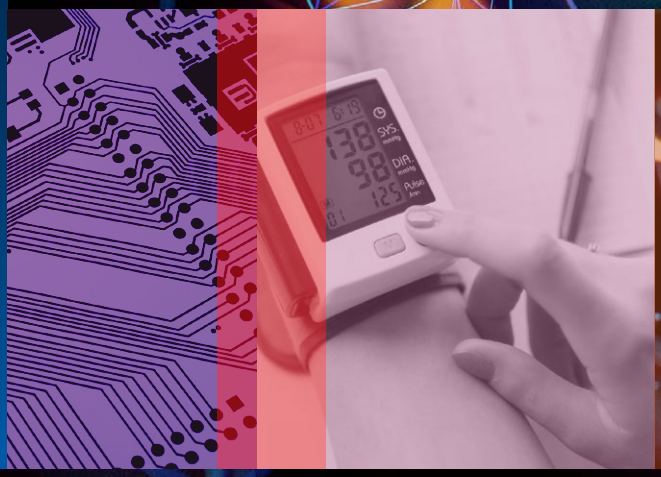
utmb Health

Intellectual Property

SHOWCASE

EDITION MD1



MD1

Medical Devices

Diagnostics

Therapeutics

Vaccines

AI & Software

utmb Health

Intellectual Property Showcase | Medical Devices

EDITION MD1

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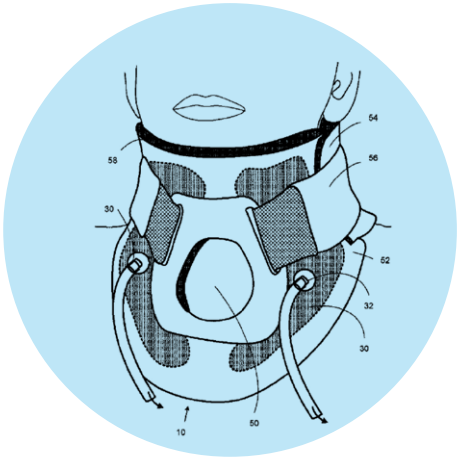
Intracranial and Intraspinal Pressure Reduction Apparatus

PATENT TITLE

Methods and Apparatus for Lowering Intracranial and Intraspinal Cord Pressure

PATENT # US9,757,501

INVENTORS | Thomas Jennings, David Gillis



PROBLEM

Elevated intracranial pressure (ICP) and central nervous system (CNS) edema are critical elements of traumatic brain and spinal cord injury. Traumatic Brain Injury accounts for approximately 40% of all deaths from acute injuries in the United States. Intracranial pressure can damage the brain or spinal cord by compressing brain tissue and restricting blood flow, which results in decreased cerebral perfusion pressure. Failure to quickly remedy excessive ICP may result in transient and permanent neurological problems, seizures, stroke, herniation of the brain and death.

Abnormal increases in (ICP) can result from increased cerebral spinal fluid pressure or directly from increased pressure within the closed cranial vault such as that resulting from growth of an intracranial mass, intracranial bleeding, fluid accumulation around the brain, or swelling of brain tissues. Whether resulting from an infectious process, pathophysiologic condition, or trauma, significantly raised intracranial pressure is a medical emergency. There is a critical need for methods and apparatus that can non-invasively reduce ICP.

SOLUTION

A novel apparatus has been developed that applies negative pressure to tissues adjacent to the vertebral venous system, thereby lowering intracranial pressure. Intracranial pressure is lowered easily without increasing the work of breathing, without the need for intubation, and without breathing through a valve in patients with elevated increased intracranial pressure.

POTENTIAL IMPACT

This novel technology will circumvent existing extremely invasive treatments for increased ICP such as draining of cerebrospinal fluid, administration of medications to decrease swelling, and, if necessary, removal of part of the skull.

PATENT DETAILS

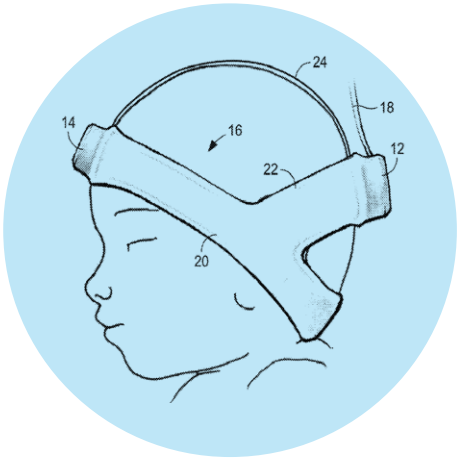
Neonatal Cerebral Oxygenation

PATENT TITLE

Systems and Methods for Measuring Neonatal Cerebral Oxygenation

PATENT # US 11,109,782

INVENTORS | Rinaat Esenaliev, Donald Prough, Yuriy Petrov, Irene Petrov, Joan Richardson



PROBLEM

Cerebral hypoxia is a risk factor for death or severe neurologic complications (e.g., cerebral palsy) for low-birth-weight neonatal infants. Unfortunately, the ability of the cerebral vasculature of low-birth-weight neonates to maintain adequate cerebral blood flow is poorly understood. Although clinical studies have been performed with classical Kety-Schmidt methodology, Doppler ultrasound, positron emission tomography, perfusion computed tomography, magnetic resonance imaging and near-infrared (NIR) spectroscopy, there is a still a critical need to for techniques to easily, repeatedly, and noninvasively monitor or measure cerebral circulatory adequacy in low-birth-weight infants.

SOLUTION

A novel monitoring method and apparatus have been developed that can provide continuous monitoring of cerebral oxygen in the first 48 hours after birth, during which cerebral circulatory function must rapidly adapt to the change from the placental circulation to independent control of blood pressure.

POTENTIAL IMPACT

There is a critical need for this novel monitoring technology. Its mass implementation can help reduce severe neurological complication in low-birth-weight neonatal infants, introducing early interventions that can be the difference between living an independent life and a life requiring assisted living.

PATENT DETAILS

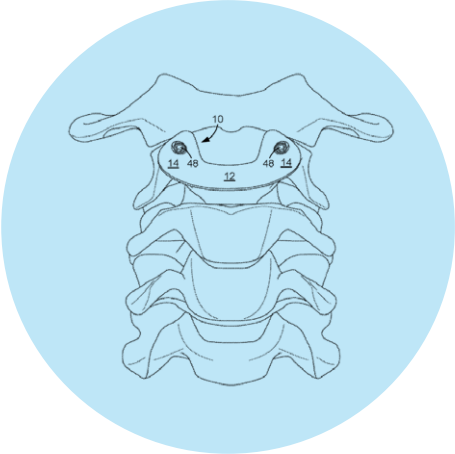
Anterior Cervical Transarticular Fixation

PATENT TITLE

Apparatuses and Methods for Anterior Cervical Transarticular Fixation

PATENT # US 10,687,953

INVENTORS | Kenrick Chur-wei Lam, Sohum Desai, Daniel Williams Branch



PROBLEM

Odontoid fractures are becoming more prevalent as the population ages. Both non-operative and external fixation of geriatric odontoid fractures are associated with a high rate of non-union or poor outcome. There are numerous options for the internal fixation of odontoid fractures. These options include posteriorly based approaches and anteriorly based approaches.

Posterior approaches include CI-C2 transarticular screws, posterior sublaminar wiring, and the use of CI lateral mass screws with either a C2 pedicle, pars, or translaminar screws. Anterior approaches include fixation using odontoid screws in which a single lag screw is inserted across the fracture line at the base of the dens using a standard Smith-Robinson approach.

Given the disadvantages posed by the current treatment options, there is a critical need to have a system and method for achieving effective cervical transarticular fixation that do not require a transom.

SOLUTION

This novel technology comprises anterior cervical transarticular fixation implants that include an implantable cervical plate configured for anterior CI-C2 transarticular fixation. The cervical plate includes lateral wings that each comprise an opening through which a fastener such as a transarticular screw, can be passed and locking mechanisms that are configured to prevent rotation of the fasteners after they have been threaded into place within the CI and C2 vertebrae.

POTENTIAL IMPACT

The technology overcomes the issues of motion loss and poor wound healing associated with current posterior approaches. The technology also can be used in a broader population than the current anterior options providing better health outcomes to patients.

PATENT DETAILS

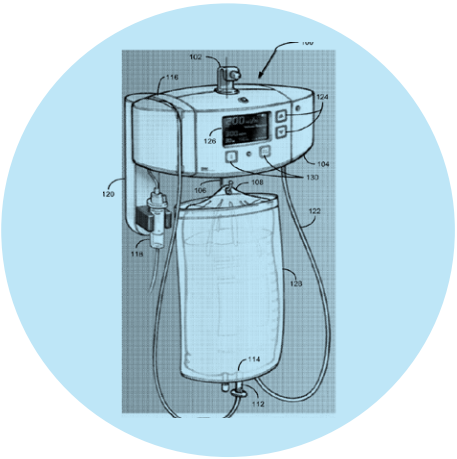
Adaptive Fluid Infusion

PATENT TITLE

Algorithm for Removal of Noise During Administration of Fluid to a Patient

PATENT # US 10,213,551

INVENTORS | Richard B. Voigt, George C. Kramer, Jordan Wolf



PROBLEM

The infusion of physiologic solutions into the blood of patients is a standard treatment for a variety of medical interventions. Fluid is often administered from containers such as bags or bottles using mechanical or hand pumps, gravity flow or pressurized sleeves that compress the fluid container. For the treatment of certain medical conditions, it is important for a caregiver to know the exact volume of fluids that have been administered and the timing of such an administration.

When an IV fluid is administered by gravity feed without an infusion pump, the infusion rate is typically controlled manually. To determine the infusion rate, a caregiver typically counts the drips over a given time-period to calculate and adjust the infusion rate. When an IV fluid is administered using an infusion pump, the amount of fluid delivered is controlled by adjusting the infusion pump's flow setpoint. While infusion pumps allow for a more accurate control of infusion rate, they are expensive and often fail to deliver fluid at the fast rates needed for a bolus. Because certain treatments require a precise concentration and timing of fluid delivery, there is a critical need for a more accurate system and method for measuring these parameters. While known filtering techniques significantly remove signal noise, they also reduce temporal resolution, which can be unacceptable.

There is a critical need for a system and method for removing signal noise from a load cell signal for accurately determining fluid administration parameters based on weight measurements of a fluid container in real-time, or near real-time, and in conjunction with additional patient responsiveness parameters to provide caregivers with improved situational awareness.

SOLUTION

This novel technology provides a system and method for dynamically removing signal noise from a load cell reading that is representative of the weight of a fluid container for accurately accounting for and displaying parameters of the administration of fluid to a patient.

POTENTIAL IMPACT

The technology eliminates fluid measurement errors associated with manual measurements provided by clinical staff. The technology also eliminates errors caused by IV bag movement during ambulatory transport. Ultimately, this measurement improvement will lead to better health outcomes for patients.

PATENT DETAILS

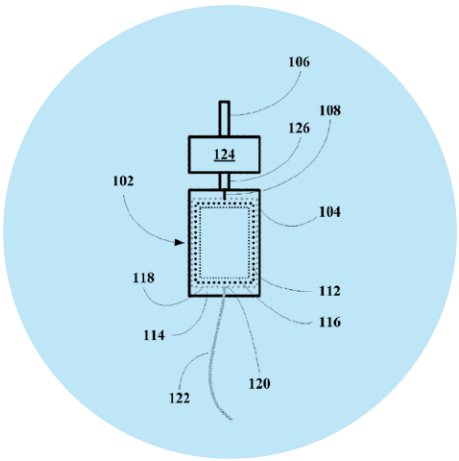
Enhanced Fluid Infusion Pump

PATENT TITLE

Fluid Balance Monitoring System with Fluid Infusion Pump for Medical Treatment

PATENT # US 8,579,859

INVENTORS | George C. Kramer, Guy A. Drew, Donald J. Deyo, Allen E. Brandenburg, Richard B. Voigt



PROBLEM

Patients injured by trauma, major surgery, burns, dehydration, or hemorrhage, lose body fluid and may need biocompatible fluids such as expanders, electrolytes, and plasma protein. Some patients develop morbidities or expire due to over-resuscitation or under-resuscitation of the provided fluids. Air or gas pressurized bags can be placed around an intravenous (IV) fluid bag and inflated to 300 mm Hg to increase infusion rates when a patient needs a large volume fast. Such high rates require more attention to monitoring and adjusting.

Infusion of fluid into the circulation through intraosseous needles can be problematic. Intraosseous needles are placed in the bone marrow when veins are difficult to catheterize due to collapsed veins or narrow veins. Bone marrow provides a virtually un-collapsible vein with access to the circulation, but it has a low hydraulic conductivity, slowing infusion rates.

There is a critical need for a portable high-pressure infuser system that can deliver fluids from a bag at pressures of 600 mm Hg to 900 mm Hg for better monitoring, control, and sustained delivery of fluid

SOLUTION

This novel technology provides a portable trauma treatment system and method for delivery of a biocompatible fluid to a patient, where the system includes an openable housing adapted to receive a flexible bag containing biocompatible fluid (BCF). The system also includes a pressurization assembly for applying constant and/or variable pressure. The pressurization assembly includes components to control the pressure applied to the bag and for rapid depressurization so that rapid fluid delivery can be immediately stopped and reduced to gravity flow rate.

POTENTIAL IMPACT

First responders and emergency department personnel are minimally equipped to measure and determine appropriate amounts and rates of fluid provided to an injured patient. Other critical elements, such as drug delivery, airway maintenance, CPR, compression of bleeding tissue, and other acute issues, take priority at the scene and in the ER. This technology provides a system to overcome these limitations. It is portable, low cost, and can be used as standard equipment.

PATENT DETAILS

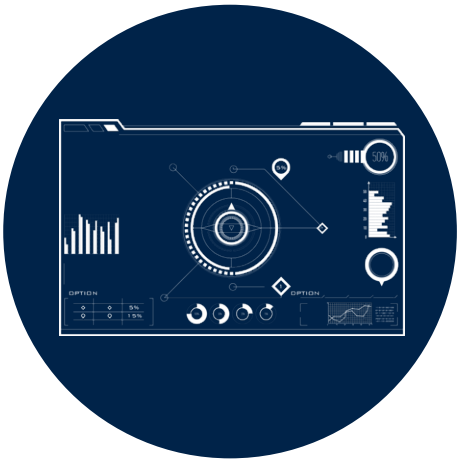
Dynamic Pressure Control

PATENT TITLE

Adaptive Optimization for Dynamic Room Pressurization Control

PATENT # US 10,352,578

INVENTORS | Curtis Adkerson



PROBLEM

Room pressurization is important for preventing unwanted airflow in certain environments, such as negative static pressure in chemical and biological facilities, or positive static pressure in food and drug processing operations. Pressure-dependent environments that use 100% outside air supply typically consume a substantial amount of energy to operate because outside air is so expensive to condition. Part of the problem lies with limitations in the terminal box controller configuration. When static values, such as a differential pressure set point and air change per hour set point, are used for terminal box controller configuration, the room will typically have high energy usage, compliance related issues, or both when there is an event or unfavorable change in the heating, ventilating and air conditioning (HVAC) system. As a result, there is a need for room pressurization control systems and methods that adaptively optimize the air change per hour set point to maximize energy savings while operating within the environmental requirements of the room.

SOLUTION

This novel technology provides room control systems and methods that adaptively optimize the air change per hour set point to maximize energy savings while operating within the environmental requirements of the room, such as maintaining a differential pressure between a room and one or more adjacent areas.

POTENTIAL IMPACT

There is an opportunity to develop room control systems that will dramatically reduce energy costs associated with complex manufacturing and research-based activities. In addition, this novel control system will help reduce errors in production related to non-optimal environmental conditions, reducing costs associated with rework.

PATENT DETAILS

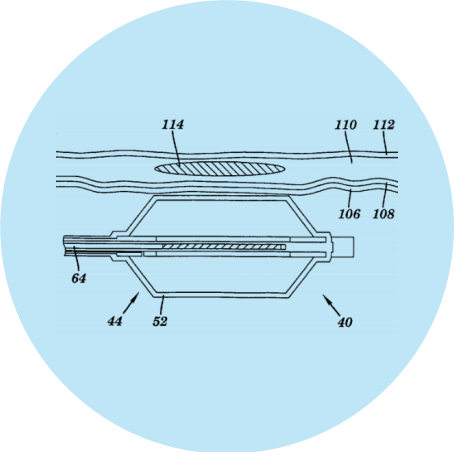
Acid Reflux Redux

PATENT TITLE

Method for Delivering Energy to Tissue and Apparatus

PATENT # US 7,074,233

INVENTORS | Ashok Gowda, Roger J. McNichols, Massoud Motamedi, Pankaj J. Pasricha



PROBLEM

astroesophageal reflux disease (GERD) is a condition in which the lower esophageal sphincter (LES) is unable to function properly resulting in the reflux of stomach secretions, in the forms of acid and enzymes, into the esophagus. This reflux results in deterioration of the lining of the esophagus lumen. GERD is a major health care problem in the United States, where 44% of Americans experience monthly heartburn and 5-10% of the US population (15-30 million adults) suffer significant daily heartburn.

There are several treatment options for GERD for different stages of disease progression and discomfort experienced by the patient. Treatment with an array of acid suppression drugs must be continuous with symptoms recurring in 80% of the patients following medication termination. Most surgical procedures that correct sphincter dysfunction have a high rate of complications. These procedures are invasive, require specialists, and have long recovery times.

SOLUTION

This novel technology provides a device and method for the use of directed energy that reduces reflux from the stomach to the esophagus.

The technology utilizes thermal control to expose directed energy to cool the lower esophageal sphincter for delivery.

POTENTIAL IMPACT

The technology is more effective than simple dietary and lifestyle choices, while being far less invasive than traditional surgical methods. In addition to vast improvements to quality-of-life, the technology will help patients reduce out-of-pocket costs, including $14 billion spent annually on heart- burn medications.

PATENT DETAILS

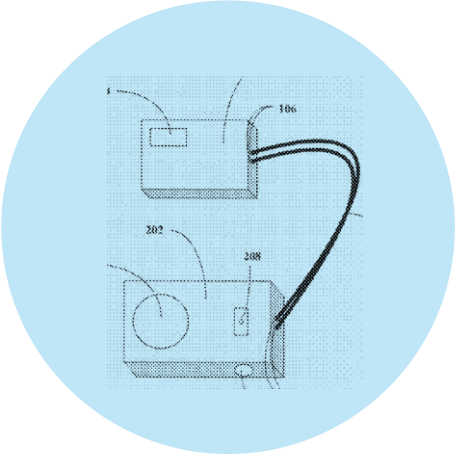
Enhanced Medical Training

PATENT TITLE

Apparatus for Simulating a Pulse and Heartbeat and Methods for Using Same to Train Medical Professionals

PATENT # US 7,510,398

INVENTOR | William E. Thornton



PROBLEM

As medical science has progressed and medical schools are increasingly under pressure to train new doctors with limited resources, medical schools are increasingly relying on nonhuman interactive formats to teach health care providers the skills they will need to successfully treat and care for patients. Many health care providers are ill-equipped to utilize the more basic medical equipment like the stethoscope. A stethoscope is a well-known medical instrument for listening to and diagnosing pathologies in the heart, lung, and bowels. In fact, many health care providers wear stethoscopes, but are not technically competent to effectively use the stethoscope.

Devices have been constructed to simulate animal/human biological function such as simulated heart beats, but the simulations are generally disconnected from other bodily functions. Thus, it would represent an advancement to be able to construct a training system that functions in a temporally relevant, and visually connected, format. Such formats include coupling audio attributes like heart rhythms and breathing patterns, tactile attributes such as pulse rhythms, visual attributes like body coloring, and bodily attributes like temperature.

SOLUTION

This novel technology provides a device and method for computer-controlled simulations of audio attributes, visual attributes, tactile attributes, and other bodily attributes including respiratory, pulse, heart rhythms, body coloring, temperature, in a temporally correlated fashion to train health care providers in the proper use of basic medical equipment for diagnosis such as a stethoscope.

POTENTIAL IMPACT

The technology can improve health care provider training by providing a more realistic and sensory-rich interface where the user can see, hear, and feel the symptoms of an abnormal condition in relationship to a normal condition or relative to other abnormal conditions. The technology will help support resource-limited institutions with adequate training while reducing the cost to provide such training.

PATENT DETAILS

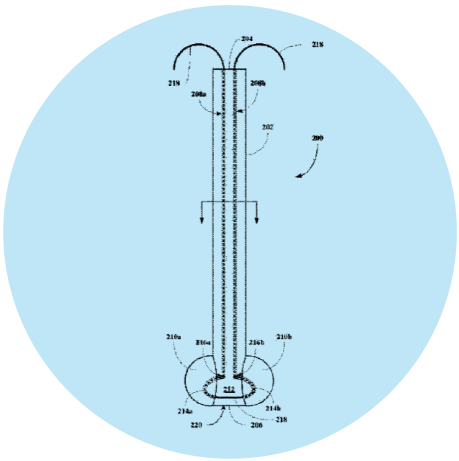
Enhanced Tendon Cutter

PATENT TITLE

Apparatus to Trace and Cut a Tendon or Other Laterally Extended Anatomical Structure

PATENT # US8,828,000

INVENTOR | Vinod Panchbahavi



PROBLEM

The flexor digitorum longus (FDL) and flexor hallucis longus (FHL) tendons are used in a variety of foot reconstructive procedures. These tendons are generally harvested from the midfoot and transferred to a different location in the foot to augment or replace a degenerated tendon.

This technique requires extensive, deep, and difficult, dissection in the midfoot in the vicinity of blood vessels and nerves. There is a need for an improved method that can be used to harvest tendons and other laterally extending anatomical structures.

SOLUTION

A novel apparatus has been developed for harvesting anatomical structures such as tendons, fine muscles, nerves, and blood vessels. This apparatus includes an elongate member having two longitudinally extending tubes or tubular apertures extending from the member's proximal end to its distal end. The distal end includes opposing heads and an arcuate base. The anatomical structure is placed on the arcuate base and a flexible cutting member is threaded through one tube other tube. The elongate member is then directed into the body along the structure to a position where the anatomical structure is to be cut. Then the cutting member is pulled back and forth at the distal end causing it to cut the anatomical structure at the distal head.

POTENTIAL IMPACT

This novel apparatus improves access to, and success of, tendon and associated structure harvesting leading to better post-surgical healing and function. The technology will reduce the need for additional surgeries.

PATENT DETAILS

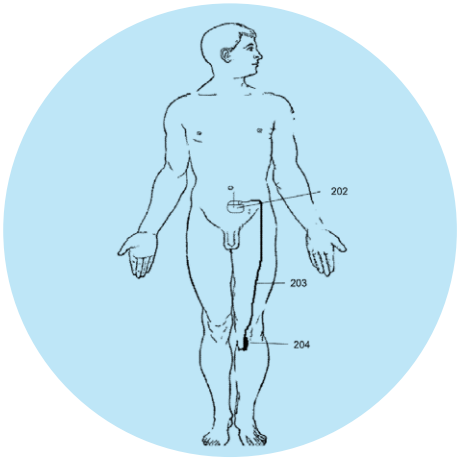
Anywhere Electroacupuncture

PATENT TITLE

Chronic Electroacupuncture Using Implanted Electrodes

PATENT # US 9,549,872

INVENTORS | Jiande Chen, Jieyun Yin



PROBLEM

Acupuncture has long been used to treat anxiety, back pain, high blood pressure, and osteoarthritis. People are now turning to acupuncture as a treatment for weight loss and other conditions.

Acupuncture is the ancient Chinese art of inserting fine needles under the surface of the skin into specific locations on the body to treat ailments. Typically, acupuncture involves the insertion of flexible, filiform needles into the skin of a patient at specific regions known as acupoints and at depths sufficient to penetrate certain tissues or musculature. Subsequent manipulation of the needle ends that protrude from the skin stimulates the subcutaneous tissue and intramuscular sensory nerves of the patient.

Electroacupuncture is one variation of traditional acupuncture in which needles are temporarily inserted at specific acupoints along the body and then attached with clips to a device that generates electric pulses. The introduction of a mild current through the needles acts as a stimulus on the tissue and nerves in the vicinity of the needle.

There remains a critical need for a chronic or permanent means of providing stimulation to the acupoints and meridians.

SOLUTION

This novel technology provides a system and method for electroacupuncture utilizing implanted leads or electrodes placed at acupoints or meridians. Electrical stimulation can be performed via a built-in clock and programmer system or via a non-implanted external device placed on the skin surface of the implanted stimulation lead or electrode.

POTENTIAL IMPACT

The technology provides a more convenient and cost-effective treatment option for patients suffering from a myriad of conditions including metabolic diseases, functional gastrointestinal diseases, chronic gastrointestinal discomfort, chronic diarrhea, chronic pain, chronic nausea, and vomiting. Patients will be able to access electroacupuncture treatment anywhere.

PATENT DETAILS

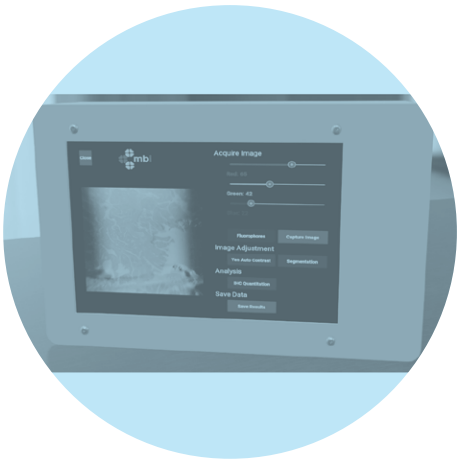
Artificial Intelligence Digital Microscopy (AIDM)

PATENT TITLE

Artificial Intelligence Enabled, Portable, Pathology Microscope

PATENT # (PENDING)

INVENTOR | Scott Moen



PROBLEM

Many researchers and clinical labs do not have access to expensive digital microscopy equipment or personnel required to perform diagnostic procedures. To overcome this hurdle, samples must be sent out to reference or core lab facilities at high expense and risk to the samples.

SOLUTION

Artificial Intelligence Digital Microscopy (AIDM) was developed out of a real-world use case to overcome limited access to expensive core lab microscopes. Since the purchase of such expensive machinery was not an option due to budgetary restrictions, AIDM was born. This innovation allows for the capture, statistical quantification and storage of diagnostic quality images used for clinical diagnostics.

POTENTIAL IMPACT

This novel technology will enable underfunded researchers and clinicians the ability to perform investigative and diagnostics procedures, that until now, required access to large, expensive microscopy equipment. Not only is AIDM inexpensive, but it is also portable, allowing for in-field testing of samples without delay. This technology is the next generation in digital pathology that could enhance the ability to provide point-of-care testing.

PATENT DETAILS

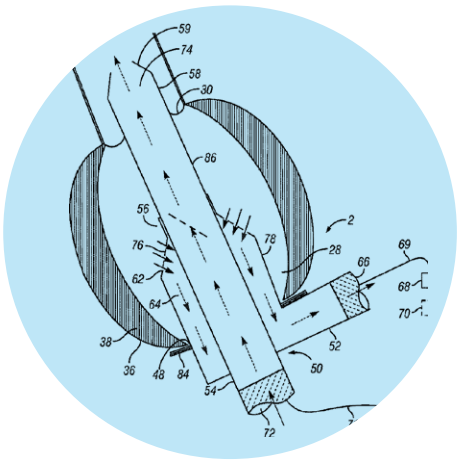
Apex to Aorta Cannula

PATENT TITLE

Apex to Aorta Cannula Assembly

PATENT # US 7,524,277

INVENTORS | Dongfang Wang, Joseph B. Zwischenberger



PROBLEM

Cardiac necrosis typically results from a myocardial infarction (MI). Often, the necrosis results in chronic heart function degradation and ultimate failure, as the damaged portion is unable to be restored. The deterioration is especially acute when the damage occurs to the left ventricle, which functions at a high pressure during systolic contractions to pump the blood received from the left atrium and the mitral valve, through the aortic valve and into the aorta for distribution throughout the body. The damaged tissue, operating under high pressures, eventually fails. Even without a failure, the heart is unable to function at the performance level prior to the MI, resulting in less circulation and lower blood oxygen levels.

While critical care technology has been applied in the treatment and restoration of the cardiac tissues after an MI, the typical procedures are traumatic to many patients and sometimes result in mortality. Less tissue decay can result from immediate and efficient cardiac, or combined cardiac and pulmonary support, but the current technology is lacking in both aspects. There remains a need for a simple, relatively accessible system and method for rapid provision of assistive devices for cardiac and/or pulmonary support.

SOLUTION

This novel technology provides a device and methods for assisting the heart to circulate blood that has been damaged by a myocardial infarction. The technology utilizes a single cannula assembly comprising at least an inner and outer cannula into the left ventricle, advancing the inner cannula of the cannula assembly past the aortic valve, and into the aorta without requiring a secondary cannula incision through an external portion of the aorta. Certain shapes and flow paths reduce thrombosis and help ensure sealing into the apex and through the aortic valve. Blood entering the left ventricle through the mitral valve is withdrawn at a sufficient rate to allow the left ventricle to not contract or to contract at a sufficient low pressure that can help the damaged area in restoration.

POTENTIAL IMPACT

The technology eliminates the need for multiple cannula insertions thereby reducing the possibility of trauma and internal bleeding. This technology is not as time-limited as traditional ECMO methods, generally limited to less than four weeks. The technology is a less expensive, and less invasive method, that functions as an immediate intervention that can be sustained for longer duration, if required.

PATENT DETAILS

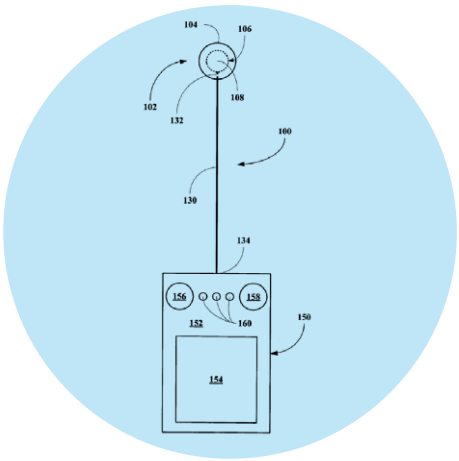
Endotracheal Tube Placement Confirmation

PATENT TITLE

Digital endotracheal tube sound acquisition and localization device

PATENT # US 8,038,629

INVENTORS | Daneshvari R. Solanki, Thomas K. Doan, William E. McGrady, II



PROBLEM

One of the most important jobs an anesthesiologist encounters is the placement of an endotracheal tube (ET) when general anesthesia with a secure airway is indicated. The inability to place the ET in the trachea or its misplacement in the esophagus can lead to disastrous results and even death. The ET has a pilot balloon that communicates with the cuff on the endotracheal tube. When the pilot balloon is inflated with air/gas, it inflates the endotracheal tube cuff. This produces a seal so the chances of gastric contents entering the trachea are minimized. The endotracheal tube cuff can be felt in the suprasternal notch when the pilot balloon is compressed.

Presently there are three ways to confirm proper placement of the ET. They include: (1) breath condensation in the endotracheal tube;(2) auscultation of bilateral breath sounds when oxygen or air is delivered through a reservoir bag; and (3) detection of carbon dioxide either on a capnograph or a disposable CO2 monitor, which is considered the gold standard by the American Association of Anesthesiologists. None of these methods are 100% confirmatory

SOLUTION

The present invention provides an apparatus for confirming proper endotracheal tube placement including an audio receiver such as a microphone. The microphone is connected to a digital audio signal processor. The microphone is adapted to be placed on a patient at a site where crepitus sounds can be efficiently detected and analyzed such as placement in a suprasternal notch of a patient. After the placement of the tube, the pilot balloon filled with a mixture of a gas (such as air) and a liquid. Proper placement can be confirmed by the audio signature produced by squeezing the pilot balloon that produces crepitus and detected by the microphone placed in the suprasternal notch or other site of the body that can yield a clear audio signal.

POTENTIAL IMPACT

The technology is a non-invasive way to confirm proper ET placement, greatly reducing the need for multiple ET placement attempts and their associated negative health outcomes. The technology can become a reusable standard piece of equipment in emergency rooms, in turn reducing cost and waste of one-time-use consumables.

PATENT DETAILS

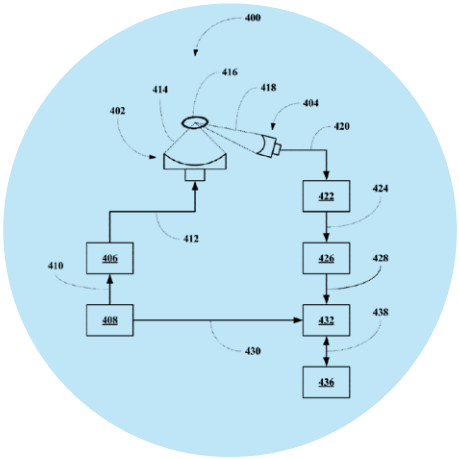
Exogenous Particulate Drug Delivery

PATENT TITLE

Non-invasive Therapies in the Presence of Exogenous Particulate Agents

PATENT # US 9,931,516

INVENTOR | Rinat O. Esenaliev



PROBLEM

The inventors have previously disclosed a treatment of solid tumors with acoustic and electromagnetic energy in the presence of nanoparticles to effectuate a therapeutic response in the tumor. In addition, the inventors have also disclosed the use of nano-shells to enhance therapeutic treatments in a body through the placement of the nano-shells in the tissue to be treated. The particles thermalize incident radiation causing localized heating of the tissue. Given these previous therapeutic successes, there is a critical need to expand this approach to develop new methods for therapeutic applications capable of being performed in the absence or presence of nanoparticles.

SOLUTION

This novel technology provides a system and method for enhancing drug delivery of pharmaceutical agents by applying continuous and/or non-continuous acoustic energy, continuous and/or non-continuous electromagnetic energy, static or alternating electric fields, and/or static or alternating magnetic fields to cell components, cells, organelles, organs, and/or tissues to enhance local pharmaceutical agent activity and or modify the properties of tissue being treated

POTENTIAL IMPACT

The technology can be used to enhance the therapeutic benefits for existing drugs and treatment options. Drugs that did not meet their original therapeutic efficacy goals can be re-evaluated when paired with this delivery technology. In some cases, this technology can be utilized to reduce therapeutic concentration of drugs which can consequently reduce adverse effects or reduce high costs.

PATENT DETAILS

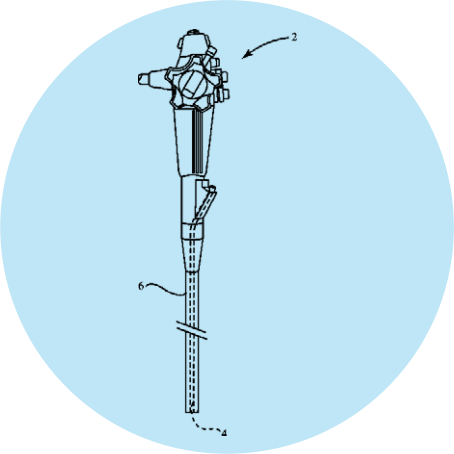
Enhanced Submucosal Procedure

PATENT TITLE

Methods and Systems for Performing Submucosal Medical Procedures

PATENT # US 8,906,051

INVENTORS | Vladimir Mitelberg, Donald K. Jones, Brett E. Naglreiter, Christopher J. Gostout, Pankaj J. Pasricha



PROBLEM

The field of gastrointestinal endoscopy focuses on diagnostic and therapeutic techniques to observe, modify, and remove tissues located in the digestive tract. General endoscopic techniques such as visualizing, dilating, cutting, and manipulating tissue have been accomplished using flexible devices such as endoscopes, balloons, snares, and electrosurgical tools. While many of these devices and techniques have been useful in identifying and removing some neoplastic lesions of the mucosal layer as well as providing access to general locations within the digestive tract for the placement of submucosal implants, there are some lesions and areas of the digestive tract which are extremely difficult to resect or access.

To overcome the accessibility issues, Endoscopic Mucosal Resection (EMR) and Endoscopic Submucosal Dissection (EDS) techniques have been developed. While these techniques have been shown to be effective in treating some flat neoplastic lesions, there are limitations and complications associated with these techniques such as size of the lesion that can be resected, muscular wall puncture of the digestive tract, and damage to the underlying muscular layer.

SOLUTION

This novel technology provides a system and method for performing submucosal medical procedures in a desired area of the digestive tract. The technology provides an integrated endoscope access needle injection instrument, a submucosal tunneling instrument, a submucosal dissection instrument, and a mucosal resection device.

POTENTIAL IMPACT

The technology overcomes the limitations associated with EMR and EDS techniques while making the submucosal medical procedures safer and less time-consuming.

PATENT DETAILS

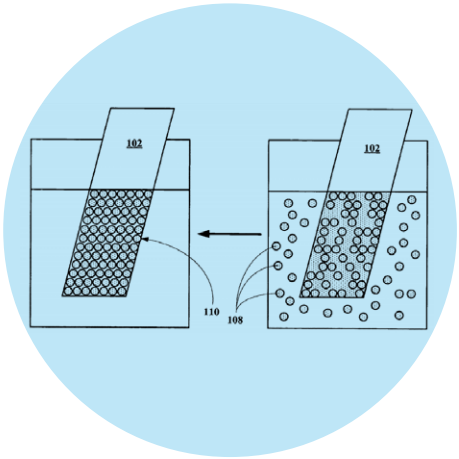
Implantable Bio-Senors

PATENT TITLE

Implantable Biosensor from Stratified Nanostructured Membranes

PATENT # US 7,863,038

INVENTORS | Massoud Motamedi, Nicholas Kotov, James Wicksted, Rinat Esenaliev



PROBLEM

Approximately, 14 million people in the USA and more than 120 million people around the world suffer from diabetes mellitus, a chronic systemic metabolic disease. Self-monitoring of blood glucose is the recommended treatment for all insulin-dependent diabetic patients. Implementation of these intensive management strategies requires accurate and frequent self-monitoring of blood sugars. Unfortunately, it also requires painful finger sticks and time-consuming monitoring.

In the past two decades, there has been a strong effort towards the developments of less invasive techniques for quantifying blood chemicals, particularly glucose, using various optical approaches. Until now, these efforts have fallen short of expectations.

There is a need for new, accurate and reliable implantable biosensors for less invasive monitoring of tissue or bodily fluid characteristics based on polymeric multi-layered composite constructs having properties capable of detection via optical, spectroscopic, optoacoustic, MNR, MRI, ultrasonic, or other detection techniques.

SOLUTION

This novel technology provides a new class of implantable biosensors capable of sensing and monitoring properties such as blood glucose levels. These biosensors can be optical, electromagnetic where the biosensor is adapted to undergo a change in a detectable property (physical and/or chemical) in response to a change in a concentration of a target atom, ion, molecule and/or molecular assembly in a target site.

POTENTIAL IMPACT

In addition to continuous remote monitoring of blood glucose, there are several other illnesses that require constant monitoring of important biological intermediates, such as neurotransmitters, nitrogen oxides, hormones, enzymes, pH, and other parameters. The technology has broad range applications including environmental exposure monitoring, bio-warfare detection, and drug PK analysis.

PATENT DETAILS

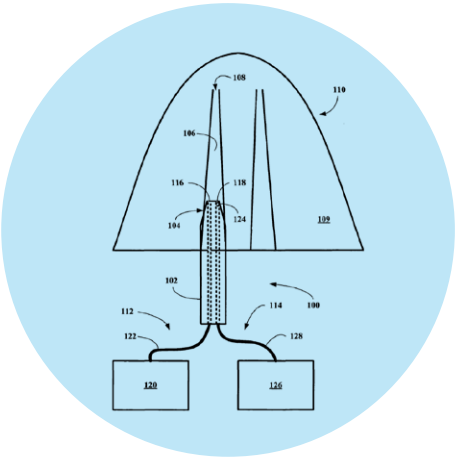
Non-Invasive Blood Testing

PATENT TITLE

Optical Probing of the Veins Under Noninvasive Blood Analysis by the Tongue

PATENT # US 8,352,005

INVENTORS | Rinat 0.Esenaliev, Donald S. Prough



PROBLEM

Blood analyses are required for diagnoses and management of various diseases in addition to regular physical exams. Current techniques and systems for blood analysis are invasive, require blood sampling, and cannot be performed in real time or continuously. Blood is usually analyzed in clinical laboratories after taking blood samples with invasive techniques. There is a need for a technique and system for noninvasive analysis of blood that would benefit large populations.

SOLUTION

This novel technology provides a portable, pocket-sized system and method for non-invasive analyses of blood. The proprietary device is placed under the tongue for the non-invasive analysis. The system has two side portions adapted to fit over teeth on each side of the lower jaw. A depressed portion between the two side portions includes an excitation port through which an input signal generated by a signal generator subsystem impinges on a surface tissue over the vein. The system includes a response port through which a response signal is received by and forwarded to a detector and analyzer, which converts the response signal into a concentration of a blood component and/or a value of a blood parameter.

POTENTIAL IMPACT

The technology can be utilized to replace current invasive blood analyses such as monitoring of glucose, cholesterol, hemoglobin, hematocrit, oxyhemoglobin, deoxyhemoglobin, carboxy-hemoglobin, or glycosylated or glycated hemoglobin. The technology can be used to measure continuously, giving the clinician the ability to track a specific parameter over time or rapidly take multiple readings to improve the accuracy of the findings. The implementation of this technology can help reduce costs such as consumable consumption and waste disposal.

PATENT DETAILS

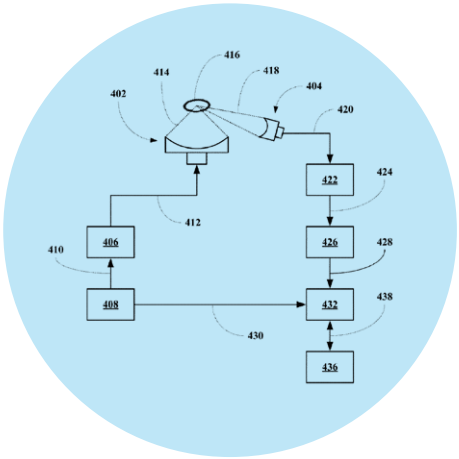
Non-Invasive Pathogenic Therapies

PATENT TITLE

Noninvasive Therapies in the Treatment of Pathogenic Infections

PATENT # US 10,518,096

INVENTOR | Rinat O. Esenaliev



PROBLEM

The inventors have previously disclosed a treatment of solid tumors with acoustic and electromagnetic energy in the presence of nanoparticles to effectuate a therapeutic response in the tumor. In addition, the inventors have also disclosed the use of nano-shells to enhance therapeutic treatments in a body through the placement of the nano-shells in the tissue to be treated. The particles thermalize incident radiation causing localized heating of the tissue.

Given these previous therapeutic successes, there is a critical need to expand this approach to develop new methods for therapeutic applications capable of being performed in the absence or presence of nanoparticles.

SOLUTION

This novel technology provides a system and method for enhancing drug delivery of pharmaceutical agents for treatment of pathogenic infection caused by bacteria, virus, and/or fungi. This enhanced delivery is achieved by applying continuous and/or non-continuous acoustic energy, continuous and/or non-continuous electromagnetic energy, static or alternating electric fields, and/or static or alternating magnetic fields to cell components, cells, organelles, organs, and/or tissues to enhance local pharmaceutical agent activity and or modify the properties of tissue being treated.

POTENTIAL IMPACT

The technology can be used to enhance the therapeutic benefits for existing drugs and treatment options for treating pathogenic infections. Drugs that did not meet their original therapeutic efficacy goals can be re-evaluated when paired with this delivery technology. In some cases, this technology can be utilized to reduce therapeutic concentration of drugs to reduce adverse effects or reduce high costs.

PATENT DETAILS

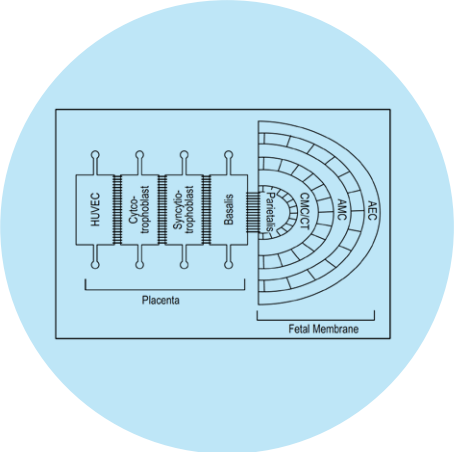
Organ-On-Chips (OOC)

PATENT TITLE

Organ-on-chips that mimic human pregnancy and parturition

PATENT # (PENDING)

INVENTORS | Han Arum, Kim Sungjin, Ramkumar Menon, Lauren Richardson



PROBLEM

Fetal membranes are the innermost lining of the intrauterine cavity that surrounds the fetus and provides mechanical and immune protection throughout pregnancy. Compromise in the fetal membrane's structural, biologic, and/ or mechanical functions, or inflammation are associated with spontaneous preterm birth and other negative outcomes.

Mechanisms that maintain the fetal membrane's security and viability are still unclear, particularly if exposed to pathogens and/or drugs. Therefore, more sophisticated testing models need to be developed that more accurately reflect the full and natural function of the organ system.

SOLUTION

An Organ-on-a-chip (OOC) system was developed allowing for direct monitoring of critical functions, such as cell migration and transition, utilizing a novel microfluidics coculture technology.

A multitude of cell types can be cultured in different microenvironments while enabling the realistic and reliable simulation of natural organ system function.

POTENTIAL IMPACT

A clear understanding of these mechanisms will help fill a major knowledge gap regarding the role of fetal membranes in term and preterm labor. Additionally, the innovation will provide a much more robust model for the design and validation of better therapeutic interventions to ensure positive health outcomes.

In the future, this microfluidic organ-on-chips (OOC) technology will allow for control, manipulation, and testing of multiple cell types, and their microenvironments, to better mimic specific organ systems and sub-systems, potentially eliminating or reducing the need for animal trials.

PATENT DETAILS

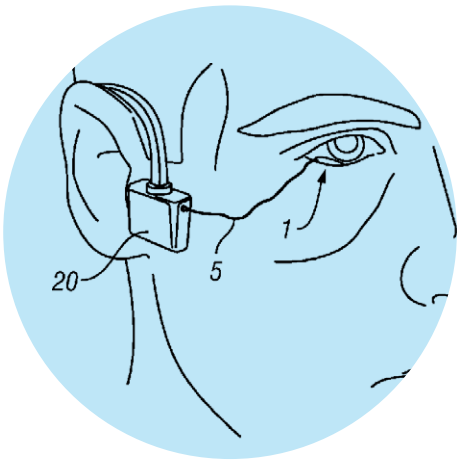
Ocular Drug Delivery

PATENT TITLE

Photokinetic Ocular Drug Delivery Methods and Apparatus

PATENT # US 8,948,863

INVENTORS | Edward R. Kraft, Gabriela A. Kulp, Bernard F. Godley, Aristides P. Koutrouvelis



PROBLEM

Millions of people worldwide suffer from ocular diseases, many of which lead to visual impairment. Anterior segment diseases can be successfully treated with topical administration of drugs in eye-drop formulation. However, this minimally invasive technique allows less than 5% of the administered drug to reach the drug target site before being washed away by tear formation or being absorbed systemically by the surrounding eye tissues. Eye drops may not be an effective method for administering larger molecular weight drugs into the eye for treatment of posterior segment eye diseases such as age-related macular degeneration, diabetic retinopathy, retinitis pigmentosa, and primary ocular lymphoma.

Direct intravitreal drug administration by needle injection is the current standard of care for many diseases of the eye. Recent drug formulation technologies have provided increased bioavailability and sustained release of drugs that are delivered by intravitreal needle injection. Even with drug formulation advancements, repeated invasive injections are required over extended periods of months and years. Intravitreal administration of drugs by needle injection is associated with an entirely new set of potentially catastrophic side effects such as infection, intravitreal hemorrhage, or retinal detachment.

There remains a critical need for an effective, minimally invasive method of intraocular drug delivery.

SOLUTION

This novel technology provides a system and method for transscleral/transcorneal needleless photokinetic drug administration into the eye. The technology is an ocular drug delivery method where a drug applied to scleral/corneal tissue is illuminated with a selected narrow wavelength light from a LED source and pulsed at a selected frequency that then causes the drug to permeate into and through the tissue.

POTENTIAL IMPACT

The intraocular drug delivery system overcomes the problems with associated with repeated ocular needle injections, provides greater access to care, and reduces the high costs associated with today's standard of care.

PATENT DETAILS

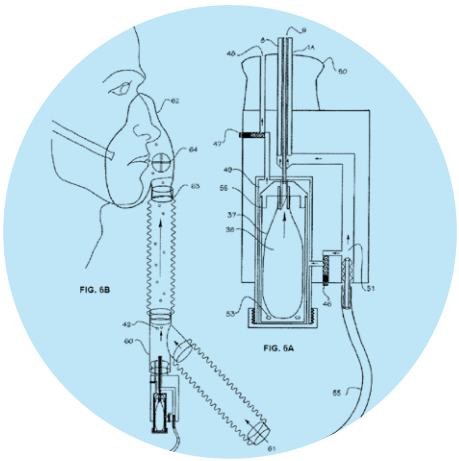
Pulse Drug Nebulizer

PATENT TITLE

Pulse Drug Nebulization System, Formulations Therefore, and Methods of Use

PATENT # US 8,776,786

INVENTORS | Edward R Kraft, Perenlai Enkhbaatar, Daniel S Traber, Gabriela A. Kulp



PROBLEM

Lung injury is traumatic and typically caused by heat and chemical irritation, with chemical injury being the leading lethal cause of smoke inhalation injury. Similarly, thermally injured patients who sustain inhalation injury have a 20-fold increase in mortality. Injuries from burn and smoke inhalation have been demonstrated to produce systemic inflammatory responses and increased levels of reactive oxygen species (ROS). ROS produces an increase in pulmonary microvasculature dysfunction and pulmonary edema accompanied by increased lipid peroxidation in lung tissue. Inhibition of lipid peroxidation reduces these symptoms.

Antioxidants are compounds that reduce oxidation products and have been demonstrated to reduce cytotoxicity in smoke inhalation-lung injury and other lung disorders. The use of antioxidants such as vitamin E may be beneficial in the treatment of victims who sustain both thermal injury to the skin and smoke inhalation. Vitamin C and vitamin E (alpha-tocopherol and gamma tocopherol) are antioxidants which may act together to scavenge ROS to produce non-reactive compounds within the human body. Tocopherols are redox agents which act under certain circumstances as antioxidants which help prevent the formation of toxic oxidation products. Inhalation-based therapies have been extensively evaluated as a site-specific method to treat pulmonary disorders due to their ability to deposit agents rapidly and selectively in the lung in greater amounts than can be readily achieved by other methods. Consequently, a variety of aerosolized compounds have been researched and their aerosolization attempted. However, these attempts have been largely unsuccessful due to the substantial insolubility of these therapeutic agents and potential therapeutic agents in carrier systems that are suitable for use in aerosol therapeutic delivery systems.

SOLUTION

This novel technology provides a system and method of nebulizing water-insoluble compositions of tocopherols to protect from cytotoxic injury, pulmonary injury, inflammatory diseases, and death.

POTENTIAL IMPACT

This technology will allow pulmonary inhalation and delivery of aerosolized medicines that were previously thought to be unsuitable for nebulization. This new delivery system will help improve health outcomes to smoke and thermal inhalation injury patients. There is broader potential for the treatment of other inhalation-based injuries and diseases.

PATENT DETAILS

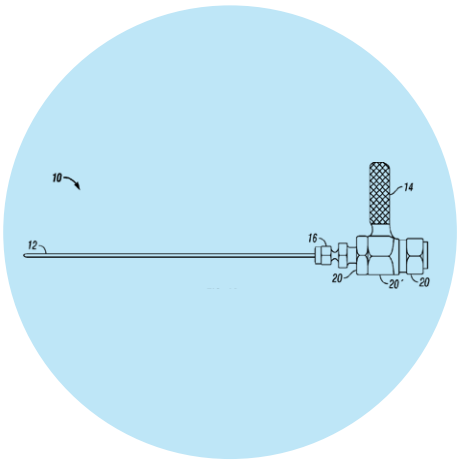
Rapid Powder Formulation Delivery

PATENT TITLE

Dry Powder Drug Delivery Formulations, Methods of Use, and Devices Therefore

PATENT # US 8,597,616

INVENTORS | Edward R. Kraft, Stephen L. Hoskins, Perenlei Enkhbaatar, Daniel L. Traber



PROBLEM

There are numerous emergency situations where individuals are exposed to one or more toxic agents via inhalation, where failure to rapidly provide, treatment can lead to debilitating complications and in many cases, death. These situations include not only the exposure of individuals to nuclear, biological, or chemical (NBC) agents in industrial settings, but also the exposure of individuals to such agents during warfare or terrorist events. To attempt to counter-act the exposure, large doses of drugs must be administered in a rapid manner to begin their therapeutic introduction into the patient's systemic circulation. For example, exposure to Sarin, Suman, Tabun, VX, any number of toxic organophosphates (OPs), or other chemical warfare agents demands the immediate administration of antidote or antidote combination.

Although intravenous (IV) administration of these antidotes has previously and often been preferred, this is not practical in combat situations or civilian mass casualty incidents. Chemical exposure and the reduction in time of delivering a drug to the systemic circulation may save lives. Inhaled drug delivery is an effective method to introduce drugs into the lungs, pulmonary region, and systemic circulation system of a patient. Inhaled drug delivery is a proven modality for both lung diseases as well as fast acting medicines that cannot be absorbed via the gastrointestinal tract or when vascular access is not an option due to time limitations or circulatory collapse. The large surface area of the lung is in immediate proximity to the circulating blood supply and can provide a very large permeable surface through which some drugs can quickly pass into the circulating blood.

SOLUTION

This novel technology provides a drug delivery system where a micronized drug powder formulation suspended in a liquefied gas is released into the pulmonary system of a patient causing the drug to be disbursed into the lung and then absorbed into the circulating blood or lung tissues. The system allows for several dry powder formulations to be co-mingled and/or mixed in the inert environment of the propellant.

POTENTIAL IMPACT

The technology can save lives after chemical or toxin exposure much the same way nasal Narcan administration can save overdose patients. The dry powder formulations can provide access to new populations and extend the shelf life of medicines, antidotes, and vaccines.

PATENT DETAILS

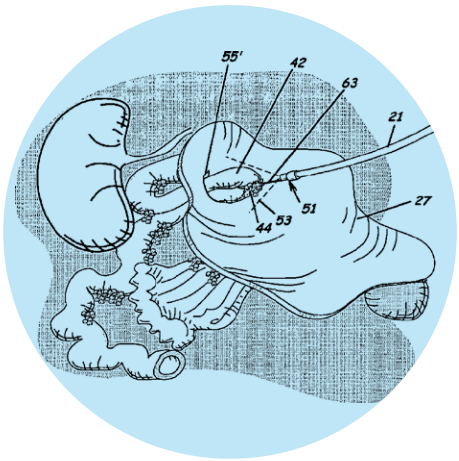
Removal of Stubborn Body Fat

PATENT TITLE

System, Kit, and Method of Transgastric Removal of Visceral Fat and Other Related Methods

PATENT # US 8,021,355

INVENTORS | Pankaj Jay Pasricha



PROBLEM

Obesity is a worldwide epidemic affecting people of all ages, races, ethnicities, and genders. Over 60% of adults in the United States are overweight or obese, and secondary health concerns related to obesity reach across all medical spectrums. Recently, the scientific and medical community have focused attention on the effects of visceral fat, or fat cells that are formed on the outer surface of organs. Unlike fat cells formed under the skin, most visceral fat cells are found beneath layers of muscle, such as that formed in the peritoneal cavity on organs under the abdominal muscles. High quantities of visceral fat can be linked to, and may be indicators of, heart disease and stroke. These fat cells are difficult to remove using current procedures while infection with current methods pose a major concern.

Traditional laparoscopy or visualization of the peritoneal cavity is either done with a flexible scope for merely diagnostic purposes or with rigid scopes for therapeutic procedures. With the rigid scope procedures, the procedure is typically performed while being observed by secondary scopes positioned at various strategic positions in the peritoneal cavity. Therefore, under current practices, flexible scopes that allow for visualization generally are not used for conducting the therapeutic procedures by themselves, and the rigid scopes that have the tools necessary to perform the tasks associated with the therapeutic procedures require the use of additional flexible scopes so the doctor or operator can view the tasks and procedure being performed. These procedures have long recovery periods for the patient because cuts through the abdominal muscle tissue are often necessary for scope insertion and to perform procedures.

SOLUTION

This novel technology provides an enhanced endoscopic surgical system and materials for performing transgastric endoscopic surgery for physical removal of visceral fat adhering to or lining organs within or lining the peritoneal cavity.

POTENTIAL IMPACT

The technology helps to overcome the limitations of current procedures including long recovery times and multiple tears or cuts through the abdominal muscle. Additionally, the technology provides access to fat stored in the peritoneal cavity where current methods are limited to the gastrointestinal tract or associated organs. Cost and quality control are also improved with used of the technology.

PATENT DETAILS

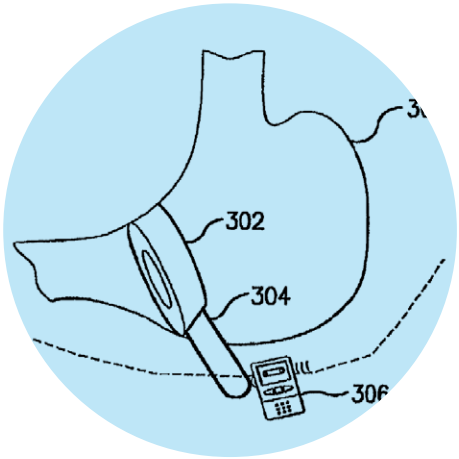
Safe and Secure Weight Loss

PATENT TITLE

Methods and Devices for Treating Obesity

PATENT # US 9,717,616

INVENTORS | Pankaj Jay Pasricha



PROBLEM

Obesity has become a global epidemic in recent years. It is estimated that over 60% percent of U.S. adults are overweight or obese. Those who are overweight or obese are more likely to develop other health risks such as hypertension, dyslipidemia, diabetes, heart diseases, gallbladder diseases, strokes, respiratory problems, and cancers. Aside from recommended daily physical activities, common weight reduction regimens include administration of systemic medications, which suppress the appetite or reduce the fat or sugar uptake of the digestive track.

Another commonly known treatment of obesity is gastric bypass surgery. The surgery divides the stomach into smaller portions and one section, known as the gastric pouch, is then connected to the small intestines. Due to the size of the pouch, food intake is limited, resulting in a reduction in calorie intake and weight loss. However, there are many complications associated with gastric bypass surgery. The surgery is highly invasive which can result in complications post-surgery such as hernias, infections, gastritis, and death. Furthermore, the surgery is irreversible and can lead to nutritional deficiencies causing anemia, osteoporosis, or other bone disorders.

Other alternatives for treating obesity by reducing the stomach volume include inserting intragastric devices such as gastric balloons into the stomach. Some of the devices may be secured to the stomach lining, while others, are free floating.

However, the placement of these devices requires large incisions and a lengthy recovery time. Additionally, these devices can deflate or can become detached from the lining and may migrate down the GI tract causing obstructions which necessitate removal. There is a critical need for weight loss procedures that are less invasive yet yield desirable results.

SOLUTION

This novel technology provides treatment for obesity by using the steady state of the intragastric pressure and wall tension in the stomach. The technology provides a system that can reduce the volume of the stomach by changing the compliance of the stomach, creating gastric satiety.

POTENTIAL IMPACT

The technology provides a less invasive, less expensive, and non-permanent alternative to gastric bypass surgery. The technology overcomes the non-compliance issues associated with dieting and exercise to provide a safe, consistent option for patients fighting obesity.

PATENT DETAILS

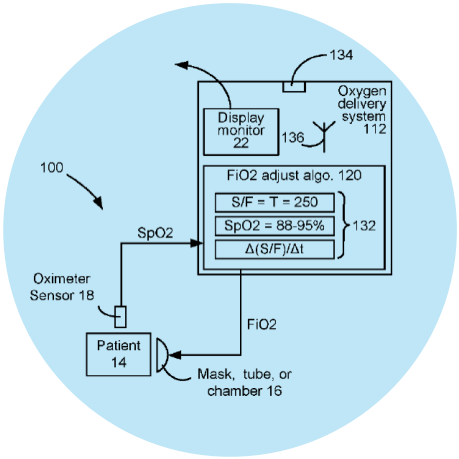
Smart Oxygenation System

PATENT TITLE

Smart Oxygenation System Employing Automatic Control Using SpO2-to-FiO2 Ratio

PATENT # US 10,589,045

INVENTORS | Michael Kinsky, Rich Branson, George Kramer, Muzna Khan, Jay Johanningman, Jose Salinas, Nehemiah Liu



PROBLEM

Mechanical ventilation is a treatment that supports and assists breathing in patients with impaired lung function. It is used to treat a wide range of pulmonary conditions. Invasive ventilation provides oxygen using an artificial airway via an endotracheal or tracheostomy tube. Noninvasive ventilation provides oxygen through a mouth, nose piece, or face mask.

Because the goal of ventilation is to ensure sufficient oxygenation of the body, various measurements have been used to assess the sufficiency of the intervention. If sufficient oxygenation is achieved, the physician may choose to withdraw or wean the patient from ventilation. By contrast, if insufficient oxygenation is detected, the physician may choose to escalate to a more aggressive means of respiratory support.

To measure lung oxygenation and lung injury severity, clinicians have historically relied on the ratio of the partial pressure of oxygen in the arterial blood (PaO2) and the fraction of inspired oxygen (FiO2). Arterial blood is the blood that leaves the lungs after oxygenation, and therefore measuring PaO2 requires an invasive arterial blood sample and specialized equipment. Thus, P/F can only be obtained in skilled facilities with clinical staff. Another limitation is that PaO2 measures oxygen dissolved in blood plasma rather than oxygen

saturation of blood hemoglobin (SpO2), which more directly reflects oxygen delivery to body tissues.

SOLUTION

A system has been developed for the maintenance of oxygenation. This system includes an oxygen delivery system configured to continually provide a fraction of inspired oxygen (FiO2) to the patient, an oximeter configured to continually measure a percentage oxygen saturation of blood hemoglobin (SpO2) of the patient and report the measured SpO2 to the oxygen delivery system, logic circuitry that continually adjusts to calculate a ratio of the measured SpO2 to the provided FiO2, an algorithm operable in the logic circuitry and configured to continually adjust the FiO2 provided to the patient given the currently-measured SpO2 and the currently-measured CLCF ratio to maintain SpO2 within a desired range.

POTENTIAL IMPACT

This novel technology will circumvent risks and complications associated with prolonged use of mechanical ventilation. Risks include barotrauma, ventilator-associated lung injury, diaphragm atrophy, and increased mucus leading to pneumonia.

PATENT DETAILS

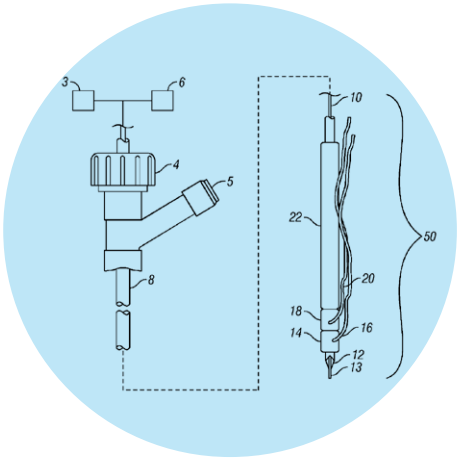
Tissue Anchor System

PATENT TITLE

Needle-Electrode and Tissue Anchor System

PATENT # US 8,920,465

INVENTORS | Gottumukkala S. Raju



PROBLEM

During medical procedures on tissue surfaces, it is desirable to pull tissue portions toward each other. This is generally known as approximation. Tissue portions can be adjacent to a wound that needs suturing or other closure. The gap between adjacent sides of the wound may be so large as to make the closure tenuous and time-consuming. Other medical procedures often benefit from pulling tissue portions away from each other, known as retraction. The tissue surfaces may benefit from such retraction for medical diagnosis, enhanced viewing, and placement during surgical removal.

Surgical hemostats and dressing forceps are routinely used for such procedures external to a body. However, the current endoscopic, laparoscopic, and other medical procedures performed internally increase complexity. The limited viewing and access during these internal procedures typically prohibit the use of such instruments for tissue approximation and retraction. The size of the typical instruments is prohibitive for use with internal procedures.

When closing a gap after a surgical excision or one created by a wound, an internally inserted and actuated surgical clip can close a relatively small gap. However, a gap that exceeds the capabilities of the clips needs special and time-consuming efforts. There is a critical need for an improved method and device to insert an anchor into a tissue portion to approximate and retract the tissue portion.

SOLUTION

This novel technology provides a system and method for setting tissue anchors for tissue approximation and retraction. The technology provides a needle-electrode anchor system having a needle and an optional electrode with one or more anchors. The system can provide an electrical cutting current to the needle-electrode to create an opening in tissue. An anchor slidably coupled to the needle-electrode can be pushed through the opening with a pusher and then pulled into position to set the anchor. Lines coupled to the anchors can be pulled together, approximating the tissue portions. If the tissue portion is to be retracted, an anchor line can be grasped to retract the tissue portion from an adjacent tissue portion.

POTENTIAL IMPACT

The technology provides an improved method and device for an improved insertion of an anchor into a tissue portion for approximation and retraction of a tissue portion during a medical procedure. The technology represents major improvements in cost, time, and quality to the medical procedure.

PATENT DETAILS

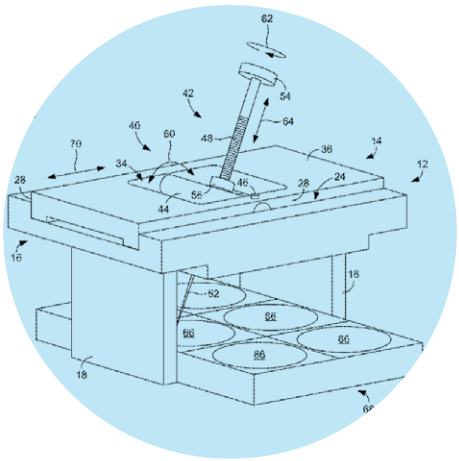
Wound Forming Rig

PATENT TITLE

Apparatuses and methods for forming wounds in cell layers

PATENT # US9,664,600

INVENTORS | John Bergmann, Celeste Finnerty, David Herndon



PROBLEM

Cell migration is fundamental to a variety of biological processes, including embryonic development, angiogenesis, wound healing, immune response, and inflammation. While cell migration can be studied using a variety of methods, the scratch assay is one of the most-commonly used. Although this method is effective in forming wounds for biological studies, the wounds that result can be of non-uniform width. The non-uniformity that results is undesirable because the interpretation of the results of the scratch assay may depend at least in part upon a presumed specific width of the wound. In addition, if more than one wound is required, uniformity of wound spacing is difficult to achieve.

SOLUTION

An apparatus and method have been developed to maximize the uniformity to wounds in cell layers. The apparatus utilizes fixed positioning and guide rails to secure various types of micro-well plates used in cell culture testing.

POTENTIAL IMPACT

This novel technology will allow researchers to better investigate and understand the repair mechanisms of wounded cell monolayers. The uniformity provided by this novel technology will remove human error and bias from the mechanism of study.

PATENT DETAILS

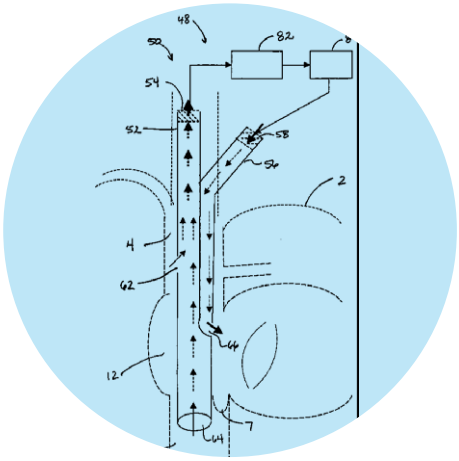
Veno-venous ECMO Cannula

PATENT TITLE

Single Expandable Double Lumen Cannula Assembly for Veno-Venous ECMO

PATENT # US 7,473,239

INVENTORS | Dongfang Wang, Joseph B. Zwischenberger



PROBLEM

While the use of critical care technologies have been applied in the treatment of Acute Respiratory Distress Syndrome (ARDS), mortality rates remain at 40%. This is due to the fact that impaired lung functioning has been attributed to poor oxygenation of the blood flowing through the pulmonary circuit. Oxygenation through Extracorporeal Membrane Oxygenation (ECMO) can be necessary. However, proper cannulation is critical for ECMO and the key to its effectiveness.

ECMO is divided into two major categories according to the cannulation and configuration: Veno-Arterial (VA) ECMO and Veno-Venous (VV) ECMO. VA ECMO is used when the patient needs support for both their heart and lungs while VV ECMO is used to support lungs only. VV ECMO provides avoidance of major arterial cannulation and associated complications. Cannulation of veins for the drainage and infusion avoids the higher pressures and problems of cannulating arteries. The advantage of avoiding arterial cannulation by VV ECMO has been known, but the technology for implementing a practical VV ECMO has eluded researchers and practitioners. There is a critical need for a simple, less invasive, percutaneous cannula system and method.

SOLUTION

This novel technology provides a simple, less-invasive, self-expandable percutaneous VV cannula assembly and method for ECMO. The technology can achieve near theoretical total venous blood drainage and extracorporeal gas exchange. It reduces recirculation and the need for multiple cannulations, thereby simplifying ECMO, resulting in decreased surgical and blood trauma for the patient.

POTENTIAL IMPACT

The technology will help reduce the 40% mortality rate associated with ARDS. In addition, this simplified, less invasive method will help reduce severe and costly complications associated with other ECMO cannulas and methods.

PATENT DETAILS

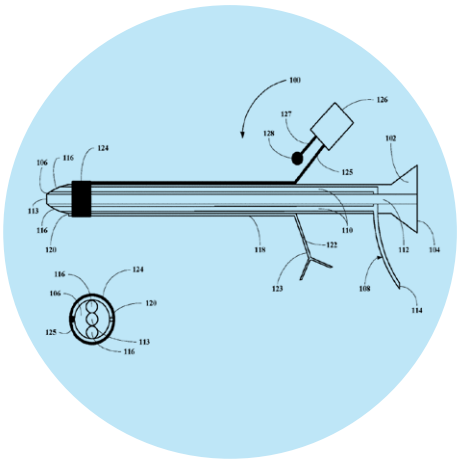
Visually Assisted Nerve Block

PATENT TITLE

Disposable Sheath Designs for the Stimulating Endoscope and Needle Endoscopes Having Distal Electrodes for Nerve Block Under Direct Vision and Methods for Making and Using Same

PATENT # US 9,986,896

INVENTORS | Daneshvari R. Solanki



PROBLEM

Video-assisted surgical procedures using endoscopy are ubiquitous. These procedures are commonly used for vein harvesting, thyroid resection, and carpel tunnel surgery; however, these techniques require a surgical incision. Presently, peripheral nerve blocks are done using indirect methods like paresthesias, peripheral nerve stimulation, and ultrasound guided techniques.

There are no video-assisted endoscopic procedures available, at present, for the performance of peripheral nerve blocks for regional anesthesia including a stimulating electrode. There is a critical need in the field to fill this void.

SOLUTION

This novel technology provides a system and method for performing video-assisted endoscopic peripheral nerve blocks for regional anesthesia. The nerve block of a peripheral nerve includes introducing an endoscope percutaneously without a surgical incision to the patient. The endoscope includes an electrode disposed at or near its distal end and connected to a stimulation unit via a conducting conduit or wire. Once the endoscope has been inserted, the endoscope is pushed into the tissue under direct visual control or visual control using a video monitor until the electrode is adjacent toa peripheral nerve to be blocked. After the electrode is properly positioned, the nerve can be blocked using a local anesthetic injected through a fluid conduit to produce anesthesia so that a surgical procedure can then be performed. The conduit for administering anesthesia can also be used to place a stimulating catheter or a non-stimulating catheter to be left in place so that additional amounts of the anesthetic agents can be administered to the nerve to maintain the block or provide postoperative pain control.

POTENTIAL IMPACT

The technology provides a safer, less invasive method to place a peripheral nerve block without the need for a surgical incision. The technology also provides sheaths adapted to surround a traditional endoscope for this procedure, allowing clinicians to utilize existing equipment for maximum clinical benefit.

PATENT DETAILS

MD1

EDITION

Intellectual Property Showcase:
Medical Devices

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