a simple circuit with an oscillating plasma of arc discharge. The ohmic resistance of the arc plasma is expected to be smaller than the total maximum value of the circuit, on the order of 0.5 Ohm, corresponding to the total measurable resistance of such networks. As a result, such a plasma arc is equivalent to a strongly varying resistance, from an infinite value before ignition to less than 0.5 Ohm after ignition, and subsequently to a negative value of the order of −100 Ohm. This variation is equivalent, theoretically, to a gain of infinity/0.5, which equals plus infinity, and to a subsequent negative gain of 0.5/−100<0, meaning that a significant excess of alternating electromotive voltage, alternating electric current and effective power is produced for a short period time in the circuit. The efficiency is incomparably better than any solid state technique known which exhibit only a small finite gain. The increase of said values is comparable to the time intervals of molecular vibrations and these time intervals are short and are not sufficient to produce atmospheric ionization or to produce general ionization. The source voltage is generally smaller than that required for ionizing air, and is increased substantially instantaneously by the plasma oscillations. This increase is sufficiently strong to cause ion transfer across the cellular membrane or across the membrane of microorganisms and cause pressure and potential increase. Moreover, the apparatus of the present invention is operated remotely and non-invasively, without any physical contact, and may even be applied over ordinary clothing. Moreover, the penetration depth for moderate power is adequate for most cases and is proportional to the intensity of the applied field which, theoretically, means that it can reach any desired depth by increasing the instantaneous power without ionizing the air. The present method is found to be effective to the same degree as microcontact, but avoids the disadvantages of electrode implantation and is not local, but can effective over large areas and depth. It also causes no ionization of the air because of the extremely short duty cycle.

Another unique property of the present method is obtained by the use of special plasma gases. As noted above, the frequency(ies) and characteristics of the plasma oscillations are dependent upon the particular gas elements of the plasma. Thus, by use of special gases, it is possible to produce the radio eigenfrequencies, which are absorbed through resonance by similar elements existing in biological matter. For instance, if nitrogen is contained in the gas plasma, it is possible to selectively excite the nitrogen atoms in the biological matter into oscillation. As a result, nitrogen atoms existing in the form of chemical compounds in a biologic area will selectively absorb this energy due to resonance of the nitrogen atoms in such compounds. This energy surplus in the biologic nitrogen atoms can provide the necessary energy to promote an endothermal chemical reaction and may allow the activated nitrogen atoms to move and participate in latent chemical reactions, which would not otherwise have occurred due to lack of available energy. Thus, it becomes possible to selectively initiate or catalyze a selected chemical reaction, while avoiding another reaction which could result from application of the same amount of energy of a less specific nature. As an example, if we consider two chemical compounds, XAB and Y, whereby the first compound, XAB, contains two chemical elements A and B which can be transferred to the Y compound by supplying appropriate energy. By supplying selected energy, we may selectively produce two alternative endothermic chemical reactions:

$$XAB+Y\text{+plasma energy } A=XA+YB \quad (1)$$

or

$$XAB+Y\text{+plasma energy } B=XB+YA \quad (2)$$

Thus, with energy coming from plasma containing element A, we can activate chemical reaction (1), whereas with the energy coming from plasma containing element B, we can activate chemical reaction (2). Moreover, these reactions can be activated selectively and at will.

Accordingly, it is an object of the present invention to provide improved methods and apparatus for the therapeutic treatment of patients.

Another object of the present invention is to provide improved methods and apparatus for electrotherapeutic treatment of patients.

An additional object of the present invention is to provide improved methods and apparatus for treating patients with pulsed magnetic induction, with the resulting induced current and voltage.

A further object of the present invention is to provide improved methods and apparatus for treating patients with pulsed magnetic induction, with the resulting induced current and voltage without requiring implantation of electrodes.

Another object of the present invention is to provide improved methods and apparatus for treating patients with pulsed magnetic induction, which is non-invasive and may even be performed over ordinary clothing.

An additional object of the present invention is to provide improved methods and apparatus for electrotherapeutic treatment of patients which allows selective initiation or catalyzation of chemical reactions within a patient.

Yet another object of the present invention is to provide improved methods and apparatus for employing pulsed magnetic induction to induce electrical voltage and current within biological matter to produce therapeutic results.

A further object of the present invention is to provide improved methods and apparatus for overcoming the transmembrane potential of human cells without using excessive and ionizing the atmospheric air high voltages

Another object of the present invention is to provide improved methods and apparatus for selectively stimulating one or more desired elements within a patient or biological matter.

A specific object of the present invention is to provide an improved method and apparatus for pulsed magnetic induction by creating a plasma, supplying energy to excite said plasma to oscillate at a higher amplitude than the amplitude of the supplied energy, and applying said the resulting oscillations to a patient or biological matter.

Another specific object of the present is to provide an improved method and apparatus for magnetic induction by creating a plasma containing a specific desired element, supplying energy to excite said element to oscillate at a characteristic radio eigenfrequency(ies), and applying said radio eigenfrequency(ies) to a patient to cause absorption of said energy by atoms of said specific element due to resonance.

An additional specific object of the present invention is to provide improved methods and apparatus for employing magnetic induction to induce electrical voltage and current within biological matter.

A further specific object of the present invention is to provide improved methods and apparatus for employing pulsed magnetic induction and the related induced electrical current and voltage to kill microorganisms or extinguish degenerate and/or weak cells.

These and other objects and features of the present invention will be apparent from the following detailed description, taken with reference to the figures of the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. **1** is a diagrammatic representation of apparatus for performing pulsed magnetic induction in accordance with the method of the present invention;

FIG. **2** is an oscillogram showing the oscillations produced in the output coil of the apparatus of FIG. **1**; and

FIG. **3** is an enlarged oscillogram showing the characteristic radio eigenfrequency(ies) oscillations produced by the output coil of the apparatus of FIG. **1**.

DETAILED DESCRIPTION OF THE INVENTION

In that form of the present invention chosen for purposes of illustration in the drawing, FIG. **1** shows a device, indicated generally at **10**, having an electrical power receptor **12** for receiving alternating current electrical energy, at 220 volts and 50/60 Hz, and supplying the energy to a suitable timer switch **14**, which regulates the operational period of the device **10**. The switch **14** passes the electrical energy through a high-voltage variable transformer **16** to a rectifier **18**, which converts the alternating current to a square wave at a frequency of only a few Hertz. The pulses of this square wave signal are sent through conductors **20** and **22** to charge a capacitive storage bank **24**, which consists of two electrodes **26** and **28** and which is capable of storing a high potential marge and is capable of discharging substantially instantaneously. As the storage bank **24** is charged, the square waves supplied to electrode **26** of the storage bank **24** are also supplied, through conductor **30**, to the anode **32** of plasma chamber **34**. The plasma chamber **34** contains a pair of hemispherical electrodes, anode **32** and cathode **367** each having central probes **38** and **40**, respectively. The spacing between the anode probe **38** of the anode **32** and probe **40** of the cathode **36** is adjustable by suitable means, such as crank **42**, which actuates rack **44** and pinion **46** to vary the position of the cathode **36** and probe **40**. Atmospheric air and gases, such as Nitrogen, Argon and the like are supplied to the plasma chamber **34** from one or more sources **48**, through inlet filter **50** and are exhausted from the plasma chamber **34** by outlet fan **52**. Also, a viewing window **54** is provided to allow the operator to observe the character of the plasma within the plasma chamber **34**. The cathode **36** of the plasma chamber **34** is connected by a flexible high voltage line **56** to contact **58** of junction box **60**. The other contact **62** of the junction box **60** is connected by conductor **64** to electrode **28** of the storage bank **24**. An induction probe, indicated generally at **66**, contains an induction coil **68**, which is connected across the contacts **58** and **62** of the junction box **60** and which preferably has a diameter of 30 centimeters and is formed of approximately 2–10 turns of at copper wire having cross sectional area of at least 6 square millimeters, so as to provide very high rates of power, current >1000amps and voltage. The induction coil **68** is enclosed within a high insulation toroid **70**, formed of suitable material, such as silicon, teflon or the like. As seen in FIG. **1**, the induction probe **66** also has a tail portion **72**, which contains the conductors **74** connecting the induction coil **68** to the junction box **60** encased within a sheath **76** formed of the same material as the toroid **70**. The tail portion **72** serves to allow adjustable positioning of the induction coil **68** with respect to the patient, indicated generally at **78**, and may be up to a few meters in length.

Finally, for test purposes or calibration, an oscilloscope **80** is connected across the electrodes **58** and **62** of the junction box **60** to provide a visual indication of the electrical signal being supplied to the induction probe **66** and, hence, to the patient **78**.

In use, the induction probe **66** is positioned to overlie a desired portion of the body of the patient **78** and rack **44** is rotated by crank **42** to move pinion **46** to provide a desired spacing between electrodes **32** and **36** for initiation of plasma ionization within the plasma chamber **34**. Next, exhaust fan **52** is started and said gases are introduced into the plasma chamber **34** from gas source **48**. An appropriate value is set for the variable transformer **16** and timer switch **14** is actuated to pass electrical energy from receptor **12** for a period of time, as selected by the timer switch **14**. By watching through the viewing window **54**, the observer can determine the operation condition of the device **10** and, if necessary or desirable, can adjust this by varying the spacing between the electrodes **32** and **36** of the plasma chamber **34**. As seen in FIGS. **2** and **3**, when the oscilloscope **80** is connected as shown, it will show a generally sinusoidal curve **82**, indicative of the oscillations produced by the circuit composed of an inductance, resistance and capacitance, and will have bursts **84** occurring at the positive and negative peaks of the sine curve **82**, caused by the eigenoscillations of the selected gases, such as air or Nitrogen, and having an eigenfrequency(ies) which is characteristic of the selected gaseous elements. These energy bursts are substantially instantaneous and are of such short duration that they cannot serve to ionize the surrounding air. Moreover, the energy contained in these bursts penetrates into the body of the patient **78** and is selectively absorbed by those elements within cells of the patient **78** which resonate to the characteristic eigenfrequency(ies) caused by ionization of the selected gases from gas source **48**. In prior art plasma techniques, similar energy burst have been observed. However, because the phenomena was not properly understood, steps have been taken to suppress the burst energy. As discussed above, this selective absorption serves to trigger selected chemical reactions within the cells of the patient **78** to produce desired therapeutic results. Thus, in accordance with the method of the present invention, enhancement of the burst energy is preferred. The energy supplied by the induction coil **68** will have a generally a low frequency damping sinusoidal base curve characteristic of the LCR circuit, having a duty cycle of the order of 0.001% with a series of about 10 to 15 equal (except the first one) bursts of radio eigenfrequency(ies) at each minimum or maximum of the low frequency cycle, having durations of less than 10^{-6} seconds each.

Obviously, numerous variations and modifications can be made without departing from the spirit of the present invention. Therefore, it should be clearly understood that the form of the present invention described above and shown in the figures of the accompanying drawing is illustrative only and is not intended to limit the scope of the present invention.

What is claimed is:

1. Apparatus for pulsed magnetic induction comprising:

means for creating a plasma containing at least one specific desired gaseous element,

means for supplying energy to excite atoms of said gaseous element to oscillate at characteristic radio eigenfrequencies and magnetic frequencies, and

means for inductively applying pulses of said radio eigenfrequencies and the magnetic frequencies produced to a target matter to cause selective absorption of energy by atoms of said specific element within said matter similar to the atoms of said specific element due to resonance.

2. The apparatus of claim wherein:

said means for creating a plasma comprises a plasma chamber containing a pair of selectably spaced electrode wherein said gaseous element is ionized.

3. The apparatus of claim **1** wherein:

said means for applying said radio eigen-frequencies to said target matter includes an induction probe.

4. The apparatus of claim **3** wherein:

said induction probe is formed to provide rates of power of magnetic pulses and to induce higher electrical current and to induce higher voltage into exposed matter without causing significant heating.

5. The apparatus of claim **3** wherein:

said induction probe contains an induction coil formed of at least one turn of wire made from a group of high conductive metals consisting of copper, gold, silver, and platinum, and the like, and having a diameter of at least 6 square millimeters to sustain a strong electrical current of at least 1000 amps.

6. The apparatus of claim **5** wherein:

said induction coil has a diameter at least a fraction of one centimeter.

7. The apparatus of claim **5** wherein:

said induction probe is encased within a shield formed of electrically insulating material.

8. The apparatus of claim **5** wherein:

said induction probe has a tail portion which allows adjustable positioning of said induction probe with respect to said target matter.

9. The apparatus of claim **1** wherein:

said means for producing a plasma produces energy having instantanious bursts of high frequency electrical energy having amplitudes which are higher than those of any other potential energy in said apparatus.

10. The apparatus of claim **1** wherein:

said means for supplying energy comprises a capacitive energy storage bank.

11. The apparatus of claim **1** further comprising: means for displaying characteristic of said plasma.

12. The apparatus of claim **1** wherein:

said means for creating a plasma includes a pair of concave electrodes arragned in facing relationship and each having a central probe projecting toward the other of said electrodes.

13. The apparatus of claim **12** wherein:

said electrodes are hemispherical.

14. The apparatus of claim **1** further comprising:

means for exciting said plasma to emit said radio eigenfrequencies in bursts having durations of about $10^{-4}$to 10^{-6}seconds.

15. The apparatus of claim **1** wherein:

said means for supplying energy functions in an oscillating manner having a duty cycle of the order of 0.001 percent.

16. The apparatus of claim **1** wherein:

said means for supplying energy functions in an oscillating manner having a duty cycle of the order of 0.001 percent and causes said plasma to emit radio eigen frequencies in bursts having durations of less than 10^{-4} seconds.

17. A method for magnetic induction comprising the steps of:

creating a plasma containing at least one specific desired element, supplying energy to excite said element to oscillate at characteristic radio eigenfrequencies, and

applying said radio eigenfrequencies by magnetic induction to a patient to cause absorption of energy by atoms of said patient similar to atoms of said specific element due to resonance.

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