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Electro-Osteogenesis

1028 Hz Pulsed EMF Bone Repair & 30+ Related Patents

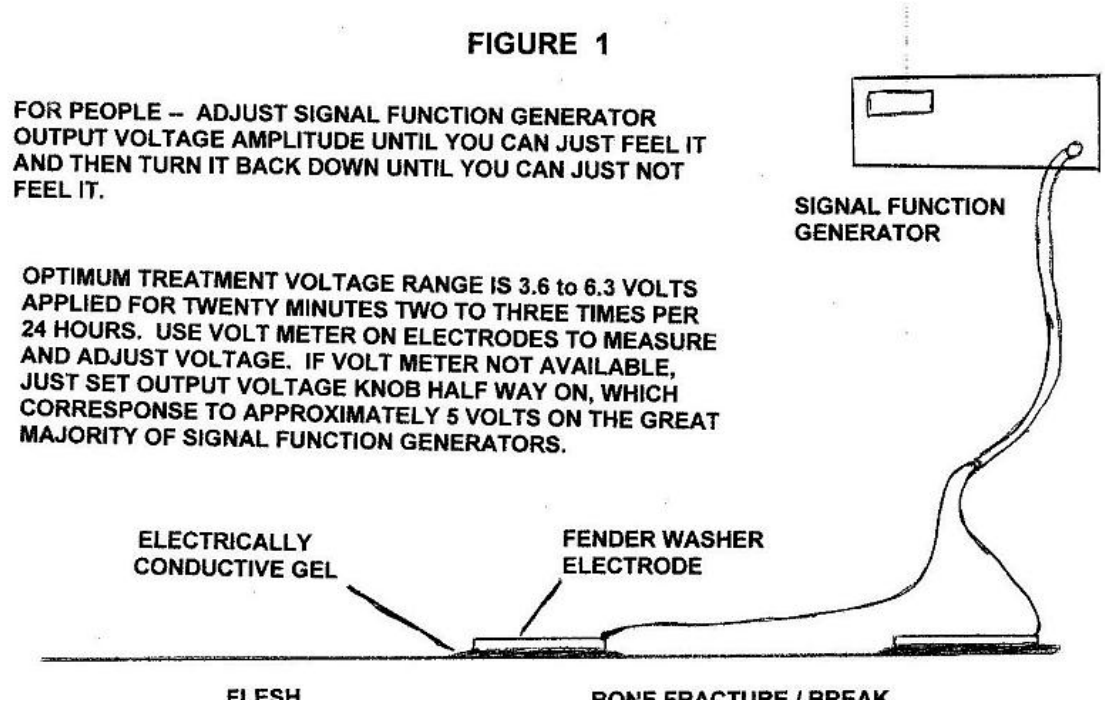
http://rifeenergymedicine.com/1028article.html

THE EXPERIMENTAL USE OF A 1028 CYCLES PER SECOND VOLTAGE SQUARE WAVE FOR REPAIR OF BONE FRACTURES, AND BONE BREAKS, CARTILAGE DAMAGE, AND CONNECTIVE TISSUE DAMAGE IN GENERAL

by Gary Wade

Some years ago in a phone conversation with a voltage square wave Rife machine practitioner, I was told a story of how a horse with a non-union fracture for nine months was quickly healed by the use/application of a 1028 cycles per second voltage square wave applied across the non-union fracture (see illustration in Figure 1). This 1028 cycles per second (cps) voltage square wave treatment protocol for the horse was provided by a dowser at the request of the Rife machine practitioner. The dowser specified that an output voltage of **3.6 to 6.3 volts** was best to use. This corresponds to the output amplitude knob on the great majority of signal function generators set to approximately 1/3 to a little over 1/2 on (knob in straight up position). **The 1028 cps voltage square wave was to be used for broken bones for twenty minutes two to three times per twenty four hours.**

FIGURE 1



Approximately a year after I received this information, I had a phone call from a man looking for a Rife frequency for helping his wife who had a non-union broken bone in her foot for also nine months. I passed the 1028 cps information onto him and approximately three weeks later he called and thanked me and informed me that his wife's bone break was healing very well as verified by x-ray. Another two months passed and he called again to thank me again for his wife's complete recovery, and to inform me that he had had a degenerated right hip joint that greatly limited his mobility. However, after seeing the complete recovery of his wife, he had decided to try the 1028 cps voltage square wave on his degenerative hip joint. He placed one electrode on the front side of his hip and one on the backside of his right hip and treated himself while he slept at night. After two months of treatment he claimed his right hip joint was completely regenerated and that he now no longer had trouble walking and climbing stairs. Well, as time passed, I continued to pass on the 1028 cps information to people in need. I have now numerous reports of success in treating knee cartilage and knee connective tissue damage, broken/fractured bones, and connective tissue injuries throughout the body. Wherever there is a damaged area or region, just place the electrodes so that the problem region is approximately between them. Just how long a treatment should be for optimum results is not known. However, **all night treatments (~8 hours) have so far shown no adverse effects as long as the signal function generator output voltage is not set to high and the DC offset is not on.**

As a practical example, consider the treatment of animals such as horses and dogs. They have a fur (electrically insulating dense hair) attached to a hide. To get the needed electrical current into the flesh the current must pass through the fur and hide regions. To accomplish this an electrically conductive gel is needed to be worked (kneaded) into the fur thoroughly so as to make a continuously electrically conductive path from the surface of the fur to the surface of the hide. Of course you could just shave an area big enough for electrode placement. However, in the case of show horses and show dogs this might not be desirable. The electrically conductive gel can be obtained on amazon.com in the form of ultrasound gel, which also doubles as an electrically conductive gel. Most ultrasound gels now double as an electrically conductive gel, but you should check to make sure on the gel you buy. The electrodes in general can be held in place by the use of an ace bandage or masking tape. For example, you can buy rolls of masking tape that are ½",1",2",3", etc. wide and wrap them around the foot, ankle, and knee holding the electrodes in place. Two large (3" plus wide) pieces of masking tape can be used to hold the electrodes on the front and back side of a hip joint. On people it may sometimes be necessary to shave the area. As electrodes, I use fender washers which I attach alligator clips to or I drill a hole in their edge and solder dual wires from the signal function generator to them and use heat shrink on the wires where they connect to the washer to greatly lessen work hardening and therefore breakage of solder connections to the washer (see photographs). Be sure to use very fine steel wool to clean the fender washer soldering sites before soldering.

Just think of all of the horses out there that have connective/cartilage tissue damage in their feet, ankles, knees, and shoulders that could potentially be greatly helped by the use of the 1028 cps voltage square wave experimental therapy.

To experiment with this 1028 cps voltage square wave, you will require a standard electronic

technician signal function generator, which produces voltage sine waves, voltage square waves, and voltage triangle waves. These signal function generators are readily available on the internet. They range from a couple hundred dollars to a couple thousand dollars. However, you only need the cheap end units that cost around $250 to $300 including S and H. You will want a four digit LED frequency readout panel, both a coarse and a fine frequency adjustment knobs, and a frequency stabilization circuit. I personally use and recommend (DIGITAL FUNCTION GENERATOR, GFG-8020H) made by GW INSTEK. Go on Google and type in: digital function generator, gfg-8020h, and you will find all the places you can purchase it from (see picture of the GFG-8020H below, all set up to treat a horse. Note that all adjustment knobs and electrical connection ports that are not needed have been covered up with masking tape).

Instructions for setting up GFG-8020H signal generator:

1) Mask off all unneeded adjustment knobs and electrical connection ports as shown in picture.

2) Plug unit in.

3) Turn unit on (push in green button)

4) Push in 1K button on Range setting

5) Push in square wave button on function setting

6) Adjust first the coarse frequency knob and then the fine frequency knob until the LED read out is stable on 1028 cps.

7) Plug in BNC connector of the electrodes to 50 ohm BNC output port.

8) Connect electrodes to/across animal damage area.

9) Adjust output amplitude to between 3.6 to 6.3 volts using a DC volt meter or just set the output amplitude knob somewhere between one third to one half on.

10) On fractures and broken bones treat for a minimum of twenty minutes two to three times per 24 hours. For other cartilage and connective tissue injuries or damage treat for a minimum 45 minutes two to three times per 24 hours.

I am currently planning experiments where various cell types will be exposed to the 1028 cps voltage square waves and their reaction will be monitored under a microscope and be documented on video/DVD. I will post interesting results and observations.

P.S. - Do not use the signal function generator when using the Horse Magnetic Pulser. The magnetic pulser unit can induce high voltages in the electrode assembly of the signal function generator and fry the electronic circuits of the signal function generator. Keep the pulser and signal function generator completely physically apart from each other.

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http://rifeenergymedicine.com/Softtissuerepair.html
http://www.horsemagneticpulser.com/

TRAUMATIC SOFT TISSUE DAMAGE AND ITS REPAIR USING THE HORSE MAGNETIC PULSER

By Gary Wade

The two fixes I want to discuss here are the use of a pulsed ringing magnetic field (THE HORSE MAGNETIC PULSER) and the application of a voltage square wave (at a frequency of 1,028 cycles per second) generated by a standard off-the-shelf electronic signal function generator (-$260.00).

The Horse Magnetic Pulser unit consists of a high voltage power supply, which charges up a high voltage capacitor, which is periodically (several times per seconds) discharged through twin spark gaps into a 16 turn, 10 inch internal diameter coil of flexible high voltage wire. The electrical circuit formed by connecting the capacitor and coil together through the twin spark gap breakdown process is called a tank circuit. In our particular cases this has a natural resonance frequency of approximately 45,000 cycles per second in the form of a sine wave current. In other words, an oscillating electric current flows first in one direction while building current amplitude to a maximum value in the coil and then the current declines in amplitude until it stops and then repeats the same pattern in the opposite direction of current flow (one complete cycle) and then flows back in the other direction, etc.. This oscillation process continues until essentially all the electrical energy that was stored in the charging capacitor has been dissipated and then the capacitor begins to charge up again until it is again connected to the coil by the twin spark gaps breaking down again and the whole oscillation process repeats. This rising and falling current oscillation pattern generates a rising and falling magnetic field in all the space around the coil.

In the case of the Horse Magnetic Pulser, this 45,000 cycles per second ringing magnetic field can have significant positive biological effect out to several feet from the coil. It can also be potentially disruptive or destructive to electronic circuits up to several feet away. These oscillating magnetic fields induce electric current flows in the saline body fluids of horse and human tissue alike. These are called eddy currents and, as was pointed out in the Einstein School of Medicine patent from Feb. 23, 1993 (**U.S. patent # 5,188,738 ****), when the value of these electric currents (eddy currents in our case) enter the 100 to 150 micro amps per centimeter squared range they start to become very anti-microbial and anti-viral causing deactivation of both bacteria and viruses in the blood with no apparent harm to the blood's viability...

**** US5188738 -- Alternating current supplied electrically conductive method and system for treatment of blood and/or other body fluids and/or synthetic fluids with electric forces**
[Steven KAALI & Paul SCHWOLSKY : Blood Electrification vs AIDS (&c)]

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http://worldwide.espacenet.com/advancedSearch?locale=en_EP

Related Patents --

US7022506

METHOD AND DEVICE FOR TREATING OSTEOARTHRITIS, CARTILAGE DISEASE, DEFECTS AND INJURIES IN THE HUMAN KNEE

A method of determining the voltage and current output required for the application of specific and selective electric and electromagnetic signals to diseased articular cartilage in the treatment of osteoarthritis, cartilage defects due to trauma or sports injury, or used as an adjunct with other therapies (cell transplantation, tissueengineered scaffolds, growth factors, etc.) for treating cartilage defects in the human knee joint and a device for delivering such signals to a patient's knee. An analytical model of the human knee is developed whereby the total tissue volume in the human knee may be determined for comparison to the total tissue volume of the diseased tissue in the animal model using electric field and current density histograms. The voltage and current output used in the animal model is scaled based on the ratio of the total tissue volume of the diseased tissue of the human to the total tissue volume of the diseased tissue in the animal model and the resulting field is applied to the diseased tissue of the human using at least two electrodes applied to the knee or a coil or solenoid placed around the knee. The voltage of the signal applied to the electrodes, coil or solenoid is varied based on the size of the knee joint; larger knee joints require larger voltages to generate the effective electric field.

US8313908
Regulation of stem cell gene production with specific and selective electric and electromagnetic fields

Methods and devices are described for the regulation of BMP 2 and 4, TGF-beta 1, 2, and 3, FGF-2, osteocalcin, and alkaline phosphatase mRNA in stem cells via capacitive coupling or inductive coupling of specific and selective electric and/or electromagnetic fields to the bone cells or other tissues containing the stem cells, where the specific and selective fields are generated by application of specific and selective signals to electrodes or one or more coils or other field generating device disposed with respect to the stem cells so as to facilitate the treatment of diseased or injured bone and other tissues.

US8065015
REGULATION OF MATRIX METALLOPROTEINASE (MMP) GENE EXPRESSION IN TUMOR CELLS VIA THE APPLICATION OF ELECTRIC AND/OR ELECTROMAGNETIC FIELDS

Methods and devices for the regulation of gene expression in tissue by applying an electric and/or electromagnetic field generated by specific and selective signals so as to treat diseases, conditions, and/or tissue. Gene expression is the up-regulation or down-regulation of the process whereby specific portions (genes) of the human genome (DNA) are transcribed into mRNA and subsequently translated into protein. Methods and devices are described for the regulation of Matrix Metalloproteinase (MMP) protein gene expression in tumor cells of various targeted tissues via the capacitive coupling or inductive coupling (e.g., by electrodes or one or more coils or other field generating devices disposed with respect to the targeted cells) of specific and selective signals to the cells of these tissues, where the resultant electric and/or electromagnetic fields treat diseased or injured tissues. The resulting methods and devices are useful for the targeted treatment and/or prevention of tumor growth and/or spread,

and/or any other conditions in which MMP protein may be implicated.

DEVICE FOR ELECTRICALLY STIMULATING OSTEOGENESIS WO2011150480

A structural arrangement for a dental implant comprises an implant body (1) preferably made of titanium or a similar material that dissipates energy and is biocompatible, capable of electrically stimulating osteogenesis; it has a metallic cylinder (2) that fits into an axial blind hole (11) in the body (1); and a connector (3) with an axial hole through which the lead (32) that transmits electric energy from the battery (4) to the metallic cylinder (2) extends, the battery (4) fitting into the compartment (31) in the connector (3).

Method and apparatus for treatment of biological tissue US4672951

The treatment of biological tissue is effected by a pulsed electric field induced by a time changing magnetic field produced by a magnetic coil or a plurality of magnetic coils. These magnetic coils are arranged in the area of desired treatment and respond to a driving current to induce the pulsed electric field into the localized treatment area. The driving current and concomitant magnetic field generates an electric field waveform that has a first pulse in a positive direction having a selected value followed by a second pulse in a negative direction having a larger value than the first pulse, and in turn followed by a third pulse in the positive direction having a value on the order of the first pulse. The apparatus for applying the driving current includes switching circuitry for energizing the magnetic coils in pairs to induce a symmetrical distribution of the magnetic and electric fields in the treatment area. This achieves time averaged uniformity of the pulse electric field in the tissue for applications such as stimulation of osteogenesis in long bone nonfusions.

Biocompatible electrode and use in orthodontic electroosteogenesis US4854865

An improved method of orthondontic electroosteogenesis comprises providing a biocompatible anode having a noble metal portion in engagement with an electrolytic gel portion comprising agarose and an electrolyte, where the anode gel portion is in engagement with epithelial gingiva at an area of osteoclastic or osteoblastic activity, and a biocompatible cathode having a noble metal portion in engagement with an electrolytic gel portion comprising agarose, an electrolyte, and a weak, biocompatible acid, where the cathode gel portion is in engagement with epithelial gingiva at an area of osteoblastic or osteoclastic activity. Electric current is then applied across the anode and cathode to stimulate osteogenesis. The invention also comprises biocompatible electrodes for electric stimulation of tissue.

DEVICE AND METHOD FOR ELECTRICALLY INDUCING OSTEOGENESIS IN THE SPINE WO03004092

A technique and associated device for stimulating multiple electrodes with multiple electrical signals in multiple regions of the spine without injury to the patient. The electrodes are

applied to respective sides of the patient's spine, and a first electrical signal is applied to any electrodes in a treatment area of the lumbar region of the patient's spine, a second electrical signal is applied to any electrodes in a treatment area of the thoracic region of the patient's spine, and a third electrical signal is applied to any electrodes in a treatment area of the cervical region of the patient's spine to induce osteogenesis in at least one of the respective treated area's of the patient's spine.; The first, second, and third electrical signals respectively generate different electrode currents in the respective treated areas and are ideally selected to create current densities that are approximately equal in respective treatment areas. The electrodes may include electrode pairs or strip electrodes placed either side of the patient's spine in the respective treatment areas.

US7465546
REGULATION OF TRANSFORMING GROWTH FACTOR-BETA (TGF-BETA) GENE EXPRESSION IN LIVING CELLS VIA THE APPLICATION OF SPECIFIC AND SELECTIVE ELECTRIC AND ELECTROMAGNETIC FIELDS

Disclosed is a device for the treatment of a bone fracture, fracture at risk, delayed union, nonunion, bone defect, spine fusion, osteonecrosis, osteoporosis, comprising: a signal source that generates at least one specific and selective electric signal having a frequency from 30 kHz to 120 kHz, a field generating device connected to the signal source so as to receive at least one specific and selective signal and that is operatively disposed with respect to targeted tissue, the field generating device upon receipt of the at least one specific and selective electric signal causing the generation of a specific and selective an electric field having an amplitude of about 0.2 to 80 mV /cm in the targeted tissue that is specific and selective for up-regulating substantially up-regulates the gene expression of TGF-â1, â2, and/or â3 protein in the targeted tissue as measured by mRNA, and the signal source controlling and varying the duration of time of application of said at least one specific and selective signal for a duration of time from approximately half hour to 24 hours per 24 hour period and controlling and varying the duty cycle of the at least one specific and selective signal applied to the field generating device from approximately 10% to 100% so as to selectively up-regulate gene expression of TGF-â1, â2, and/or â3 in the targeted tissue as a result of upon application of the at least one specific and selective electric field thereto for a pre-determined duration of time at predetermined intervals, a portable power unity that drives the signal source in the first and second modes, an output signal in the first mode causing the generation of a 20mV/cm field in the targeted tissue for a selected period of time, and an output signal in the second mode causing the generation of a 40mV/cm field in the targeted tissue for another selected period of time.

US7130692
Portable electrotherapy device for treating osteoarthritis and other diseases, defects and injuries of the knee joint

A portable device for applying therapeutic electrical signals and/or electromagnetic fields to a patient's knee for the treatment of osteoarthritis and other diseases, defects and injuries. The device is operable in several modes to deliver signals to the patients knee so as to cause an electric and/or electromagnetic field to be generated that selectively up-regulates gene expression of Aggrecan and Type II Collagen while simultaneously selectively down-regulating the gene expression of metalloproteases. The device includes a signal generator that generates compound electric signals including a 60 kHz sine wave having a peak to peak

voltage of approximately 4.6 V to 7.6 V and a 100% duty cycle signal that is generated for approximately 30 minutes and a 50% duty cycle signal that is generated for approximately 1 hour after the 100% duty cycle signal.; These compound electric signals are communicated to electrodes or coils in the proximity of a patient's knee for the generation of a specific and selective electromagnetic field that treats the diseased tissue.

US8017369
Up-regulation of bone morphogenetic protein (BMP) gene expression in bone cells by electromagnetic signals

A use of a signal generating device and a field generating device in the manufacture of a medical device for specifically and selectively up-regulating the gene expression of bone morphogenetic protein(s) in the bone tissue of a patient in need thereof. The signal generating device generates at least one specific and selective signal that has signal characteristics that are selected to up-regulate the gene expression of bone morphogenetic protein(s) (BMPs) as measured by mRNA when said signal is applied to bone tissue. The device generates an electric field in exposed bone tissue for a selected duration of time at selected intervals so as to up-regulate the expression of BMPs as measured by mRNA as a result of application of the specific and selective electric field. The specific and selective signal has a sine wave configuration and causes upon application to said field generating device the generation of an electric field having an amplitude of about 20 mVIcm in the bone tissue at 60 kHz with approximately a 50% duty cycle.

GROWTH METHOD OF OSTEOBLAST CELL ON TI/TIO2 NANOTUBES KR20140011056

The present invention relates to a method for growing an osteoblast cell based on a Ti/TiO2 nanotube. More particularly, by culturing the osteoblast cell after irradiating an electron beam on the Ti/TiO2 nanotube manufactured by an anodic oxidation method, an adsorption ratio can be increased more than that of before the electron beam irradiation, and by improving or controlling material properties by irradiating an electron beam on the Ti/TiO2 nanotube, not only properties as new functional material can be provided but also high added values can be created. Thereby, material wherein the osteoblast cell based on the Ti/TiO2 nanotube are generated can be applied as materials for dental implant, restoring treatment of bone defect, recycling an alveolar bone, bone graft, bone augmentation or auxiliary materials. [Reference numerals] (a) Step of cutting Ti foil and Pt foil into a fixed size; (b) Step of putting the cut Ti foil and Pt foil into an beaker containing ethanol, cleaning it using an ultrasonic cleaner for 3 minutes and drying it using nitrogen gas; (c) Step of manufacturing 1000 ml of a 0.5% HF aqueous solution by mixing 10.4 ml of a 48% HF solution and 989.6 ml of DI water; (d) Step of approving external voltage of 15-25 V after connecting the Pt foil to a cathode of power supply and Ti foil to an anode thereof and putting the two foils into the 0.5% HF aqueous solution to become parallel for the purpose of using an anodic oxidation method; (e) Step of taking out the Ti foil from the HF solution and sufficiently cleaning it and then drying it using nitrogen gas; (f) Step of drying the dried Ti foil for 3-5 hours at a temperature of 80[deg.]C by putting it in an electric oven; (g) Step of manufacturing a Ti/TiO2 nanotube by putting the completely dried Ti foil into an electric furnace in air and then performing a heat treatment for 1 hour a temperature of 100[deg.]C; (h) Step of irradiating an electron beam for enhancing osteogenesis and Synostosis on the Ti/TiO2 nanotube; (i) Step of culturing preosteoblast cells (MC3T3-E1) using a DMEM medium wherein a 10% fetal bovine serum

(FBS) is added after irradiating the electron beam, and culturing it on the Ti/TiO2 nanotube for 2-24 hours

DEVICE FOR ELECTRICALLY STIMULATING OSTEOGENESIS
WO2011150480

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Method and apparatus for treatment of biological tissue
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Biocompatible electrode and use in orthodontic electroosteogenesis
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An improved method of orthondontic electroosteogenesis comprises providing a biocompatible anode having a noble metal portion in engagement with an electrolytic gel portion comprising agarose and an electrolyte, where the anode gel portion is in engagement with epithelial gingiva at an area of osteoclastic or osteoblastic activity, and a biocompatible cathode having a noble metal portion in engagement with an electrolytic gel portion comprising agarose, an electrolyte, and a weak, biocompatible acid, where the cathode gel portion is in engagement with epithelial gingiva at an area of osteoblastic or osteoclastic activity. Electric current is then applied across the anode and cathode to stimulate osteogenesis. The invention also comprises biocompatible electrodes for electric stimulation of tissue.

DEVICE AND METHOD FOR ELECTRICALLY INDUCING OSTEOGENESIS IN THE SPINE
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A technique and associated device for stimulating multiple electrodes with multiple electrical signals in multiple regions of the spine without injury to the patient. The electrodes are applied to respective sides of the patient's spine, and a first electrical signal is applied to any

electrodes in a treatment area of the lumbar region of the patient's spine, a second electrical signal is applied to any electrodes in a treatment area of the thoracic region of the patient's spine, and a third electrical signal is applied to any electrodes in a treatment area of the cervical region of the patient's spine to induce osteogenesis in at least one of the respective treated area's of the patient's spine.; The first, second, and third electrical signals respectively generate different electrode currents in the respective treated areas and are ideally selected to create current densities that are approximately equal in respective treatment areas. The electrodes may include electrode pairs or strip electrodes placed either side of the patient's spine in the respective treatment areas.

US8630714
Bone growth stimulation using a constant current capacitively coupled stimulator

A non-invasive bone growth stimulation system and method of use are disclosed. The non-invasive bone growth stimulation system generates a substantially constant AC current signal that is delivered to a body to treat bone fractures. The substantially constant AC current is derived from a square wave that is converted to a sinusoidal signal with at least one low pass filter to effectively produce the constant AC current at the fundamental frequency of the square wave.

WO2013170111
DEVICE FOR STIMULATING GROWTH OF INTRA-ORAL-BONE AND SOFT TISSUE

A device for stimulating growth of infra-oral bone and soft tissue includes a housing adapted to fit within a user's mouth and an electromagnetic field emitter disposed within the housing providing an electromagnetic pulse to an interior of the user's mouth. The device also includes a control unit for controlling intensity and frequency of the electromagnetic pulse emitted from the electromagnetic field emitter and for controlling duration of treatment.

CN104207853
Electromagnetic stimulation dental implantation device

The invention relates to the dental restoration field, especially to an electromagnetic stimulation dental implantation device, which includes an implant and a healing abutment movably connected to the implant. The healing abutment is an annular hollow shell, the healing abutment cavity is internally provided with an electromagnetic generator, which can generate an electromagnetic field stimulating the growth and healing of bone tissue around the implant under a power-up state. The electromagnetic generator in the healing abutment provided by the invention can generate a low frequency electromagnetic field under a power-up state, can effectively promote increment, differentiation and calcium salt absorption of damaged bone tissue osteoblasts around the implant, thus speeding up the growth and healing of the injured bone tissue, shortening the healing period, and alleviating the pain of patients.

US2010092916
METHOD AND DEVICES TO INCREASE CRANIOFACIAL BONE

DENSITY

The present invention relates to a method for increasing bone growth in teeth and/or other craniofacial regions of a subject. This method includes administering to the jaw and/or teeth of the subject a mechanical vibration having a frequency of 10 to 1000 Hz with an acceleration peak of 0.1 to 2.00 g and that can produce a low magnitude strain of 1 to 50 microstrain in the jaw and/or teeth. The present invention also relates to devices that deliver high frequency, low magnitude force to the teeth.

US2013273490
METHOD AND DEVICE FOR INCREASING BONE DENSITY IN THE MOUTH

A dental device includes a mouthpiece configured to sit against occlusal surfaces of a patient's teeth and a motor connected to the mouthpiece. The motor is configured to vibrate the mouthpiece at a frequency between 60 and 120 Hz and an acceleration between 0.03G and 0.06G such that the mouthpiece places an axial vibratory force on the occlusal surfaces.

CN203898943
Portable electromagnetic bone growth stimulation instrument

The utility model relates to a portable electromagnetic bone growth stimulation instrument which comprises the components of: a CPU, a display, a keyboard, a frequency timing control chip, a magnetic field generating circuit, an input power supply circuit and an output coil. The portable electromagnetic bone growth stimulation instrument is characterized in that: the input power supply circuit is connected with the CPU and the frequency timing control chip respectively; the CPU is connected with the display, the keyboard and the frequency timing control chip respectively; the frequency timing control chip is connected with the magnetic field generating circuit; and the output end of the magnetic field generating circuit is connected with the output coil. The portable electromagnetic bone growth stimulation instrument has the following beneficial effects: improving an aspect of power supply input, controlling through an electronic chip, improving stability and treatment efficiency of the portable electromagnetic bone growth stimulation instrument, reducing discomfort of patients without treatment effect reduction, improving treatment efficiency, and reducing workload of medical nursing personnel to a certain extent. The portable electromagnetic bone growth stimulation instrument is further described in cooperation with attached maps and embodiments.

US8764688
Therapeutic Method and Apparatus Using Mechanically Induced Vibration

A sleeve that provides mechanical stimulation to the arm to prevent bone density loss. A primary goal of this product is to prevent bone density loss that occurs during extended space travel. For one embodiment, only the predefined frequency specifications had to be met (between 40 Hz and 60 Hz). By meeting these frequencies for a duration of 30 minutes the product will theoretically prevent the loss of bone density. Additionally, clinical trials will need to be conducted before this product can be marketed. The product includes of several

mechanical vibrators attached to a sleeve. The vibrators are small unbalanced-mass motors which are similar to those found in cell phones. The motors are encased in dome shaped housings designed to reduce lateral vibrations along the arm. The product is controlled using an Arduino board attached to the sleeve that actuates the motors.

WO2015050315
METHOD OF OSTEOGENESIS FOR BONE HEALING USING NANO MAGNETIC PARTICLE AND ELECTROMAGNETIC FIELD SYSTEM

The present invention relates to a method for facilitating osteogenesis on areas having damaged bones and a lack of bones by using nanomagnetic particles and low frequency electromagnetic field where a magnetic nanoparticle containing hydrogel only uses natural collagen without crosslink and polymerization process and accordingly hardly causes immune reaction, thereby having a good biosynthesis and being injected to on areas having a lack of bones after being mixed with other bone inducing materials wherein the hydrogel is injected, and then the radiation time of the electromagnetic field is controlled, thereby using the electromagnetic field whose strength is between 1 mt-1.5 T strength and leading to osteogenesis rapidly.

CN204208192
Portable fracture rehabilitation auxiliary treatment apparatus

The utility model provides a portable fracture rehabilitation auxiliary treatment apparatus. The apparatus comprises a power supply, a first voltage generation circuit and a second voltage generation circuit. The input ends of the first voltage generation circuit and the second voltage generation circuit are connected to the power supply. The output ends of the first voltage generation circuit and the second voltage generation circuit are respectively connected to a first emission electrode and a second emission electrode. The portable fracture rehabilitation auxiliary treatment apparatus provided by the utility model performs effective stimulation on bone fractures through high-frequency pulse voltages. The operation process is simple and convenient. Fractured bone rehabilitation is accelerated.

UA85309
METHOD FOR STIMULATING REGENERATION OF BONE TISSUE

A method for stimulating the regeneration of the bone tissue comprises the use of pulse low-intensity ultrasound with frequency of 880 kHz, intensity of 0.4 W/cmand 0.7 W/cm. The stimulation starts in three days following the surgery. The duration of the total course is 7 days with 5-minute daily sessions. The pulse duration is 4 ms, the interval between the pulses is 16 ms. The intensity of ultrasound is 0.7 W/cmwithin the first 4 days and 0.4 W/cm thereafter.

CN204034034 // CN204034031
Portable device for electrotherapy of bone fracture

The utility model proposes a portable device for the electrotherapy of bone fracture, and the device comprises a power supply, a first voltage generation circuit, and a second voltage

generation circuit. The input ends of the first and second voltage generation circuits are connected to the power supply. The output end of the first voltage generation circuit is connected to a first emitting electrode, and the output end of the second voltage generation circuit is connected to a second emitting electrode. The device provided by the utility model can achieve effectively stimulation for bone fracture through high-frequency pulse and voltage, is simple and convenient in operation, and speeds up the healing of bone fracture.

US2014342428
Genetic Regulation of Bone and Cells by Electromagnetic Stimulation Fields and Uses thereof

The present invention provides methods to modify the genetic regulation of mammalian tissue, bone, cells or any combination thereof by preferential activation, up-regulation and/or down-regulation. The method comprises steps of tuning the predetermined profiles of one or more time-varying stimulation fields by manipulating the B-Field magnitude, rising slew rate, rise time, falling slew rate, fall time, frequency, wavelength, and duty cycle, and exposing mammalian cells or tissues to one or more tuned time-varying stimulation fields with predetermined profiles. Examples of mammalian cells or tissues are chondrocytes, osteoblasts, osteocytes, osteoclasts, nucleus pulposus, associated tissue, or any combination. The resulted modification on gene regulation of these cells, tissues or bones may promote the retention, repair of and reduction of compromised mammalian cartilage, bone, and associated tissue.

US2014303525
METHOD AND DEVICE FOR NON-INVASIVE ACOUSTIC STIMULATION OF STEM CELLS AND PROGENITOR CELLS IN A PATIENT

The present invention provides a method for non-invasive acoustic stimulation of stem cells and/or progenitor cells in a patient. The invention also provides a device for non-invasive stimulation of stem cells and/or progenitor cells in the patient by generating and delivering acoustic waves of a suitable frequency and intensity to the stem cells and/or progenitor cells. The method and device of the present invention is useful in enhancing regeneration of bones and other tissues, such as cartilages, muscles, and nerve tissues, in a patient, for treatment of conditions such as bone loss or fracture.

CN203468766
Electromagnetic stimulation dental implant device

The utility model relates to the field of dental repair, and particularly relates to an electromagnetic stimulation dental implant device. The electromagnetic stimulation dental implant device comprises an implant body and a healing abutment which is movably connected with the implant body, wherein the healing abutment is an annular hollow shell; and an electromagnetic generator is arranged inside a cavity of the healing abutment, and generates an electromagnetic field of stimulating bone tissue around the implant body to grow and heal in a power-up state. The electromagnetic generator inside the healing abutment disclosed by the utility model can generate a low-frequency electromagnetic field in the power-up state, and can effectively promote increment and differentiation of damaged bone

osteoblasts around the implant body and absorption of a calcium salt. Thus, growth and healing of the damaged bone tissue are accelerated, the healing cycle is shortened, and the pain of a sufferer is relieved.

US4153060
Method and Apparatus for Electrically Enhanced Bone Growth and Tooth Movement

Abstract -- Disclosed is a method and apparatus for electrically stimulating bone growth and tooth movement in the mouths of mammals. A positive electrode is placed on the gum surface adjacent the bone structure which is to be resorbed. A negative electrode is placed on the gum surface adjacent the bone tissue which is to be accreted or built up. A current source is connected, such that a small current flows between the electrodes, which has the effect of stimulating bone growth in a specific direction. In a preferred embodiment, the electrodes are placed on the gum surface adjacent a tooth, the positive electrode on the side towards which the tooth should move, and the negative on the side from which the tooth will move. Application of a small current to the electrodes will enhance the repositioning of the tooth in conjuction with normal orthodontic practices.

US4854865
Biocompatible electrode and use in orthodontic electroosteogenesis

Abstract: An improved method of orthondontic electroosteogenesis comprises providing a biocompatible anode having a noble metal portion in engagement with an electrolytic gel portion comprising agarose and an electrolyte, where the anode gel portion is in engagement with epithelial gingiva at an area of osteoclastic or osteoblastic activity, and a biocompatible cathode having a noble metal portion in engagement with an electrolytic gel portion comprising agarose, an electrolyte, and a weak, biocompatible acid, where the cathode gel portion is in engagement with epithelial gingiva at an area of osteoblastic or osteoclastic activity. Electric current is then applied across the anode and cathode to stimulate osteogenesis. The invention also comprises biocompatible electrodes for electric stimulation of tissue.

US4757804
Device for Electromagnetic Treatment of Living Tissue

Abstract: A solenoid device for treatment of body tissue such as bones or other regions with pulsed signals comprises a flexible flat belt for encircling a body part or cast surrounding a body part containing tissue to be treated. The belt has a plurality of parallel conductors extending along its length and has its opposite ends offset by one or more conductor spacings. The resultant aligned conductor ends are connected together to form at least one continuous coil, with the resultant unconnected outer conductor ends at opposite sides of the belt comprising inputs across which a suitable electrical signal can be connected. An adjustment device or buckle is mounted on the belt to allow the diameter of the belt to be adjusted. The buckle traps a doubled over portion of the belt circumference which is adjustable in length to change the diameter of the device to closely fit the underlying body part or cast.

Other References:

"Fracture Healing in the Rabbit Fibula When Subjected to Various Capacitively Coupled Electrical Fields" by Brighton et al, Journal of Orthopedic Research, vol. 3, No. 3, 1985..

"Electrical Stimulation of Hard and Soft Tissues in Animal Models" by Jonathan Black, Ph.D., Clinics in Plastic Surgery, vol. 12, No. 2, Apr. 1985..

"Bioelectric Stimulation of Bone Formation: Methods, Models, and Mechanisms" by Spadaro, Journal of Bioelectricity, vol. 1, No. 1, 1982..

"A Review of Electromagnetically Enhanced Soft Tissue Healing" by Cyril B. Frank, M.D. and Andrew Y. J. Szeto, Ph.D..

"Treatment of Osteonecrosis of the Hip with Specific, Pulsed Electromagnetic Fields (PEMFs): A Preliminary Clinical Report" by C. A. L. Bassett, et al, Journal of Bone Circulation..