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(54) ELECTRONIC SYSTEM FOR INFLUENCING CELLULAR FUNCTIONS IN A WARM-BLOODED MAMMALIAN SUBJECT

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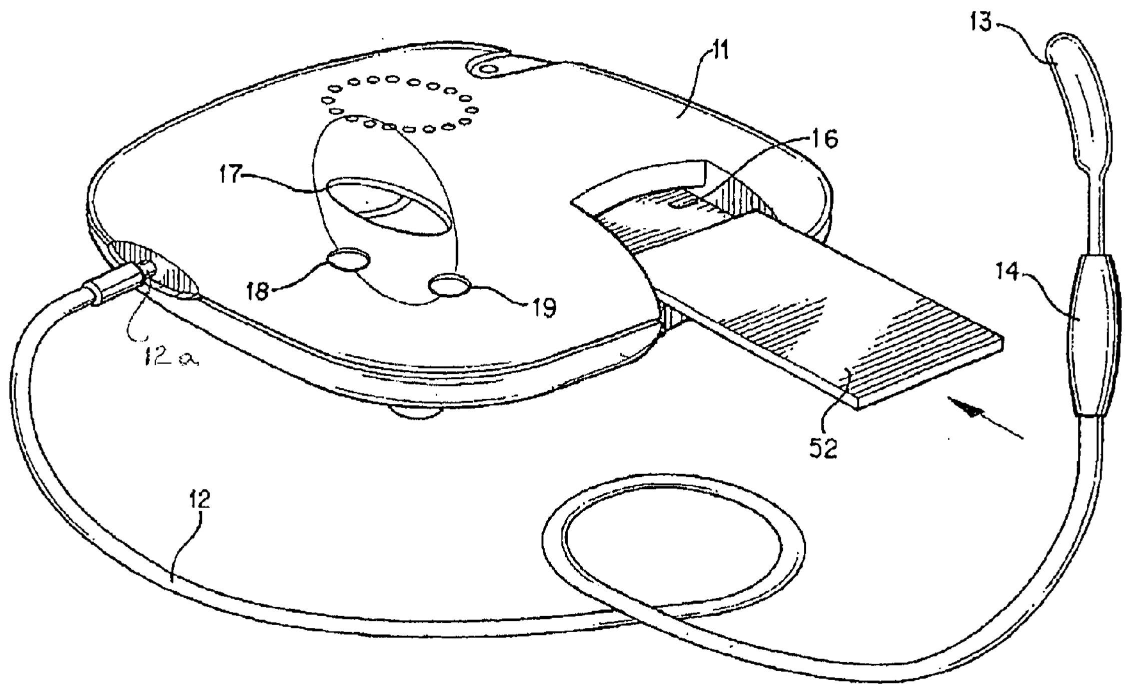
(57) **ABSTRACT**

An electronic system activatable by electrical power is described. The system is useful for influencing cellular functions or malfunctions in a warm-blooded mammalian subject. The system includes one or more controllable low energy HF (High Frequency) carrier signal generator circuits, one or more data processors for receiving control information, one or more amplitude modulation control generators and one or more amplitude modulation frequency control generators. The amplitude modulation frequency control generators are adapted to accurately control the frequency of the amplitude modulations to within an accuracy of at least 1000 ppm, most preferably to within about 1 ppm, relative to one or more determined or predetermined reference amplitude modulation frequencies.



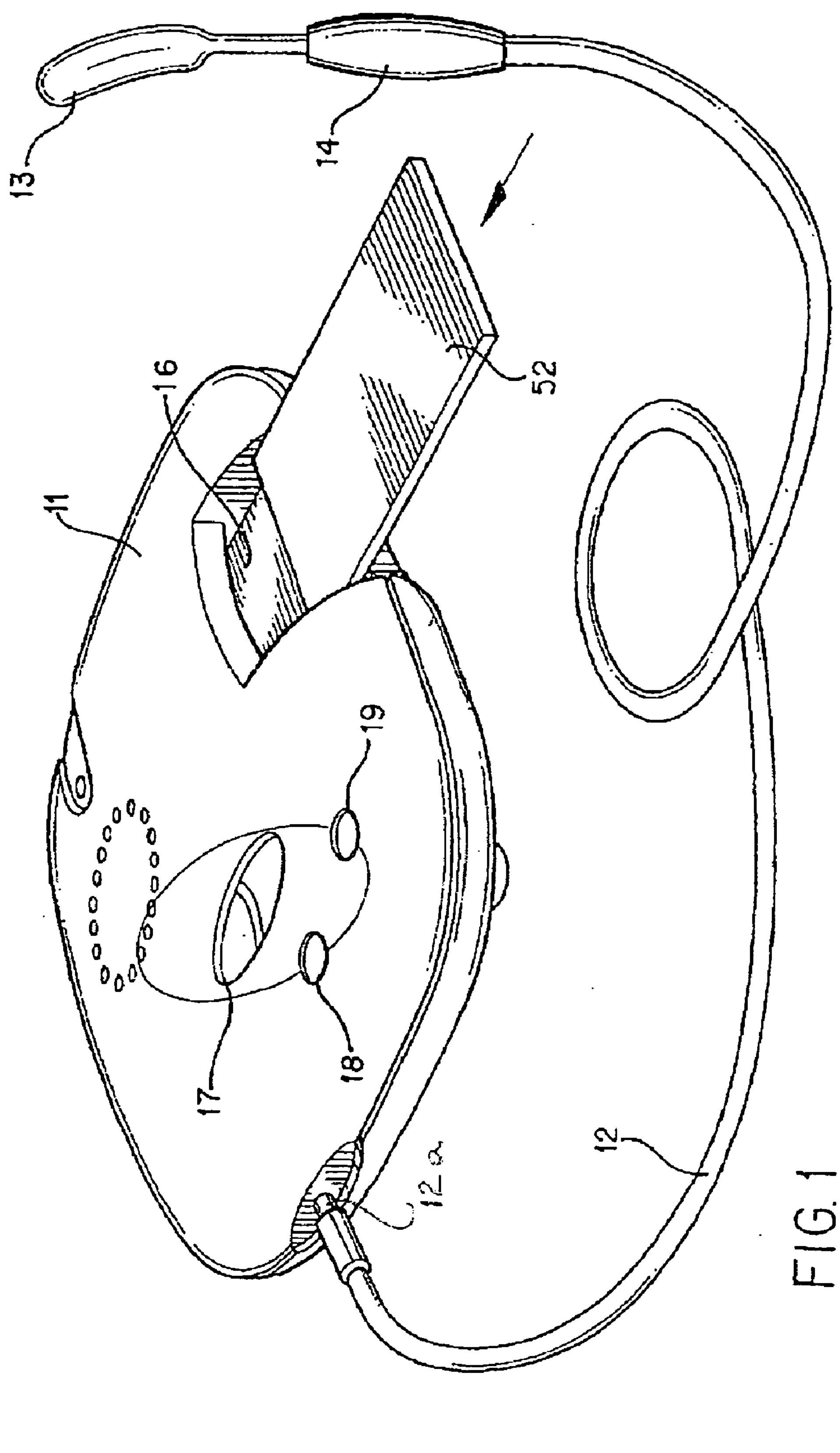


FIG. 1

FIG. 2 FB, 21.3.7 The dotted lines show different possibilities of embodiments

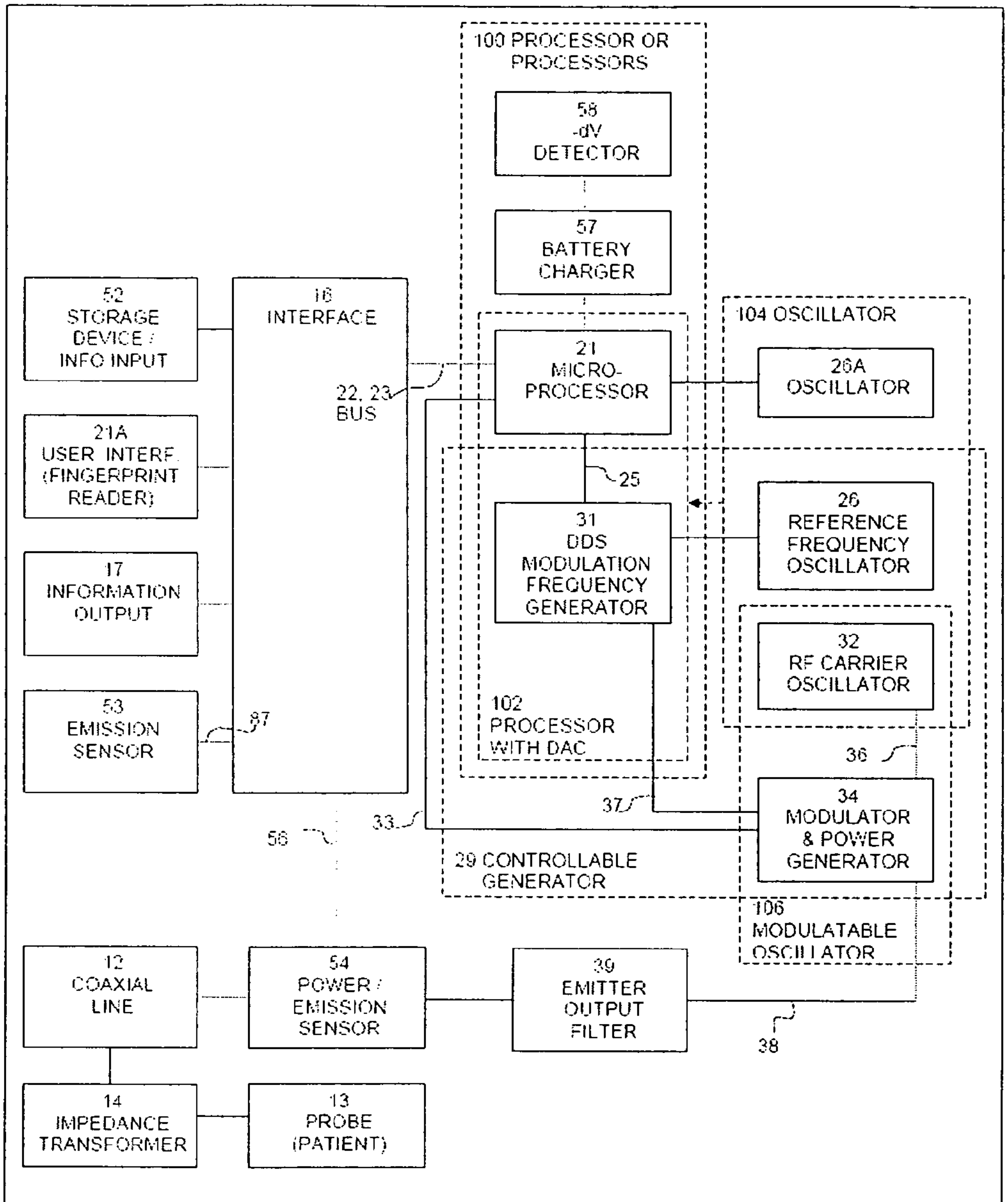


FIG. 2

ELECTRONIC SYSTEM FOR INFLUENCING CELLULAR FUNCTIONS IN A WARM-BLOODED MAMMALIAN SUBJECT

FIELD OF THE INVENTION

[0001] This invention relates to an electronic system for influencing cellular functions in a warm-blooded mammalian subject. More particularly, the invention concerns research findings related to how earlier electronic systems may be modified and programmed to achieve both improved and additional therapeutic effects.

BACKGROUND OF THE INVENTION

[0002] Reference is made to European Patent EP 0 592 851 B1 and corresponding Patents and Patent Applications and to the various publications referred to therein. Since the time of the priority Application filed in the USA on 25 Sep. 1992 (U.S. Ser. No 951,563 now U.S. Pat. No. 5,441,528), a number of further publications related to effects of very low energy electromagnetic fields on patients suffering from insomnia and/or anxiety disorders have taken place:

[0003] Koziol J A, Erman M, Pasche B, Hajdukovic R, Mitler MM (1993) Assessing a changepoint in a sequence of repeated measurements with application to a low-energy emission therapy sleep study. *J Applied Statistics* 20: 393-400

[0004] Amato D, Pasche B (1993) An evaluation of the safety of low energy emission therapy. *Compr Ther* 19: 242-247

[0005] Higgs L, Reite M, Barbault A, Lebet J P, Rossel C, Amato D, Dafni U, Pasche B (1994) Subjective and Objective Relaxation Effects of Low Energy Emission Therapy. *Stress Medicine* 10: 5-13

[0006] Reite M, Higgs L, Lebet J P, Barbault A, Rossel C, Kuster N, Dafni U, Amato D, Pasche B (1994) Sleep Inducing Effect of Low Energy Emission Therapy. *Bioelectromagnetics* 15: 67-75

[0007] Lebet J P, Barbault A, Rossel C, Tomic Z, Reite M, Higgs L, Dafni U, Amato D, Pasche B (1996) Electroencephalographic changes following low energy emission therapy. *Ann Biomed Eng* 24: 424-429

[0008] Pasche B, Erman M, Hayduk R, Mitler M, Reite M, Higgs L, Dafni U, Amato D, Rossel C, Kuster N, Barbault A, Lebet J-P (1996) Effects of Low Energy Emission Therapy in chronic psychophysiological insomnia. *Sleep* 19: 327-336

[0009] Kelly T L, Kripke D F, Hayduk R, Ryman D, Pasche B, Barbault A (1997) Bright light and LEET effects on circadian rhythms, sleep and cognitive performance. *Stress Medicine* 13: 251-258

[0010] Pasche B, Barbault A (2003) Low-Energy Emission Therapy: Current Status and Future Directions. In *Bioelectromagnetic Medicine*, Rosch P J, Markov M S (eds) pp 321-327. Marcel Dekker, Inc.: New York, N.Y.

[0011] The above publications are related to an earlier device, system and use thereof described in said EP 0 592 851 B1. The improved electronic system and programmed control thereof in accordance with the present invention, however, has been determined to find therapeutic application not only for influencing cellular functions (or malfunctions) leading to central nervous system (CNS) disorders, but more particularly for influencing other cellular functions (or malfunctions) including directly or indirectly influencing cancerous cell growth or proliferation thereof in warm-blooded mammalian subjects. The direct or indirect influence on cancerous cell growth may involve but is not necessarily limited to any of prophylactic avoidance of cancerous cell formation, influencing of cell functions such as for example influencing leukocyte cell functions which can lead to inhibition of cancerous cell growth or proliferation thereof, and/or killing of cancerous cells harboured by a warm-blooded mammalian subject.

[0012] Electromagnetic energy generating devices and use of electromagnetic energies for treating living mammalian subjects harbouring cancerous cells described in the literature include: U.S. Pat. No. 5,908,441 issued Jun. 1, 1999 to Bare; James E. and the references cited therein and so-called "NovoCure technology" involving in vivo implantation of electrodes to either side of tumorous growths. This literature however does not contemplate very low energy emissions of electromagnetic energy involving amplitude-modulated high frequency carrier signals as required in terms of the present invention.

[0013] U.S. Pat. No. 5,690,692 issued on Nov. 25, 1997 entitled "Bio-Active Frequency Generator and Method" describes a programmable control which instructs a frequency synthesizer to enable generation of an electrical current at a specific precise frequency signal or at a series of specific precise frequencies signals having a square wave form to within an accuracy of 0.001 Hz. This Patent contemplates amplifying the voltage of the generated signals and applying the signals to a subject at the specific precise frequency or sequentially at the series of specific precise frequencies by means of electrodes held by or otherwise connected to the subject (which may be a mammal or a food). Once again, this Patent does not contemplate very low energy emissions involving amplitude-modulated high frequency carrier signals as required in terms of the present invention.

SUMMARY OF THE INVENTION

[0014] In one aspect of the invention, an electronic system is provided which is activatable by electrical power. The system is employed to influence cellular functions or malfunctions in a warm-blooded mammalian subject. The system comprises one or more controllable low energy electromagnetic energy generator circuits for generating one or more high frequency radio frequency RF carrier signals. One or more microprocessors or integrated circuits comprising or communicating with the one or more generator circuits are provided which are also for receiving control information from a source of programmed control information. The one or more generator circuits include one or more amplitude modulation control signal generators for controlling amplitude modulated variations of the one or more high frequency carrier signals. The one or more generator circuits furthermore include one or more programmable amplitude modulation frequency control signal generators for controlling the frequency at which the amplitude modulations are generated. The one or more amplitude modulation frequency control generators are, in terms of an important improvement of the present invention, adapted to accurately control the frequency of the amplitude modulations to within an accuracy of at least 1000 ppm relative to one or more determined or predetermined reference amplitude modulation frequencies selected from within a range of 0.01 Hz to 150 kHz. The system furthermore comprises a connection or coupling position for connection or coupling to or being connected or coupled to an electrically conductive applicator for applying to the warm-blooded mammalian subject the one or more amplitude-modulated low energy emissions at said accurately controlled modulation frequencies.

[0015] As used herein, the term, "accurately controlled" means that the modulated low energy electromagnetic emissions should be modulated to within a resolution of at most about 1 Hz of intended higher frequencies (greater than about 1000 Hz) determined or predetermined modulation frequencies. For example, if one of the one or more determined or predetermined modulation frequencies to be applied to the warm-blooded mammalian subject is about 2000 Hz, the accurate control should lead to such modulated low energy emission being generated at a frequency of between about 1999 and about 2001 Hz. However, and in terms of what has been determined from experiences in treating human subjects harbouring cancerous cells with the aim of arresting proliferation or killing of such cells, it is preferable that the accurate control should lead to a resolution of about 0.5, more preferably about 0.1, yet more preferably about 0.01 and indeed most preferably about 0.001 Hz of the intended determined or predetermined modulation frequency.

[0016] Of importance is the requirement for emissions to be at a very low and safe energy level and result in low levels of absorption, the reason believed to be that physiological exchanges or flow of electrical impulses within warm-blooded animals (which are to be affected by application of the emissions of the present invention) are similarly at very low energy levels. In any event, in the region (at or near to the position of contact or close-by induction of the electrically conductive applicator with a subject receiving treatment), the specific absorption rate (SAR) should be and is most preferably substantially less than 1.6 milliW/g weight of living tissue.

[0017] Furthermore of importance to achieve the intended biological therapeutic effect is that the stability of the emissions be maintained during emission, and that such stability should preferably be of the order of 10^{-5}, more preferably 10^{-6}, and most preferably 10^{-7}, stability being determined as the relative deviation of frequency divided by the desired frequency, e.g. 0.01 Hz (deviation)/1,000 Hz (desired freq.) $=10^{-5}$.

[0018] As already described in said EP 0 592 851 B1, the system includes a microprocessor (which may more recently be replaced by an integrated circuit) into which control information is loaded from an application storage device. The microprocessor (or now alternatively integrated circuit) then controls the function of the system to produce the desired therapeutic emissions. Also described is the provision in the system of an impedance transformer connected intermediate the emitter of low energy electromagnetic emissions and a probe (here more broadly described as an electrically conductive applicator) for applying the emissions to the patient. The impedance transformer substantially matches the impedance of the patient seen from the emitter circuit with the impedance of the output of the emitter circuit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] FIG. **1** shows an exemplary casing structure for the electronic circuit shown in FIG. **2**, an applicator **13** (exemplified as a probe suitable for being placed in the mouth of a patient) and an interface **16** (which may be replaced by a receiver) for receiving information from a source of information **52** such as may be comprised in an information storage device, e.g. of the nature described and illustrated in FIGS. 12 to 17 of EP 0 592 851 B1.

[0020] FIG. **2** is a block diagram of exemplary circuitry which may be comprised in the exemplary casing structure of FIG. **1**. This FIG. **2** differs essentially from FIG. 2 of EP 0 592 851 B1 by comprising a highly accurate modulation frequency generator **31** (named a Digital Direct Synthesizer or DDS), which enables accurate control of modulatable oscillator represented by dotted line block **106**.

[0021] Reference is made to the various Figures of EP 0 592 851 B1 and the detailed description thereof, a number of which are exemplary of components which may be comprised in the circuit of FIG. **2**.

[0022] Thus, FIG. 3 of EP 0 592 851 B1 is a detailed schematic of a modulation signal generator 31, replaced by a DDS modulation frequency generator **31** comprised in the circuit of present FIG. **2**;

[0023] FIG. 4 of EP 0 592 851 B1 is a detailed schematic of a modulation signal buffer and carrier oscillator circuit which may be employed in the circuit of the present FIG. **2**;

[0024] FIG. 5 of EP 0 592 851 B1 is a detailed schematic example of an amplitude modulation (AM) and power generator **34** and output filter **39** which could be comprised in the circuit of the present FIG. **2**;

[0025] FIG. 6 of EP 0 592 851 B1 is a detailed schematic example of an impedance transformer **14** which may be comprised in the circuit of the present FIG. **2**;

[0026] FIG. 7 of EP 0 592 851 B1 is a detailed schematic example of an emission sensor **53** which may be comprised in the circuit of the present FIG. **2**;

[0027] FIG. 8 of EP 0 592 851 B1 is a detailed schematic example of an output power sensor circuit **54** which may be employed in the circuit of the present FIG. **2**.

[0028] FIG. 9 of EP 0 592 851 B1 is a detailed schematic example of a display module or information output **17** which may be included in the circuit of the present FIG. **2**.

[0029] FIG. 10 of EP 0 592 851 B1 is a detailed schematic example of a power supply control circuit including battery charger **57** which may be comprised in the circuit of the present FIG. **2**.

[0030] FIGS. 11a-d of EP 0 592 851 B1 are exemplary flow charts of the method of operation of the system of FIGS. **1** and **2**.

DETAILED DESCRIPTION

[0031] Referring to FIG. **1**, presented is a modulated low energy electromagnetic emission application system **11**, in accordance with the present invention. As described in prior U.S. Pat. Nos. 4,649,935 and 4,765,322, such a system has proven to be useful in the practice of Low Energy Emission Therapy (LEET, a trademark of Symtonic S.A. or a successor of this Company), which involves application of emissions of low energy radio frequency (RF) electromagnetic waves to a warm-blooded mammalian subject. The application has proven to be an effective mode of treating a warm-blooded mammalian subject suffering from central nervous system (CNS) disorders such as, for example, generalized anxiety disorders, panic disorders, sleep disorders including insomnia, psychiatric disorders such as depression, obsessive compulsive disorders, disorders resulting from substance abuse, sociopathy, post traumatic stress disorders or other disorders of the central nervous system and combinations thereof.

[0032] The system includes an electrically conductive applicator **12**, **13** for applying one or more electromagnetic emissions to the warm-blooded mammalian subject. One form of applicator may consist of an electrically conductive probe or mouthpiece **13** which is inserted into the mouth of a subject undergoing treatment. Probe **13** is connected to an electromagnetic energy emitter (see also FIG. **2**), through coaxial cable **12** and impedance matching transformer **14**.

[0033] It has previously been considered that an efficient connection of an electrically conductive applicator to a subject could only be achieved by means of a probe which is adapted to be applied to any mucosa of the subject, such as by being located within oral, nasal, optical, urethral, anal, and/or vaginal cavities or surfaces. It has however now been determined that in fact satisfactory application of emissions to a patient can be achieved by simpler physical contact of the electrically conductive applicator with the skin of the patient. Emissions to the patient may, for example be achieved by a conductive, inductive, capacitive or radiated coupling to the patient. An example of a coupling found to be effective involving indirect physical contact with the skin of a patient, is an insulated applicator to be placed over or within an ear of the patient. The emissions thus passed to the patient may be either by capacitive or radiated means or by a combination of both. An important advantage of a device which does not need to be placed in the mouth of a patient is that the patient is able to speak clearly during a time of treatment and can receive treatment during activities of daily living. The treatment is accordingly more user-friendly, can be administered for longer periods of time and can lead to enhanced patient compliance.

[0034] Electronic system **11** also includes a connector or coupler for connection to a programmable device such as a computer or an interface or receiver **16** which is adapted to receive an application storage device **52** such as, for example, magnetic media, semiconductor media, optical media or mechanically encoded media, or programmed emissions programmed with control information employed to control the operation of system **11** so that the desired type of low energy emission therapy is applied to the patient.

[0035] Application storage device **52** can be provided with a microprocessor which, when applied to interface **16**, operates to control the function of system **11** to apply the desired low energy emission therapy. Alternatively, application storage device **52** can be provided with a microprocessor which is used in combination with microprocessor **21** within system **11**. In such case, the microprocessor within device **52** could assist in the interfacing of storage device **52** with system **11**, or could provide security checking functions.

[0036] System **11** may also include a display **17** which can display various indications of the operation of system **11**. In addition, system **11** may include on and off power buttons **18** and **19**, optionally replaced by user interface **21**A (refer to FIG. **2**).

[0037] Referring to FIG. **2**, presented is a block diagram of exemplary electronic circuitry of system **11**, in accordance with the present invention. A data processor, such as for example, microprocessor or integrated circuit **21**, operates as the controller for electronic system **11**, and is connected to control the various components of the system **11**, for example, through address bus **22**, data bus **23** and input/output lines **25**. The block diagram of FIG. **2** is modified as compared to FIG. 2 of EP 0 592 851 B1 by including what is known as a digital direct synthesizer (DDS) **31** which operates as a accurate and stable modulation frequency generator within the system **11**. An exemplary DDS device is available from Analog Devices of Norwood, Mass. 02062-9106, USA, Part No AD9835. The device is a numerically controlled oscillator and modulation capabilities are provided for phase modulation and frequency modulation. As represented by dotted line block **102**, entitled "PROCESSOR WITH DAC", the functionality of the DDS may also be combined with microprocessor **21** with digital to analogue converter (DAC).

[0038] Microprocessor **21** preferably includes internal storage for the operation of a coded control program, and temporary data. In addition, microprocessor **21** may include input/output ports and internal timers. Microprocessor **21** may be a microcontroller, for example microcontrollers **8048** or **8051** available from Intel Corporation of Santa Clara, Calif. 95054-1549, USA.

[0039] The timing for microprocessor **21** is provided by system clock oscillator **26**A which may be run at any clock frequency suitable for the particular type of microprocessor used. An exemplary clock frequency is about 8.0 MHz. Oscillator **26**A may be replaced by reference frequency oscillator **26** which secures the stability of the accurate modulation frequency. RF (radio frequency) oscillator **32** may also be employed for this purpose. A combination of oscillators is represented by dotted line block **104**, entitled "OSCILLATOR".

[0040] An exemplary operating program for microprocessor **21** is presented in flow chart form with reference to FIGS. 11a-d of EP 0 592 851 B1. In general, microprocessor **21** functions to control controllable electromagnetic energy generator circuit **29** to produce a desired form of modulated low energy electromagnetic emission for application to a subject through applicator or probe **13**.

[0041] Dotted line block **29**, entitled CONTROLLABLE GENERATOR, includes DDS modulation frequency generator **31** and carrier signal oscillator **32**. Microprocessor **21** operates to activate or deactivate controllable generator circuit **29** through oscillator disable line **33**, as described in greater detail in EP 0 592 851 B1. Controllable generator circuit **29** also includes an AM modulator and power generator **34** which operates to amplitude modulate a carrier signal produced by carrier oscillator **32** on carrier signal line **36**, with a modulation signal produced by modulation signal generator circuit **31** on modulation signal line **37**. The combination of the functionality of the DDS modulation frequency generator **31**, with processor **21** with DAC, represented by dotted line block **102**, enables output lines **33** and **37** to be combined to produce a single signal. The combination furthermore enables arbitrary or periodic wave forms of any shape to be generated, as similarly described in EP 0 592 851 B1.

[0042] AM modulator and power generator **34** produces an amplitude modulated carrier signal on modulated carrier signal line **38**, which is then applied to emitter output filter circuit **39**. The filter circuit **39** is connected to probe or applicator **13** via power emission sensor **54**, coaxial cable **12** and impedance transformer **14**.

[0043] Microprocessor **21** controls DDS modulation signal generator circuit **31** of controllable generator circuit **29** via interface lines **25**.

[0044] As is illustrated and described in EU 0 592 851 B1, microprocessor **21** may select a desired waveform stored in a modulation waveform storage device **43** and also controls a waveform address generator **41** to produce on waveform address bus **42** a sequence of addresses which are applied to modulation signal storage device **43** in order to retrieve the selected modulation signal. In the embodiment described in EP 0 592 851 B1, the desired modulation signal is retrieved from modulation signal storage device **43** and applied to modulation signal bus **44** in digital form. Modulation signal bus **44** is applied to wave form generator and DAC **46** which converts the digital modulation signal into analogue form. This analogue modulation signal is then applied to a selective filter **47** which, under control of microprocessor **21**, filters the analogue modulation signal by use of a variable filter network including resistor **48** and capacitors **49** and **51** in order to smooth the wave form produced by DAC **46** on modulation signal line **20**.

[0045] A further embodiment possibility is a combination of PROCESSOR WITH DAC dotted line block **102** with OSCILLATOR dotted line block **104** or with a combination of oscillators **26** and **26**A. With such a combination, the hardware solution described in EP 0 592 851 B1 can be realized internally in the processor **102** with multiple outputs **33** and **37** or a single output combining these signals.

[0046] The above embodiment from EP 0 592 851 B1 is in part replaced by the functionality of the DDS modulation frequency modulator **31**. However, if it is determined that emissions of different wave forms is desirable, it would be desirable to include the modulation signal storage device **43** and wave form generator **46** described in EP 0 592 851 B1. Various modulation signal wave forms may then be stored in modulation signal storage device **43**. Wave forms that have been successfully employed include square wave forms or sinusoidal wave forms. Other possible modulation signal wave forms include rectified sinusoidal, triangular, or other wave forms and combinations of all of the above.

[0047] The particular modulation control information employed by microprocessor **21** to control the operation of controllable generator circuit **29**, is stored in application storage device **52**. The application storage device is conveniently a computer comprising or being for receiving the information. Alternatively, application storage devices illustrated and described in EP 0 592 851 B1, with reference to FIGS. 12, 13, 14 and 15, may be selected.

[0048] Interface **16** is configured as appropriate for the particular application storage device **52** in use. Interface **16** translates the control information stored in application storage device **52** into a usable form for storage within the memory of microprocessor **21** to enable microprocessor **21** to control controllable generator circuit **29** to produce the desired modulated low energy emission.

[0049] Interface **16** may directly read the information stored on application storage device **52**, or it may read the information through use of various known communication links. For example, radio frequency, microwave, laser, telephone, internet or optical based communications links may be employed to transfer information between interface or receiver **16** and application storage device or computer **52**.

[0050] The system **11** may comprise a user identification device, included in block **21***a* in FIG. **2**. Conveniently, such a device communicates with the one or more data processors or integrated circuits **21** via interface **16**, as shown. The user identification device may be of any type, a finger print reader being an example. Such a reader is for example available from Lenovo, 70563 Stuttgart, Germany, Part No. 73P4774.

[0051] The control information stored in application storage device or computer **52** specifies various controllable parameters of the modulated low energy RF electromagnetic emission to be applied to a subject through applicator or probe **13**. Such controllable parameters include, for example, but are not necessarily limited to, the frequency and amplitude of the carrier, the amplitudes and frequencies and wave forms of the modulation of the carrier, the duration of the emission, the power level of the emission, the duty cycle of the emission (i.e., the ratio of on time to off time of pulsed emissions applied during a treatment), the sequence of application of different modulation frequencies for a particular application, and the total number of treatments and duration of each treatment prescribed for a particular subject, and combinations thereof.

[0052] For example, the carrier signal and modulation signal may be selected to drive the applicator or probe **13** with an amplitude modulated signal in which the carrier signal includes spectral frequency components below about 1 GHz, and preferably between about 1 MHz and about 900 MHz, and in which the modulation signal comprises spectral frequency components between about 0.01 Hz and 150 KHz. The one or more modulation frequencies may be simultaneously emitted or sequenced to form the modulation signal.

[0053] As an additional feature, an electromagnetic emission sensor **53** may be provided to detect the presence of electromagnetic emissions at the frequency of the carrier oscillator **32**. Emission sensor **53** provides microprocessor **21** with an indication of whether or not electromagnetic emissions at the desired frequency are present. Microprocessor **21** then takes appropriate action, for example, by displaying an error message on display **17**, disabling controllable generator circuit **29**, or the like.

[0054] A power sensor **54** is preferably included which detects the amount of power applied to the subject through applicator or probe **13** compared to the amount of power returned or reflected from the subject. This ratio is indicative of the proper use of the system during a therapeutic session. Power sensor **54** applies to microprocessor **21**, through power sensor line **56**, an indication of the amount of power applied to patient through applicator or probe **13** relative to the amount of power reflected from the patient.

[0055] The indication provided on power sense line **56** may be digitalized and employed by microprocessor **21**, for example, to detect and control a level of applied power, and to record on application storage device **52** information related to the actual treatments applied to and received by the patient. Such information may then be used by a physician or other clinician to assess patient treatment compliance and effect. Such treatment information may include, for example: the number of treatments applied for a given time period; the actual time and date of each treatment; the number of attempted treatments; the treatment compliance (i.e., whether the applicator or probe was in place or not during the treatment session); and the cumulative dose of a particular modulation frequency.

[0056] The level of power applied is preferably controlled to cause the specific absorption rate (SAR) of energy absorbed by the patient to be from about 1 microWatt per kilogram of tissue to about 50 Watts per kilogram of tissue. Preferably, the power level is controlled to cause an SAR of from about 100 microWatts per kilogram of tissue to about 10 Watts per kilogram of tissue. Most preferably, the power level is controlled to cause an SAR of from about 1 milliWatt per kilogram of tissue to about 100 milliWatts per kilogram of tissue. These SARs may be in any tissue of the patient, but are preferably in the tissue of the central nervous system or the diseased tissue.

[0057] System **11** may also include powering circuitry including battery and charger circuit **57** and battery voltage change detector **58**.

[0058] The RF carrier oscillator **32** produces a RF carrier frequency of about 27 MHz. Other embodiments of the invention contemplate RF carrier frequencies of about 48 MHz, about 433 MHz or about 900 MHz. In general, the RF carrier frequency produced by carrier oscillator **32** has spectral frequency components less than about 1 GHz and preferably between about 1 MHz and about 916 MHz. Although the described embodiment contemplates that once set, the carrier oscillator frequency remains substantially constant, the carrier frequency produced by carrier oscillator **32** may be variable and controllable by microprocessor **21** by use of stored or transmitted control information.

[0059] Carrier oscillator **32** produces on carrier signal line **36** a carrier signal which is then modulated by the modulation signal carried on signal line **37**.

[0060] Oscillator disable line **33** enables microprocessor **21** to disable the signal from oscillator **32** by applying an appropriate disable signal to oscillator disable line **33**.

[0061] The output of the AM modulator and power generator **34** appears on signal line **38**. This modulated signal is applied through emitter output filter **39** which substantially reduces or eliminates the carrier harmonics resulting from side effects of the modulator and power generator circuit **34**.

[0062] The output of the AM modulator and power generator **34** and emitter output filter **39** may be designed to possess a 50 Ohm output impedance to match a 50 Ohm impedance of coaxial cable **12**.

[0063] It has been determined through impedance measurements that when a probe **13** is applied within the mouth of a subject, the probe/subject combination exhibits a complex impedance of the order of about 150+j200 Ohms. Impedance transformer **14** serves to match this complex impedance with the 50 Ohm impedance of coaxial cable **12** and therefore the output impedance of the AM modulator **34** and output filter **39**. This promotes power transmission, and minimizes reflections.

[0064] The arrangement described above has been optimized for a contact probe with coupling to the mucosa of the mouth. In a further example, a conductive, isolated probe has been used at a frequency around 433 MHz coupling to the outer ear channel. Due to the different probe design in such a frequency band and with this coupling method, the values of matching elements (79 and 81 described in EP 0592 851 B1) would be different or could even be omitted. Applicator or probe **13** may then be regarded as a capacitive coupler or as an antenna matched to the capacitive load.

[0065] As described in EP 0 592 851 B1, with reference to the flow charts of FIGS. 11a-d, microprocessor **21** may operate to analyse the signal appearing on power sense line **56** to determine and control the amount of power applied to the patient, and to assess patient treatment compliance, and possibly to record indicia of the patient treatment compliance on application storage device **52** for later analysis and assessment by a physician or other clinician.

[0066] Exemplary of treatments performed on patients have included brain, bladder, colorectal, kidney, mesothelium, neuroendocrine, liver, lung, breast, ovary, pancreas, prostate and thyroid tumour types. The treatments involved applying an about 27.12 MHz RF signal, amplitude modulated at specifically defined frequencies ranging from about 0.2 to about 23,000 Hz at very high precision and stability. Further Examples of treatment modes (at specific accurately controlled AM frequencies) for specified types of tumours are described in detail below.

[0067] The following are synopses of abstracts for future publications related to uses of electronic devices of the present invention:

A

Example A

A Phase I Study of Therapeutic Amplitude-Modulated Electromagnetic Fields (THERABIONIC) in Advanced Tumors

[0068] Boris Pasche [1], Alexandre Barbault [1], Brad Bottger [2], Fin Bomholt [3], Niels Kuster [4].

[1] Cabinet Médical de l'Avenue de la Gare 6, CH-1003-Lausanne, Switzerland.

[2] Danbury Hospital, Danbury, Conn.-06810.

[3] SPEAG, Zurich, CH-8004-Zurich, Switzerland

[4] IT'IS Foundation, Swiss Federal Institute of Technology, Zurich, Switzerland.

[0069] Background: In vitro studies suggest that low levels of amplitude-modulated electromagnetic fields may modify cell growth. Specific frequencies have been identified specific frequencies that may block cancer cell growth. A portable and programmable device capable of delivering low levels of amplitude-modulated electromagnetic fields has been developed. The device emits a 27.12 MHz radiofrequency signal, amplitude-modulated at cancer-specific frequencies ranging from 0.2 to 23,000 Hz with high precision. The device is connected to a spoon-like coupler, which is placed in the patient's mouth during treatment.

[0070] Methods: A phase I study was conducted consisting of three daily 40 min treatments. From March 2004 to September 2006, 24 patients with advanced solid tumors were enrolled. The median age was 57.0±12.2 years. 16 patients were female. As of January 2007, 5 patients are still on therapy, 13 patients died of tumor progression, 2 patients are lost to follow-up and one patient withdrew consent. The most common tumor types were breast (7), ovary (5) and pancreas (3). 22 patients had received prior systemic therapy and 16 had documented tumor progression prior to study entry.

[0071] Results: The median duration of therapy was 15.7±19.9 weeks (range: 0.4-72.0 weeks). There were no NCI grade 2, 3 or 4 toxicities. Three patients experienced grade 1 fatigue during and immediately after treatment. 12 patients reported severe pain prior to study entry. Two of them reported significant pain relief with the treatment. Objective response could be assessed in 13 patients, 6 of whom also had elevated tumor markers. 6 additional patients could only be assessed by tumor markers. Among patients with progressive disease at study entry, one had a partial response for >14.4 weeks associated with >50% decrease in CEA, CA 125 and CA 15-3 (previously untreated metastatic breast cancer); one patient had stable disease for 34.6 weeks (add info); one patient had a 50% decrease in CA 19-9 for 12.4 weeks (recurrent pancreatic cancer). Among patients with stable disease at enrollment, four patients maintained stable disease for 17.0, >19.4, 30.4 and >63.4 weeks.

[0072] Conclusions: The treatment is a safe and promising novel treatment modality for advanced cancer. A phase II study and molecular studies are ongoing to confirm those results.

Example B

A Phase II Study of Therapeutic Amplitude-Modulated Electromagnetic Fields (THERABIONIC) in the Treatment of Advanced Hepatocellular Carcinoma (HCC)

[0073] Frederico P Costa [1], Andre Cosme de Oliveira [1], Roberto Meirelles Jr [1], Rodrigo Surjan [1], Tatiana Zanesco [1], Maria Cristina Chammas [1], Alexandre Barbault [2], Boris Pasche [2].

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[0074] Background: Phase I data suggest that low levels of electromagnetic fields amplitude-modulated at specific frequencies administered intrabucally with the device of Example A are a safe and potentially effective treatment for advanced cancer. The device emits a 27.12 MHz RF signal, amplitude-modulated with cancer-specific frequencies ranging from 0.2 to 23,000 Hz with high precision. The device is connected to a spoon-like coupler placed in the patient's mouth during treatment. Patients with advanced hepatocellular carcinoma HCC and limited therapeutic options were offered treatment with a combination of HCC-specific frequencies.

[0075] Methods: From October 2005 to October 2006, 38 patients with advanced HCC were recruited in a phase II study. The patients received three daily 40 min treatments until disease progression or death. The median age was 64.0±14.2 years. 32 patients were male and 29 patients had documented progression of disease (POD) prior to study entry.

[0076] Results: As of January 2007, 12 patients are still on therapy, 20 patients died of tumor progression, 2 patients are lost to follow-up and 3 patients withdrew consent. 27 patients are eligible for response. The overall objective response rate as defined by partial response (PR) or stable disease (SD) in patients with documented POD at study entry was 31.6%: 3 PR and 9 SD. The median survival was 20.7 weeks with a median duration of therapy of 17.5 weeks. 13 patients have received therapy for more than six months. The median duration of response is 12.9 weeks. 12 patients reported pain at study entry: 8 of them (66%) experienced decreased pain during treatment. There were no NCI grade 2/3/4 toxicities. One patient developed grade 1 mucositis and grade 1 fatigue.

Patient characteristics (n = 38)		
Cirrhosis	36	
Portal vein thrombosis	9	
Elevated AFP	25	
Extra-hepatic metastases	12	
Previous intrahepatic/systemic therapy	30	
Previous hepatic resection/RFA or ethanol	8	
CLIP	0/1: 12	>2: 22
Okuda	I: 14	II/III: 20
Child-Pugh	A: 15	B: 19
MELD	Median: 10	

[0077] Conclusion: In patients with advanced HCC the treatment is a safe and effective novel therapeutic option, which has antitumor effect and provides pain relief in the majority of patients.

[0078] Thus, it is seen that the electronic device of the present invention, comprising means for the accurate control over the frequencies and stability of amplitude modulations of a high frequency carrier signal, provides a safe and promising novel treatment modality for the treatment of patients suffering from various types of advanced forms of cancer.

[0079] Exemplary of above accurately controlled amplitude modulated frequencies controlling the frequency of amplitude modulations of a high frequency carrier signal are set forth below along with the type of cancer or tumour harboured by a subject to be treated.

Example 1

AM Frequencies Employed for Treatment of Breast Cancer (188 Frequencies so Far Included)

[0080]

78.76 Hz
181.821 Hz
414.817 Hz
440.933 Hz
628.431 Hz
721.313 Hz
813.205 Hz
818.342 Hz
891.901 Hz
929.095 Hz
929.1 Hz
1021 Hz
1372.207 Hz
1372.934 Hz
1588.721 Hz
1670.699 Hz
1821.729 Hz
1836.219 Hz
2193.937 Hz
2221.323 Hz
2278.312 Hz
2357.832 Hz
2381.443 Hz
2417.323 Hz
2431.334 Hz
2450.332 Hz
2551.313 Hz
2556.221 Hz
2598.853 Hz
2621.322 Hz
2740.191 Hz
2851.347 Hz
2885.322 Hz
2919.273 Hz
3074.333 Hz
3115.188 Hz
3249.529 Hz
3405.182 Hz
3432.274 Hz
3434.693 Hz
3594.231 Hz
3647.619 Hz
3742.957 Hz
3753.382 Hz
3830.732 Hz
3855.823 Hz
3916.321 Hz
3935.218 Hz
3975.383 Hz

-continued

3993.437 Hz
4153.192 Hz
4194.968 Hz
4241.321 Hz
4243.393 Hz
4253.432 Hz
4314.444 Hz
4318.222 Hz
4375.962 Hz
4393.419 Hz
4417.243 Hz
4481.463 Hz
4482.223 Hz
4495.138 Hz
4549.808 Hz
4558.306 Hz
4779.451 Hz
4838.674 Hz
4871.513 Hz
4895.296 Hz
4962.213 Hz
4969.224 Hz
4979.321 Hz
5027.231 Hz
5059.792 Hz
5118.094 Hz
5176.287 Hz
5365.222 Hz
5376.392 Hz
5426.323 Hz
5431.542 Hz
5521.621 Hz
5739.422 Hz
5745.218 Hz
5821.975 Hz
6037.432 Hz
6044.333 Hz
6086.256 Hz
6208.932 Hz
6212.808 Hz
6231.031 Hz
6280.321 Hz
6329.391 Hz
6476.896 Hz
6497.319 Hz
6504.983 Hz
6651.276 Hz
6757.901 Hz
6758.321 Hz
6855.286 Hz
6858.121 Hz
6898.489 Hz
7092.219 Hz
7120.218 Hz
7127.311 Hz
7156.489 Hz
7208.821 Hz
7282.169 Hz
7376.329 Hz
7488.742 Hz
7541.319 Hz
7577.421 Hz
7621.085 Hz
7627.207 Hz
7650.939 Hz
7691.212 Hz
7842.184 Hz
7849.231 Hz
7915.423 Hz
7932.482 Hz
7949.196 Hz
7967.311 Hz
8021.229 Hz
8070.181 Hz
8114.032 Hz
8149.922 Hz

-continued

8194.19 Hz
8245.801 Hz
8328.322 Hz
8330.534 Hz
8355.987 Hz
8408.121 Hz
8431.184 Hz
8452.119 Hz
8548.324 Hz
8749.383 Hz
8782.421 Hz
8784.424 Hz
8923.1 Hz
8923.361 Hz
8935.752 Hz
8936.1 Hz
9012.282 Hz
9012.896 Hz
9060.323 Hz
9072.409 Hz
9131.419 Hz
9199.232 Hz
9245.927 Hz
9270.322 Hz
9279.193 Hz
9393.946 Hz
10227.242 Hz
10340.509 Hz
10363.313 Hz
10449.323 Hz
10456.383 Hz
10468.231 Hz
10470.456 Hz
10472.291 Hz
10689.339 Hz
10832.222 Hz
11525.121 Hz
11541.915 Hz
11812.328 Hz
11812.419 Hz
11840.323 Hz
11925.089 Hz
12123.281 Hz
12267.281 Hz
12294.283 Hz
12611.288 Hz
12629.222 Hz
12633.372 Hz
12648.221 Hz
13315.335 Hz
13331.358 Hz
13735.241 Hz
13826.325 Hz
13853.232 Hz
13990.123 Hz
14122.942 Hz
14162.332 Hz
14519.232 Hz
14543.128 Hz
15651.323 Hz
17352.085 Hz
18785.463 Hz
30182.932 Hz

Example 2

AM Frequencies Employed for Treatment of Liver Cancer (162 Frequencies so Far Included)

[0081]

423.321 Hz
427.062 Hz
470.181 Hz
560.32 Hz
642.932 Hz
668.209 Hz
677.972 Hz
811.924 Hz
842.311 Hz
843.22 Hz
1250.504 Hz
1755.402 Hz
1873.477 Hz
1924.702 Hz
1975.196 Hz
2017.962 Hz
2083.419 Hz
2190.731 Hz
2221.323 Hz
2324.393 Hz
2353.478 Hz
2362.309 Hz
2419.309 Hz
2425.222 Hz
2430.219 Hz
2431.094 Hz
2471.328 Hz
2478.331 Hz
2743.995 Hz
2744.211 Hz
2831.951 Hz
2843.283 Hz
2859.891 Hz
2873.542 Hz
2886.232 Hz
3042.012 Hz
3078.983 Hz
3086.443 Hz
3127.232 Hz
3160.942 Hz
3206.315 Hz
3267.433 Hz
3269.321 Hz
3457.291 Hz
3505.229 Hz
3516.296 Hz
3531.296 Hz
3546.323 Hz
3572.106 Hz
3576.189 Hz
3669.513 Hz
3923.221 Hz
4013.932 Hz
4071.121 Hz
4079.951 Hz
4222.821 Hz
4238.402 Hz
4256.321 Hz
4289.296 Hz
4312.947 Hz
4435.219 Hz
4471.188 Hz
4483.889 Hz
4486.384 Hz
4629.941 Hz
4732.211 Hz
4876.218 Hz
5086.281 Hz
5124.084 Hz

-continued

5133.121 Hz
5247.142 Hz
5270.834 Hz
5340.497 Hz
5520.218 Hz
5882.292 Hz
5926.512 Hz
6037.311 Hz
6180.334 Hz
6329.195 Hz
6350.333 Hz
6361.321 Hz
6364.928 Hz
6383.321 Hz
6461.175 Hz
6733.331 Hz
6758.232 Hz
6779.482 Hz
6856.222 Hz
6877.183 Hz
6980.525 Hz
7019.235 Hz
7043.209 Hz
7130.323 Hz
7144.142 Hz
7210.223 Hz
7291.21 Hz
7510.92 Hz
7529.233 Hz
7549.212 Hz
7650.028 Hz
7680.518 Hz
7692.522 Hz
7829.231 Hz
7862.209 Hz
7947.392 Hz
7979.308 Hz
8028.339 Hz
8055.942 Hz
8072.134 Hz
8141.174 Hz
8336.383 Hz
8432.181 Hz
8452.119 Hz
8460.944 Hz
8475.221 Hz
8492.193 Hz
8542.311 Hz
8818.104 Hz
8852.329 Hz
8853.444 Hz
8858.179 Hz
8939.212 Hz
9332.397 Hz
9381.221 Hz
9740.219 Hz
9768.331 Hz
9797.294 Hz
10317.499 Hz
10443.311 Hz
10456.383 Hz
10579.425 Hz
10863.209 Hz
10866.382 Hz
11067.418 Hz
11149.935 Hz
11163.895 Hz
11802.821 Hz
11953.424 Hz
12223.329 Hz
12265.295 Hz
12267.233 Hz
12623.191 Hz
12685.231 Hz
12721.423 Hz
12785.342 Hz

-continued

14085.222 Hz
14333.209 Hz
14537.331 Hz
14542.432 Hz
14655.03 Hz
14828.234 Hz
15149.213 Hz
15237.489 Hz
16110.932 Hz
16144.343 Hz
18265.238 Hz
18283.323 Hz
18863.292 Hz
18930.995 Hz
19970.311 Hz
20330.294 Hz
20365.284 Hz

Example 3

AM Frequencies Employed for Treatment of Ovarian Cancer (273 Frequencies so Far Included)

[0082]

78.76 Hz
181.821 Hz
410.245 Hz
414.817 Hz
436.332 Hz
447.942 Hz
481.191 Hz
489.292 Hz
559.292 Hz
608.321 Hz
655.435 Hz
657.397 Hz
657.483 Hz
664.211 Hz
708.8 Hz
708.822 Hz
734.921 Hz
749.221 Hz
764.232 Hz
778.295 Hz
779.403 Hz
806.021 Hz
806.389 Hz
809.313 Hz
824.327 Hz
825.145 Hz
835.129 Hz
839.521 Hz
841.208 Hz
843.312 Hz
956.984 Hz
958.929 Hz
985.313 Hz
1024.208 Hz
1102.635 Hz
1121.329 Hz
1159.738 Hz
1372.207 Hz
1396.498 Hz
1502.181 Hz
1518.208 Hz
1552.123 Hz
1579.212 Hz
1624.802 Hz
1670.699 Hz
1696.403 Hz

-continued

1762.938 Hz
1771.402 Hz
1775.313 Hz
1821.729 Hz
2016.323 Hz
2034.231 Hz
2050.282 Hz
2053.396 Hz
2082.234 Hz
2089.092 Hz
2221.323 Hz
2228.832 Hz
2253.704 Hz
2254.329 Hz
2278.312 Hz
2332.949 Hz
2348.233 Hz
2381.443 Hz
2413.193 Hz
2425.222 Hz
2433.321 Hz
2439.253 Hz
2465.23 Hz
2477.919 Hz
2669.177 Hz
2715.232 Hz
2733.843 Hz
2802.339 Hz
2812.321 Hz
2831.386 Hz
2835.332 Hz
2851.347 Hz
2877.192 Hz
2885.322 Hz
2887.385 Hz
2894.972 Hz
2973.771 Hz
3080.592 Hz
3157.483 Hz
3161.465 Hz
3223.232 Hz
3238.148 Hz
3249.529 Hz
3262.145 Hz
3314.321 Hz
3361.671 Hz
3366.311 Hz
3523.215 Hz
3527.233 Hz
3542.213 Hz
3590.376 Hz
3629.232 Hz
3632.793 Hz
3636.289 Hz
3637.085 Hz
3669.513 Hz
3770.189 Hz
3858.916 Hz
3919.232 Hz
3957.185 Hz
3975.228 Hz
4061.131 Hz
4072.322 Hz
4169.451 Hz
4174.259 Hz
4241.321 Hz
4243.393 Hz
4261.228 Hz
4279.113 Hz
4309.335 Hz
4314.188 Hz
4318.222 Hz
4328.928 Hz
4380.321 Hz
4394.134 Hz
4412.252 Hz

-continued

4424.236 Hz
4439.341 Hz
4442.161 Hz
4447.221 Hz
4458.339 Hz
4556.322 Hz
4566.009 Hz
4682.643 Hz
4718.331 Hz
4749.302 Hz
4765.331 Hz
4917.202 Hz
5011.325 Hz
5149.331 Hz
5228.172 Hz
5237.132 Hz
5313.353 Hz
5745.218 Hz
5757.897 Hz
5762.386 Hz
5812.322 Hz
5869.321 Hz
5882.292 Hz
5921.249 Hz
5991.932 Hz
6069.458 Hz
6071.319 Hz
6083.214 Hz
6161.782 Hz
6169.341 Hz
6275.232 Hz
6294.929 Hz
6350.333 Hz
6406.891 Hz
6407.207 Hz
6450.787 Hz
6477.098 Hz
6477.929 Hz
6478.338 Hz
6543.421 Hz
6552.24 Hz
6663.955 Hz
6753.338 Hz
6851.323 Hz
6855.286 Hz
6875.232 Hz
6882.949 Hz
7206.403 Hz
7232.214 Hz
7257.489 Hz
7276.209 Hz
7281.219 Hz
7285.693 Hz
7429.212 Hz
7460.932 Hz
7480.228 Hz
7495.763 Hz
7539.432 Hz
7564.185 Hz
7650.028 Hz
7689.728 Hz
7780.294 Hz
8021.921 Hz
8038.961 Hz
8040.322 Hz
8044.233 Hz
8095.313 Hz
8143.491 Hz
8164.332 Hz
8261.121 Hz
8302.285 Hz
8309.752 Hz
8372.532 Hz
8408.121 Hz
8424.229 Hz
8428.313 Hz

-continued

8435.451 Hz
8486.421 Hz
8492.797 Hz
8548.324 Hz
8554.361 Hz
8562.965 Hz
8579.323 Hz
8579.333 Hz
8642.181 Hz
8655.818 Hz
8758.341 Hz
8779.323 Hz
8792.231 Hz
8819.127 Hz
8831.132 Hz
9028.031 Hz
9173.264 Hz
9184.338 Hz
9186.919 Hz
9393.946 Hz
9482.409 Hz
9737.211 Hz
9746.232 Hz
9922.231 Hz
10032.684 Hz
10446.028 Hz
10478.221 Hz
10545.313 Hz
10639.345 Hz
10743.118 Hz
10813.981 Hz
10832.421 Hz
10838.243 Hz
10862.429 Hz
10865.127 Hz
10917.229 Hz
10977.188 Hz
11120.209 Hz
11177.289 Hz
11177.409 Hz
11321.491 Hz
11359.093 Hz
11673.031 Hz
11793.886 Hz
11895.229 Hz
12074.531 Hz
12216.212 Hz
12253.329 Hz
12260.933 Hz
12262.853 Hz
12292.222 Hz
12357.353 Hz
12527.032 Hz
12755.333 Hz
12947.311 Hz
13717.221 Hz
13825.295 Hz
13829.195 Hz
14410.949 Hz
14436.201 Hz
14537.218 Hz
14947.184 Hz
15429.139 Hz
15443.309 Hz
15450.183 Hz
16144.343 Hz
17932.432 Hz
17951.395 Hz
17970.122 Hz
18337.222 Hz
18378.321 Hz
18921.415 Hz
18926.951 Hz
18931.327 Hz
114508.332 Hz

Example 4

AM Frequencies Employed for Treatment of Prostate Cancer (183 Frequencies so Far Included)

[0083]

331.3 Hz
331.358 Hz
403.218 Hz
461.233 Hz
522.2 Hz
522.213 Hz
618.4 Hz
618.407 Hz
618.8 Hz
656.295 Hz
657.394 Hz
657.397 Hz
657.4 Hz
657.483 Hz
659.033 Hz
694.4 Hz
694.689 Hz
694.7 Hz
741.4 Hz
741.421 Hz
749.221 Hz
752.9 Hz
752.933 Hz
776.194 Hz
785.219 Hz
786.332 Hz
793.331 Hz
809.205 Hz
819.322 Hz
844.8 Hz
844.822 Hz
847.332 Hz
1083.309 Hz
1102.635 Hz
1102.71 Hz
1240.336 Hz
1372.934 Hz
1444.288 Hz
1486.322 Hz
1563.332 Hz
1591.322 Hz
1670.699 Hz
1697.321 Hz
1743.521 Hz
2031.448 Hz
2050.282 Hz
2076.519 Hz
2156.332 Hz
2229.515 Hz
2243.121 Hz
2381.443 Hz
2440.489 Hz
2475.912 Hz
2477.919 Hz
2628.324 Hz
2669.328 Hz
2824.832 Hz
2887.829 Hz
2891.331 Hz
3081.523 Hz
3249.529 Hz
3250.125 Hz
3251.815 Hz
3264.827 Hz
3278.329 Hz
3281.432 Hz
3348.783 Hz
3519.118 Hz
3539.962 Hz
3551.318 Hz
3556.439 Hz
3572.321 Hz
3670.129 Hz
3681.341 Hz
3686.021 Hz
3753.382 Hz
3774.923 Hz
3867.692 Hz
3909.333 Hz
3916.321 Hz
4031.233 Hz
4031.933 Hz
4038.203 Hz
4081.743 Hz
4084.319 Hz
4139.322 Hz
4153.192 Hz
4223.795 Hz
4231.221 Hz
4241.321 Hz
4320.513 Hz
4329.152 Hz
4380.321 Hz
4417.312 Hz
4489.452 Hz
4549.808 Hz
4558.306 Hz
4638.293 Hz
4740.322 Hz
4854.318 Hz
4882.322 Hz
4978.822 Hz
5237.152 Hz
5264.222 Hz
5289.195 Hz
5426.323 Hz
5431.542 Hz
5455.593 Hz
6345.332 Hz
6347.433 Hz
6363.284 Hz
6418.331 Hz
6496.231 Hz
6538.295 Hz
6577.421 Hz
6590.328 Hz
6651.276 Hz
6706.431 Hz
6743.322 Hz
6783.282 Hz
6850.197 Hz
6855.286 Hz
6864.896 Hz
6871.943 Hz
6973.393 Hz
7120.932 Hz
7146.509 Hz
7192.505 Hz
7251.309 Hz
7251.322 Hz
7278.124 Hz
7279.335 Hz
7299.119 Hz
7527.229 Hz
7589.925 Hz
7699.193 Hz
7842.184 Hz
8023.32 Hz
8096.939 Hz
8245.801 Hz
8315.291 Hz
8357.305 Hz
8408.121 Hz
8432.209 Hz
8535.238 Hz

-continued

8552.431 Hz
8585.224 Hz
8935.752 Hz
9015.253 Hz
9018.233 Hz
9068.231 Hz
9137.232 Hz
9156.321 Hz
9351.931 Hz
9393.946 Hz
9694.179 Hz
9984.405 Hz
10226.223 Hz
10390.232 Hz
10514.768 Hz
10689.339 Hz
10772.419 Hz
10818.452 Hz
11165.239 Hz
11985.353 Hz
12209.329 Hz
12308.321 Hz
12583.339 Hz
13820.329 Hz
14013.123 Hz
14171.434 Hz
14681.329 Hz
14759.131 Hz
14986.794 Hz
15930.249 Hz
16026.623 Hz
17880.954 Hz
18247.532 Hz
18282.211 Hz
18629.328 Hz
19469.318 Hz
19766.218 Hz
60317.352 Hz

Example 5

AM Frequencies Employed for Treatment of Kidney Cancer (36 Frequencies so Far Included)

[0084]

628.321 Hz
631.141 Hz
643.312 Hz
812.512 Hz
826.321 Hz
1372.934 Hz
2082.241 Hz
2156.931 Hz
2254.329 Hz
3555.209 Hz
3928.343 Hz
4420.932 Hz
4819.228 Hz
4828.321 Hz
5314.322 Hz
6007.332 Hz
7054.279 Hz
7074.429 Hz
7254.343 Hz
8041.289 Hz
8727.224 Hz
8760.983 Hz
8831.132 Hz
8870.228 Hz
10565.321 Hz

-continued

10586.229 Hz
10634.293 Hz
10687.949 Hz
11421.933 Hz
11523.212 Hz
11561.221 Hz
11846.212 Hz
12631.331 Hz
12693.272 Hz
14411.321 Hz
20178.941 Hz

Example 6

AM Frequencies Employed for Treatment of Thyroid Cancer (110 Frequencies so Far Included)

[0085]

493.442 Hz
517.202 Hz
618.927 Hz
621.321 Hz
648.252 Hz
663.407 Hz
821.202 Hz
874.341 Hz
914.429 Hz
941.311 Hz
983.429 Hz
1587.811 Hz
1723.389 Hz
2179.231 Hz
2315.888 Hz
2341.312 Hz
2445.123 Hz
2454.232 Hz
2723.302 Hz
2740.384 Hz
2749.323 Hz
2856.253 Hz
2859.495 Hz
2886.232 Hz
3021.122 Hz
3078.275 Hz
3080.592 Hz
3198.323 Hz
3248.321 Hz
3271.329 Hz
3284.192 Hz
3335.332 Hz
3434.911 Hz
3440.212 Hz
3475.216 Hz
3509.522 Hz
3533.328 Hz
3637.085 Hz
3682.489 Hz
4154.301 Hz
4243.393 Hz
4261.228 Hz
4330.289 Hz
4340.833 Hz
4358.333 Hz
4366.294 Hz
4426.387 Hz
4458.339 Hz
4479.113 Hz
4744.424 Hz
4865.421 Hz
5323.192 Hz

-continued

5324.123 Hz
5548.879 Hz
5711.283 Hz
5754.332 Hz
6455.131 Hz
6620.132 Hz
6666.839 Hz
6714.189 Hz
6745.333 Hz
6766.281 Hz
6884.432 Hz
7036.122 Hz
7230.838 Hz
7323.209 Hz
7355.378 Hz
7432.143 Hz
7534.221 Hz
7623.184 Hz
7725.339 Hz
7920.879 Hz
8013.953 Hz
8019.912 Hz
8040.231 Hz
8078.955 Hz
8082.173 Hz
8147.1 Hz
8281.259 Hz
8309.752 Hz
8311.371 Hz
8435.094 Hz
8525.789 Hz
8744.527 Hz
9009.329 Hz
9070.809 Hz
10020.521 Hz
10039.109 Hz
10127.279 Hz
10134.161 Hz
10257.324 Hz
10498.339 Hz
11537.292 Hz
11559.292 Hz
11913.222 Hz
11927.934 Hz
11955.949 Hz
12120.049 Hz
12139.222 Hz
13636.082 Hz
13654.272 Hz
13677.211 Hz
14014.941 Hz
14445.214 Hz
16023.119 Hz
16048.391 Hz
17323.196 Hz
17577.221 Hz
17881.709 Hz
17911.323 Hz

Example 7

AM Frequencies Employed for Treatment of Bladder Cancer (28 Frequencies so Far Included)

[0086]

623.243 Hz
757.084 Hz
870.4 Hz
2454.423 Hz
2480.191 Hz

-continued

2581.101 Hz
2715.232 Hz
3042.012 Hz
3196.194 Hz
3265.323 Hz
3438.109 Hz
3692.319 Hz
3952.308 Hz
5230.227 Hz
6022.942 Hz
6061.711 Hz
6710.899 Hz
6721.912 Hz
7181.784 Hz
7458.209 Hz
8235.21 Hz
8749.232 Hz
9354.812 Hz
12532.729 Hz
13467.209 Hz
13777.9 Hz
14015.241 Hz
18524.419 Hz

Example 8

AM Frequencies Employed For Treatment of Colon Cancer (100 Frequencies so Far Included)

[0087]

78.76 Hz
796.562 Hz
841.541 Hz
842.783 Hz
914.429 Hz
1162.117 Hz
1372.207 Hz
1372.934 Hz
1718.532 Hz
2243.169 Hz
2278.312 Hz
2286.5 Hz
2286.519 Hz
2334.178 Hz
2423.292 Hz
2454.423 Hz
2464.229 Hz
2598.853 Hz
2623.048 Hz
3131.123 Hz
3161.465 Hz
3175.313 Hz
3249.529 Hz
3363.229 Hz
3373.892 Hz
3390.925 Hz
3409.179 Hz
3432.274 Hz
3509.522 Hz
3531.422 Hz
3533.328 Hz
3766.296 Hz
4040.839 Hz
4081.022 Hz
4123.953 Hz
4146.274 Hz
4233.822 Hz
4282.332 Hz
4318.222 Hz
4344.082 Hz

-continued

4416.221 Hz
4481.242 Hz
4724.263 Hz
4751.319 Hz
4755.323 Hz
4788.485 Hz
5149.331 Hz
5217.402 Hz
5386.212 Hz
5407.192 Hz
5426.323 Hz
5496.434 Hz
5555.212 Hz
5572.032 Hz
5634.933 Hz
5724.231 Hz
5758.378 Hz
5787.342 Hz
5948.897 Hz
5967.448 Hz
5976.825 Hz
6182.322 Hz
6292.379 Hz
6324.493 Hz
6341.248 Hz
6471.322 Hz
6477.218 Hz
6558.342 Hz
6855.286 Hz
7129.843 Hz
7140.187 Hz
7162.422 Hz
7368.222 Hz
7645.859 Hz
7829.234 Hz
7866.229 Hz
7877.334 Hz
8013.314 Hz
8374.942 Hz
8384.228 Hz
8408.121 Hz
8534.111 Hz
8568.033 Hz
8573.122 Hz
9226.222 Hz
9351.9 Hz
9737.211 Hz
9744.193 Hz
9942.321 Hz
10301.371 Hz
10401.515 Hz
10872.693 Hz
11220.222 Hz
11283.378 Hz
12256.432 Hz
13749.858 Hz
15231.548 Hz
15248.324 Hz
58191.928 Hz
60317.352 Hz

Example 9

AM Frequencies Employed for Treatment of Pancreas Cancer (166 Frequencies so Far Included)

[0088]

331.3 Hz
331.365 Hz
436.3 Hz
436.332 Hz
447.942 Hz
476.127 Hz
559.292 Hz
589.187 Hz
624.218 Hz
727 Hz
734.921 Hz
809.313 Hz
845.309 Hz
870.4 Hz
963.221 Hz
1156.79 Hz
1157 Hz
1179 Hz
1360.133 Hz
1372.207 Hz
1372.934 Hz
1804.126 Hz
1816.221 Hz
1873.477 Hz
1967.211 Hz
1990.482 Hz
2278.312 Hz
2315.921 Hz
2320.315 Hz
2334.178 Hz
2381.443 Hz
2469 Hz
2477.919 Hz
2542.221 Hz
2598.853 Hz
2647.938 Hz
2685.081 Hz
2716.095 Hz
2721.331 Hz
2732.231 Hz
2809.849 Hz
2823.428 Hz
2835.332 Hz
3134.313 Hz
3241.461 Hz
3255.219 Hz
3263.432 Hz
3286.255 Hz
3330.935 Hz
3373.892 Hz
3438.109 Hz
3449.219 Hz
3535.219 Hz
3549.215 Hz
3564.419 Hz
3619.412 Hz
3622.312 Hz
3638.432 Hz
3696.424 Hz
3943.214 Hz
3976.929 Hz
4014.889 Hz
4041.219 Hz
4044.195 Hz
4056.384 Hz
4085.971 Hz
4144.592 Hz
4153.192 Hz
4161.889 Hz
4243.393 Hz
4332.498 Hz
4341.423 Hz
4355.327 Hz
4417.885 Hz
4422.322 Hz
4451.297 Hz
4486.384 Hz
4558.306 Hz
4580 Hz

-continued

4685.082 Hz
4839.589 Hz
5151.402 Hz
5209.911 Hz
5262.282 Hz
5271.312 Hz
5387.73 Hz
5494.928 Hz
5521.221 Hz
5573.209 Hz
5609.382 Hz
5929.616 Hz
5948.897 Hz
5966.112 Hz
5976.825 Hz
6064.197 Hz
6086.256 Hz
6157.253 Hz
6215.298 Hz
6333.917 Hz
6365.242 Hz
6558.342 Hz
6568.278 Hz
6823.194 Hz
6853.391 Hz
6855.286 Hz
7213.204 Hz
7228.528 Hz
7238.232 Hz
7277.921 Hz
7280.422 Hz
7320.494 Hz
7366.412 Hz
7534.221 Hz
7548.713 Hz
7567.127 Hz
7620.851 Hz
7663.209 Hz
7725.203 Hz
7852.233 Hz
7920.879 Hz
7985.122 Hz
8008.323 Hz
8013.312 Hz
8045.484 Hz
8242.332 Hz
8351.622 Hz
8408.121 Hz
8455.894 Hz
8551.231 Hz
8743.321 Hz
8789.631 Hz
8868.809 Hz
9012.241 Hz
9028.994 Hz
9131.232 Hz
9658.296 Hz
9663.495 Hz
9680.737 Hz
9824.442 Hz
9942.321 Hz
10279.122 Hz
10388.49 Hz
10438.495 Hz
10518.311 Hz
10528.239 Hz
10582.095 Hz
10926.111 Hz
10948.411 Hz
10955.558 Hz
11538.193 Hz
11904.741 Hz
12255.229 Hz
12613.341 Hz
12819.942 Hz
13674.482 Hz

-continued

13731.322 Hz
14525.312 Hz
14537.218 Hz
14549.331 Hz
14845.453 Hz
14944.989 Hz
15246.315 Hz
18668.239 Hz
19321.231 Hz
19347.208 Hz
30182.932 Hz

Example 10

AM Frequencies Employed for Treatment of Lung Cancer (80 Frequencies so Far Included)

[0089]

304.148 Hz
694.7 Hz
694.727 Hz
708.8 Hz
708.841 Hz
1587.811 Hz
1759.318 Hz
1873.477 Hz
2253.704 Hz
2391.312 Hz
2454.232 Hz
2729.929 Hz
2741.261 Hz
2761.312 Hz
2784.491 Hz
2812.443 Hz
2855.218 Hz
2859.495 Hz
3128.822 Hz
3139.297 Hz
3193.212 Hz
3348.783 Hz
3360.971 Hz
3366.311 Hz
3373.892 Hz
3440.212 Hz
3461.322 Hz
3682.489 Hz
3727.231 Hz
3749.882 Hz
3769.942 Hz
4131.235 Hz
4158.393 Hz
4243.393 Hz
4347.733 Hz
4373.411 Hz
4378.321 Hz
4416.221 Hz
4481.242 Hz
4777.521 Hz
4798.422 Hz
4837.241 Hz
4959.842 Hz
5013.321 Hz
5047.523 Hz
5068.322 Hz
5371.922 Hz
5538.432 Hz
5548.879 Hz
5679.309 Hz
5734.143 Hz
5787.342 Hz

-continued

6445.309 Hz
6838.434 Hz
6870.955 Hz
6879.216 Hz
7079.411 Hz
7216.288 Hz
7376.089 Hz
7761.289 Hz
8082.173 Hz
8281.259 Hz
8352.189 Hz
8442.473 Hz
8773.916 Hz
8935.752 Hz
9121.223 Hz
9181.434 Hz
9317.913 Hz
9363.896 Hz
9736.919 Hz
9753.321 Hz
10424.908 Hz
10452.913 Hz
10824.609 Hz
11656.329 Hz
12748.919 Hz
15774.291 Hz
15798.333 Hz
16510.321 Hz

Example 11

AM Frequencies Employed for Treatment of Leiomyosarcoma (36 Frequencies so Far Included)

[0090]

836.923 Hz
843.181 Hz
1411.241 Hz
2073.721 Hz
2381.443 Hz
2711.019 Hz
2911.329 Hz
3232.185 Hz
3518.321 Hz
3544.209 Hz
3569.219 Hz
4233.822 Hz
4241.321 Hz
4266.591 Hz
4337.322 Hz
4424.112 Hz
4436.111 Hz
4485.22 Hz
5545.521 Hz
5577.841 Hz
5631.422 Hz
5696.184 Hz
6472.098 Hz
6558.342 Hz
6651.276 Hz
7168.892 Hz
7406.309 Hz
7452.528 Hz
7649.209 Hz
7808.352 Hz
9040.313 Hz
9074.294 Hz
9189.092 Hz
9484.512 Hz

-continued

9943.972 Hz
12086.394 Hz

Example 12

AM Frequencies Employed for Treatment of Mesothelioma (16 Frequencies so Far Included)

[0091]

958.929 Hz
1713.913 Hz
1736.782 Hz
2334.178 Hz
2607.193 Hz
3112.974 Hz
3319.945 Hz
3449.219 Hz
3622.312 Hz
5151.402 Hz
5887.022 Hz
5965.922 Hz
6516.793 Hz
7224.197 Hz
9471.152 Hz
14617.393 Hz

Example 13

AM Frequencies Employed for Treatment of Neuro-Endocrine (30 Frequencies so Far Included)

[0092]

1766.335 Hz
2408.225 Hz
2441.502 Hz
2647.938 Hz
2741.261 Hz
3020.212 Hz
3128.822 Hz
3238.742 Hz
3296.431 Hz
3348.783 Hz
3360.971 Hz
3440.212 Hz
3533.328 Hz
3666.283 Hz
4079.282 Hz
4243.393 Hz
4426.387 Hz
5245.818 Hz
5536.242 Hz
5548.879 Hz
5739.422 Hz
5849.241 Hz
6291.631 Hz
6406.891 Hz
6780.679 Hz
7151.264 Hz
7482.245 Hz
7575.393 Hz
8359.932 Hz
9073.418 Hz

Example 14

AM Frequencies Employed for Treatment of Leukemia and Chronic Lymphoid Cancer (17 Frequencies so Far Included)

[0093]

814.413 Hz
825.145 Hz
2415.243 Hz
2436.316 Hz
2874.432 Hz
2891.029 Hz
3361.671 Hz
5245.452 Hz
5557.333 Hz
6850.197 Hz
6919.322 Hz
7587.224 Hz
7629.318 Hz
8172.405 Hz
8272.338 Hz
8438.453 Hz
12950.331 Hz

Example 15

AM Frequencies Employed for Treatment of Myeloma, Multiple Cancer (20 Frequencies so Far Included)

[0094]

765.196 Hz
2336.238 Hz
2372.122 Hz
2381.443 Hz
2425.394 Hz
2656.339 Hz
2741.261 Hz
2883.618 Hz
2919.273 Hz
3265.323 Hz
3564.455 Hz
3580.25 Hz
3584.291 Hz
3674.292 Hz
5249.331 Hz
7967.311 Hz
7973.125 Hz
8049.952 Hz
8283.329 Hz
10351.323 Hz

Example 16

AM Frequencies Employed for Treatment of Hodgkin Disease (Lymphoma) (19 Frequencies so Far Included)

[0095]

752.5 Hz
976.3 Hz
1558.223 Hz
2310.912 Hz
2477.919 Hz
2560.843 Hz
3348.783 Hz
3371.216 Hz
3605.432 Hz
3623.198 Hz
3838.281 Hz
3838.48 Hz
5102 Hz
5696.932 Hz
5724.231 Hz
6358.194 Hz
7472.211 Hz
8062.121 Hz
8222.222 Hz

Example 17

AM Frequencies Employed for Treatment of Brain Cancer (57 Frequencies so Far Included)

[0096]

1372.934 Hz
2318.182 Hz
2381.443 Hz
2425.394 Hz
2442.423 Hz
2478.973 Hz
2654.513 Hz
2661.324 Hz
2686.105 Hz
2690.179 Hz
3249.332 Hz
3277.509 Hz
3335.279 Hz
3348.783 Hz
3436.211 Hz
3916.321 Hz
4031.933 Hz
4086.091 Hz
4241.321 Hz
4318.222 Hz
4334.33 Hz
4358.333 Hz
4393.419 Hz
4454.194 Hz
4515.789 Hz
4619.324 Hz
4723.937 Hz
4853.286 Hz
5289.231 Hz
5378.099 Hz
5426.323 Hz
5640.981 Hz
6316.211 Hz
6459.203 Hz
6474.332 Hz
6626.572 Hz
6855.286 Hz
6915.886 Hz
6943.386 Hz
7151.264 Hz
7182.922 Hz
7194.897 Hz
7323.209 Hz
7390.343 Hz
7796.221 Hz
7961.122 Hz
8128.942 Hz

-continued

8245.109 Hz
8272.281 Hz
8358.154 Hz
8408.121 Hz
9138.82 Hz
10719.318 Hz
11556.241 Hz
12828.633 Hz
14515.962 Hz
14586.765 Hz

[0097] The above Examples reflect AM frequencies determined by a bio-feedback procedure involving very substantial observations and measurements of physiological responses (at certain well defined AM frequencies) by subjects exposed to low energy electromagnetic emission excitation. In general, it is recommended that all of the listed frequencies be applied in the treatment of subjects suffering from the indicated form of cancer. However, a limited number of the listed frequencies also lead to beneficial effects.

[0098] Of note in respect of the above listed frequencies, in particular those Examples including a large number of frequencies, it has earlier on been determined that beneficial therapeutic effects are achieved by application of some but not all of the frequencies listed. However, following on more extended trials, it has been determined that application to subjects of further frequencies enhance the efficacy of treatment and yields therapeutic effects in patients whose tumours have become resistant to therapy. It is accordingly preferred that all of the determined listed frequencies be applied to the subject. The mechanism of including additional frequencies is attributed to either or both of inter-active synergism between applied frequencies or between cells which have been influenced by the treatment and additive effects of the additional frequencies.

[0099] Of further note is the fact that different patients suffering from the same type of tumour cell growth practically invariably exhibit the above-mentioned physiological responses at the same well defined AM frequencies. Furthermore, AM frequencies which differ only very slightly (less than 0.0001% at higher frequencies) from the frequencies listed, in general elicit no physiological response by subjects exposed to excitation at such very slightly different frequency. In view of these determinations, the electronic system of the present invention may be adapted to screen a subject for physiological responses over a broad range of frequencies to determine the presence or absence tumour cells and, if positive, then to note at which defined frequencies physiological responses are elicited. These frequencies will in general match with the defined frequencies listed in one or other of the Examples above or such further examples as may be developed and hence the nature of the tumour will be known. The electronic system of the invention is therefore a valuable diagnostic tool for diagnosing the presence or absence and identities of types of tumour cell growths or cancers. Furthermore, the electronic system of the invention is of value for predicting whether a patient will benefit from the application of a given series of modulation frequencies. The system therefore possesses a capability of predicting responses to treatment, thereby enhancing the possibility to select optimal modes of treatment.

[0100] The sequence of well defined frequencies are preferably applied sequentially for determined periods of time, e.g. 3 seconds for each frequency, but several frequencies may also be applied simultaneously. This means that a cycle of application involving 180 frequencies would take nearly 10 minutes time. Advantageous effects may however also arise from applying individual well defined frequencies for differing time periods, e.g. some for 3 seconds, some for 6 seconds, etc. . . . .

[0101] Therapeutic dosages to be applied to a subject suffering from the presence of tumour cell growth or cancer are determined by the time of application of the low energy electromagnetic emissions to the subject and will depend on the nature of the cancer and the overall condition of the subject. In general, however, greatest experience has been gained in treating terminally ill subjects expected to survive no longer than about three months and who have agreed to discontinue alternative forms of cancer treatments such as chemo-therapy or radioactive treatment. In these severe cases, lengthy times of treatment are recommended, e.g. 3 times 1 hour daily treatment. However, with the development of alternative forms of application, i.e. other than by means of a mouth probe, continuous application is possible and is likely to enhance compliance and the efficacy of the treatment.

[0102] While the invention has been described with specific embodiments, other alternatives, modifications, and variations will be apparent to those skilled in the art. Accordingly, it will be intended to include all such alternatives, modifications, and variations within the spirit and scope of the appended claims.

1-18. (canceled)

19. An electronic system activatable by electrical power and structured to influence cellular functions or malfunctions in a warm-blooded mammalian subject, said electronic system comprising at least one controllable low energy electromagnetic energy generator circuit for generating one or more high frequency carrier signals, at least one data processor constructed and arranged for communication with the at least one generator circuit and for receiving control information from a source of control information, said at least one generator circuit including at least one amplitude modulation control signal generator for controlling amplitude modulated variations of the one or more high frequency carrier signals, said at least one generator circuit furthermore including at least one programmable amplitude modulation frequency control signal generator for controlling a frequency at which amplitude modulations are generated, the system furthermore comprising a connection position for connection to an electrically conductive applicator for applying to the warm-blooded mammalian subject one or more amplitude-modulated low energy emissions at a program-controlled frequency, wherein said at least one programmable amplitude frequency control generator is adapted to accurately control the frequency at which said amplitude modulations are generated to within an accuracy of at least 1000 ppm relative to one or more determined or predetermined reference amplitude modulation frequencies selected from within a range of 0.01 Hz to 70 kHz and wherein said source of control information includes reference amplitude modulation frequency control information which comprises at least a significant proportion (in excess of 50%) of accurately defined reference amplitude modulation frequencies listed in any one of Examples A, B and 1 to 17, or all of said accurately defined frequencies or yet further accurately defined frequencies, or combinations thereof.

20. The system according to claim **19**, wherein the frequency of one or more of the amplitude modulations generated are controllable to within an accuracy of 100 ppm relative to the one or more determined or predetermined reference amplitude modulation frequencies.

21. The system according to claim **20**, wherein the frequency of one or more of the amplitude modulations generated are controllable to within an accuracy of 10 ppm relative to the one or more determined or predetermined reference amplitude modulation frequencies.

22. The system according to claim **21**, wherein the frequency of one or more of the amplitude modulations generated are controllable to within an accuracy of about 1 ppm relative to the one or more determined or predetermined reference amplitude modulation frequencies.

23. The system according to claim **19**, wherein the one or more amplitude modulated low energy emissions generated are maintained at a stability during emission of at least 10^{-5}.

24. The system according to claim **23**, wherein a stability of at least 10^{-6} is maintained.

25. The system according to claim **24**, wherein a stability of at least 10^{-7} is maintained.

26. The system according to claim **19**, wherein said at least one controllable generator circuit is controllable by amplitude modulation control signals which lead to various forms of amplitude modulation wave forms being generated.

27. The system according to claim **26**, wherein the amplitude modulation wave forms are selected from sinusoidal, square, triangular or multiple combinations thereof.

28. The system according to claim **26**, wherein the at least one generator circuit is controllable by amplitude modulation control signals which generate a plurality of amplitude modulation wave forms, either sequentially or simultaneously.

29. The system according to claim **19**, wherein the one or more high frequency carrier signals generated by the at least one generator circuit are selected from one or more high frequencies selected from about 27 MHz, 433 MHz and 900 MHz.

30. The system according to claim **19**, wherein the system further comprises one or more interfaces communicating with the at least one data processor, and wherein the control information is transferable to said one or more interfaces and hence to the at least one data processor to enable command signals responsive to received control information to be communicated to the at least one generator circuit by the at least one data processor.

31. The system according to claim **30**, wherein the control information is transferable over a communication link to the at least one data processor via the one or more interfaces communicating with the at least one data processor.

32. The system according to claim **30**, wherein the control information is stored in an information storage device and wherein the control information is transferable to the at least one data processor via said one or more interfaces communicating with the at least one data processor.

33. The system according to claim **30**, wherein the system further comprises a user identification device communicating with at least one of the at least one data processor to enable the system to be activated for use only by the user.

34. The system according to claim **19**, further comprising a monitor comprising monitoring software for monitoring the amplitude and the amplitude modulation frequency of the amplitude modulated low energy electromagnetic emissions generated by the at least one generator circuit.

35. The system according to claim **19**, wherein the determined or predetermined amplitude modulation frequency control information is determined or predetermined by a biofeedback process involving observations or measurements of physiological reactions by the subject during a time that cellular functions of the subject are excited by exposing the subject to emissions of high frequency carrier signals amplitude modulated at a series of amplitude modulation frequencies.

36. The system according to claim **35**, wherein the determined or predetermined frequencies are employed as a mode to identify a nature of a tumor or cancer harbored by the warm-blooded mammalian subject.

* * * * *