painful and can cause damage and bleeding itself. Hyperbaric oxygenation is an alternative treatment when all else fails. A hyperbaric chamber encases the patient and delivers hyperatmospheric oxygen throughout the body. Although hyperbaric oxygen heals radiation proctitis in about 90% of subjects, the chambers are highly scarce, expensive to operate, and sometimes can cause serious side effects (e.g., perforated ear drums and double vision).

UCLA researchers have designed a specialized catheter to safely and effectively heal and prevent radiation proctitis. This device treats radiation injury by delivering and maintaining substantially pure oxygen within the rectal vault. The use of direct, pressurized oxygen is expected to cost-effectively heal the proctitis in a manner at least comparable to the hyperbaric oxygen chamber. Advantageously, the balloon oxygenation catheter can become the first line treatment for radiation proctitis. The catheter can also be used prophylactically in patients receiving radiation treatment. Concurrent oxygenation can even enhance radiation's effectiveness while potentially reducing proctitis risk. Moreover, the approach can be effective for other forms of rectal injury, such as proctitis from Crohn's disease or ulcerative colitis. The approach would be less painful and morbid than the usual techniques of burning the rectal lining with heat, flames, or noxious chemicals, and can avoid serious side effects.

LEAD INVENTOR: Brennan Spiegel, M.D.

UCLA Case No. 2012-411

Patent Status: Provisional application filed

Novel Method for the Rapid Fabrication of Brachytherapy Applicators

Brachytherapy is a widely used method for the treatment of cancer. However, success of brachytherapy relies on accurate fit between the applicator and the patient surface. Currently used standard applicators usually fit poorly to the patient, resulting in air gaps that reduce the effectiveness of treatment. The invention herein provides a method to fabricate a mold of a part of the patient's body for the utilization of a brachytherapy applicator to treat various forms of lesions.

Dr. Ke Sheng, Associate Clinical Professor in the Department of Radiation Oncology, and colleagues have developed a method to fabricate brachytherapy applicators. The present invention utilizes 3D CAD analytical software to reconstruct the surface from a patient's CT scan. Once the reconstruction is complete, the mold can be fabricated to fit the surface of the patient. Grooves or channels can be fabricated at the same time providing excellent localization for catheters that are connected to an HDR afterloader. A radioactive pellet will then travel through the catheters to treat the lesion.
Perhaps one of the most beneficial features of the present invention is the ability to manufacture the mold remotely in the absence of the patient. Compared to previously manually fabricated skin molds, the present invention holds potential for the rapid cost-efficient production of brachytherapy applicators for the treatment of various superficial cancers of the scalp, leg, ear, nose and breast, etc.

LEAD INVENTOR: Ke Sheng, Ph.D.

UCLA Case No. 2012-418

Patent Status: Provisional application filed

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. Patients with larger or pendulous breasts, which are pulled down by gravity into close proximity of healthy organs, are especially prone to greater non-target toxicity and higher skin doses of radiation. Devices previously designed to support breast tissue and create space from the chest for safer radiotherapy have suffered from patient discomfort and skin build-up.

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.

LEAD INVENTOR: Ke Sheng, Ph.D.

UCLA Case No. 2013-077

Patent Status: Provisional application filed

Non-Invasive Optometric Medical Diagnostic Device

Biological tissues such as skin and arterial walls contain various endogenous fluorophores, such as NADH, collagen, elastin, and flavins, that are uniquely characterized by their fluorescence properties. These proteins can be markers of diseases and cause the skin of diseased patients to fluoresce differently from that of healthy individuals. Consequently, fluorescence of the skin has been proposed as a means of diagnosing pathologic tissue.

UCLA researchers have created a fast, low-cost, and non-invasive approach for diagnosing various 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 skin's 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 and cancer, acne, and photo-aging.

LEAD INVENTOR: Laurent Pilon, Ph.D.

UCLA Case No. 2004-657

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

Corneal Hydration Sensing with Thz Illumination

Proper corneal hydration levels are critical to maintaining optical vision. Currently, corneal hydration is measured using ultrasound optical pachymetry, which involves measuring the central corneal thickness and extrapolating the average water content from these measurements. However, mapping from thickness to hydration is very inaccurate and is limited by inherent constraints. Another method uses confocal Raman spectroscopy to remotely measure corneal hydration. However, the excitation illumination influence necessary to achieve accurate measurements exceeds the ANSI regulations for use in humans by orders of magnitude.

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.

LEAD INVENTOR: Martin Culjat, Ph.D.

UCLA Case No. 2012-100

Patent Status: Provisional application filed

Smart Assistive Devices for Geriatric Patients

Falls are a leading cause of injury and death in the elderly and account for significant healthcare and hospitalization costs. A wide range of disabilities and environmental risks contribute to the risk of falling; age-related cognitive impairment is a leading contributor. Information on the cause and circumstances leading to falls would be valuable to their prevention, yet the ability to capture such information has been limited only to patient reporting.

Professor William Kaiser of UCLA's Department of Electrical Engineering and colleagues have developed smart assistive devices—such as canes, prosthetics, and walkers—that wirelessly capture user and environmental information through integrated sensing technology. These smart devices are able to capture spatial, pressure, and patient physiological data, all of which may be contributors to imbalance and falls. The devices and the data processing architecture have been developed and have great potential in guiding patients towards safe behavior and reducing the risk of falls.

LEAD INVENTOR: William Kaiser, Ph.D.

UCLA Case No. 2008-554

Patent Status: Provisional application filed

Improvement of Dental Resins: Decreased Toxicity and Improved Biocompatibility

Resin-based and resin-containing materials are routinely used in dental practices as direct filling materials, fissure sealing agents, and as bonding resins or resin cements for metal, porcelain, and resin inlays, veneers, crowns, and bridges. The use of resin-based materials will likely continue to increase in the future. While the use of resin-containing materials is beneficial to the appearance of patients, these materials carry the risks of cytotoxicity and allergy. Most dental bonding technologies use primers containing the hydrophilic resins HEMA or TEGDMA. HEMA and TEGDMA have been shown to be a cause of these adverse effects due to the release of unpolymerized monomers in the surrounding tooth area, thereby triggering apoptosis or programmed cell death. Similarly, the adverse effects of bleaching agents on dental pulp and gingivae are well established. Therefore, methods for neutralizing the harmful effects of resin monomers and bleaching agents would be beneficial to current dental practices.

UCLA investigators have discovered that the presence of a chemical inhibitor (CI) can inhibit HEMA- and TEGDMA-mediated apoptosis 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 HEMA and TEGDMA treated cells. This in vitro data has been confirmed with in vivo rat models demonstrating that this CI can inhibit cell death induced by composites and bleaching systems and restore function to dental pulp stromal cells. The results indicate that CI prevents adverse effects mediated by HEMA, TEGDMA and bleaching agents. This inhibitor may be incorporated into additive resin materials to mitigate their adverse effects.

LEAD INVENTOR: Anahid Jewett, Ph.D., M.P.H.

UCLA Case No. 2005-379

Patent Status: Provisional application filed

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. Popular materials for these metallic devices include nickel titanium (NiTi) or Cobalt Chromium (CoCr). Although these materials are commonly used, they have several limitations. First, the device generates friction during the installation procedure as the device rubs against the plastic catheter used during installation. A second problem is that once a metal device is placed in an artery, the patient needs to be on blood thinning medications for a long time. This problem can be mitigated by covering the device with native tissues and cells.

Researchers at UCLA have discovered a method of treating NiTi, “nitinol,” sheets, wires, or stents that overcomes the limitations of these devices in current practice. 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 or delivery.

LEAD INVENTOR: Satoshi Tateshima, M.D.

UCLA Case No. 2008-007

Patent Status: Provisional application filed

Robotic Micro-Surgery System

In recent years, robotic manipulators have proven beneficial in assisting surgeons in the performance of minimally invasive procedures with high precision and little tissue damage. Nonetheless, current robotic systems are not suitable for microsurgery procedures due to their limited range of motion, lack of tracking system, and bulky design. Furthermore, because microsurgery requires many instruments, the robotic systems need to be equipped with multiple integrated arms that are capable of maneuvering different surgical instruments.

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.

LEAD INVENTOR: Tsu-Chin Tsao, Ph.D.

UCLA Case No. 2009-300

Patent Status: Pending, US and Foreign – Publication #WO/2011/088400

Bioactive Endovascular Coils

About 5% of the population has some type of aneurysm in the brain. All cerebral aneurysms have the potential to rupture, causing serious complications including hemorrhagic stroke, permanent nerve damage, or death. The conventional treatment for brain aneurysms is microvascular clipping, a highly invasive, microsurgical procedure requiring craniotomy and long recovery periods. Over the past two decades, endovascular occlusion of intracranial aneurysms using Guglielmi detachable coil (GDC) technology has gained worldwide acceptance as a less-invasive treatment alternative to standard microsurgical clipping. In this procedure, a catheter is inserted into an artery and a guide wire is used to release detachable coils made of platinum wire into the aneurysm to block it from circulation and cause the blood to clot. This method is minimally invasive, but its current limitations include a relatively high incidence of aneurysm recurrence and a reduced efficacy in treating large aneurysms. New approaches to improve detachable coil technology will be important for increasing the success rate of cerebral aneurysm treatment.

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 the 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.

LEAD INVENTOR: Benjamin Wu, Ph.D.

UCLA Case No. 2011-135

Patent Status: Pending, US and Foreign

Lung Isolation System

Lung isolation and single lung ventilation are routinely instituted during thoracic surgery. Surgery involving the lung or the contents of the thorax often requires cessation of ventilation to one lung to either keep the lung immobile while surgery is performed or to deflate the lung for better visualization of thoracic structures. One-lung ventilation is also utilized to isolate unilateral pulmonary bleeding or infection as well as during the management of large pulmonary air leaks. The present gold standard for lung isolation, the double lumen endotracheal tube (DLT), is difficult to insert due to the device's size and design, requires exchange of the tube to a single lumen tube when post-operative intubation is required, and has limited compatibility with bronchoscopes and suction catheters due to its small lumen diameters. Alternatives to the DLT, including balloon tipped endobronchial catheters ("bronchial blockers"), also have major drawbacks. Namely, one cannot quickly and easily alternate ventilation from one lung to the other, and the balloon could be dislodged preventing suction of the isolated lung.

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 without the downsides of either. It also incorporates a video visualization system, thus precluding the need for traditional fiberoptic bronchoscopy.

LEAD INVENTOR: Nir Hoftman, M.D.

UCLA Case No. 2011-739

Patent Status: Provisional application filed

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. Treatment options include feeding the patient intravenously, surgically altering the intestine, or transplanting the intestine. These therapies have limited success and transplantation is limited to donor supply. Research within the past decade has suggested the possibility of treating short gut syndrome via intestinal lengthening devices.

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.

LEAD INVENTOR: Greg Carman, Ph.D. & James Dunn, M.D., Ph.D.

UCLA Case No. 2009-227

Patent Status: Pending, US and Foreign - #WO/2010/124126

An Improved Novel Tactile Interface System for Use In Remote Sensory Processes

Current robotically supported surgical methods and complex laparoscopic procedures are limited in the scope of their application by the lack of haptic or tactile feedback transmitted to the operator of pneumatic systems employed in such processes. As a result, medical professionals continue to rely heavily on visual cues when manipulating surgical devices through patient tissues during the course of most surgeries. In addition, existing haptic feedback systems have been plagued by designs with limited adaptability, impractical system size and high manufacturing cost. This has therefore hindered the development of new advances in areas such as minimally invasive surgery (MIS) and telemedicine. Enhanced tactile interface systems would shorten the learning curve of many MIS procedures, improve the quality and safety of an array of surgical techniques and greatly expand the use of such systems to a variety of applications. Similarly, those industries requiring the need for simulations that enable the controller to feel the environment within the context of the system would benefit greatly from an improved tactile user interface. These industries include, but are not limited to, filmed entertainment, video-gaming and the military.

A pneumatic haptic feedback system has been designed to be modular, scalable and miniaturized. When the operator applies a force upon an object to be manipulated, a sensor transmits a signal that results in the application of proportional pressure upon the hands of the operator. In addition, a control system has been engineered to regulate the signal input in proportion to the applied force. The adaptability of this system allows for straightforward custom redesigns and lower system integration expenses. In addition, this system has been constructed for wireless applications.

LEAD INVENTOR: Warren Grundfest, M.D.

UCLA Case No. 2006-552

Patent Status: Pending, US and Foreign – Publ. No. US 2010/0292706 A1

***Prototype on display**

Laser-based Bacterial Disruption for Treatment of Infected Wounds

Surgical wound infections are the second most common hospital acquired infection and can increase hospital length of stay by 10-14 days. Treatment of infected wounds cost more than a billion dollars in the US annually. Wound infections are difficult to treat because bacteria form biofilms that encase the bacteria. This barrier formed by the bacteria prevents white blood cells and antibiotics from entering and killing the bacteria. Current wound infection treatments include topical and systemic antibiotics, surgical wound debridement, wound dressings, chemical methods such as citric acid surfactants, and low intensity ultrasound. None of the above mentioned methods successfully destroys the bacterial biofilms.

Researchers at UCLA have developed a novel technology using laser generated shockwaves to disrupt bacterial biofilms. Laser is applied to tissue coated with a thin metallic film. The metal absorbs the laser, exfoliates, and launches a mechanical stress wave (shockwave) through the tissue that disrupts the bacterial biofilms. A second wave is then generated through gel containing nano-encapsulated antibiotics and silver nanoparticles, and the antibiotic and silver nanoparticles are propelled into the tissue. Thus, this technology not only disrupts the bacterial biofilms but also delivers antibiotics into the tissue.

LEAD INVENTOR: Warren Grundfest, M.D.

UCLA Case No. 2009-230

Patent Status: Provisional application filed

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 a 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.

LEAD INVENTOR: Robert Cameron, M.D.

UCLA Case No. 2012-287

Patent Status: Provisional application filed

Organ Resuscitation Solution & System for Enhanced Liver Transplantation

Liver organs suffer a tremendous degree of ischemia and reperfusion injury (IRI) during transplantation. The injury stems from the interruption of blood flow and depletion of nutrients to the organ in the period between donor organ procurement, preservation and transplantation into the recipient. Cell injury or death and metabolic changes accompany this cessation of blood flow and liver cells are further compromised upon revascularization of the organ in a process known as reperfusion injury. IRI is a significant problem and causes up to 12% of early organ failure and 15% to 25% of long-term graft dysfunction. Post-reperfusion syndrome has an incidence rate of up to 30% and can cause acute cardiovascular collapse leading to acute death of the patients. Moreover, IRI contributes to the ongoing crisis of transplantable organs because many potential organs from deceased donors are particularly susceptible to IRI. As such, these organs are discarded since these organs would lack sufficient function when transplanted. Currently, there is no procedure or treatment to mitigate these effects.

Researchers in the Department of Surgery and UCLA Pfleger Liver Institute have developed a novel solution and system to minimize 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. Over 2000 patients die annually in the United States while awaiting a liver transplant. Thus, increasing the number of available livers for organ transplantation could have huge benefit for the 16,000 patients awaiting a new liver. Moreover, this system could potentially be applied to other transplantable organs.

LEAD INVENTOR: Johnny Hong, M.D.

UCLA Case No. 2012-292

Patent Status: Pending, US and Foreign

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