CLAIMS

1. A method for stimulating a tissue with electromagnetic fields, the method comprising:

a) applying an electric field stimulus to a tissue through an arrangement of electromagnetic transducers that receives an activation signal, the frequency of which varies from an initial tissue stimulation frequency (f_{ie}) to a final tissue stimulation frequency (f_{fe}) with increments or decrements in steps of a frequency delta (Δf_e) during a time delta (Δt_e);

b) measuring the tissue impedance response to the stimulus of stage (a);

c) establishing a reference level with the tissue impedance response measured in stage (b);

d) establishing a tolerance (NT) to the reference level established in stage (c);

e) determining lower tissue stimulation frequencies (f_{bx}) as the point where the tissue impedance response falls below the tolerance (NT) established in stage (d);

f) determining upper tissue stimulation frequencies (f_{tx}) as the point where the tissue impedance response returns to the tolerance (NT) established in stage (d);

wherein the upper tissue stimulation frequencies (f_{tx}) are greater than the lower tissue stimulation frequencies (f_{bx}) and "x" is a natural number greater than or equal to 1.

2. The method of Claim 1, wherein the initial tissue stimulation frequency (f_{ie}), the final tissue stimulation frequency (f_{fe}), the frequency delta (Δf_e), the time delta (Δt_e), the tolerance (NT), the lower tissue stimulation frequencies (f_{bx}) and the upper tissue stimulation frequencies (f_{tx}) are established by a user in a computing unit, and stored in memory.

3. The method of Claim 1, wherein the tolerance (NT) is between about 25% and about 50%.

4. The method of Claim 1, wherein at stage (a), the activation signal is selected among other things, from direct or alternating signal, pulsed signal or non-alternating pulse trains, squared wave signal with variation of the duty cycle, triangular wave signal, sawtooth wave signal, modulated by amplitude, modulated by frequency, modulated by phase, modulated by pulse positions, or combinations of these.

5. The method of Claim 1, wherein the initial tissue stimulation frequency (f_{ie}) and the final tissue stimulation frequency (f_{fe}) are between about 0.1 Hz and about 1000 kHz.

6. The method of Claim 1, wherein the frequency delta (Δf_e) is a value between about 0.1 Hz and about 1 kHz.

7. The method of Claim 1, wherein the time delta (Δt_e) is between about 1 second and about 1 hour.

8. The method of Claim 1, wherein after stage (f), the following stages are completed:

g) determining stimulation frequency bands based on the lower tissue stimulating frequencies (f_{bx}) determined in stage (e) along with the upper tissue stimulating frequencies (f_{tx}) determined in stage (f); and

h) applying a electric field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal the frequency of which varies by the stimulation frequency bands determined in stage (g) with increments or decrements in steps of a frequency delta (Δf_e) during a time delta (Δt_e);

i) establishing a maximum stimulation time (t_{max});

j) measuring the tissue impedance response to the stimulus of stage (h);

k) verifying that the tissue impedance response measured in stage (j) in the stimulation frequency bands determined in stage (g) return to the tolerance (NT) established in stage (d) or exceed the maximum stimulation time (t_{max}).

9. The method of Claim 8, wherein the maximum stimulation time (t_{max}) is between about 1 hour and about 18 hours.

10. The method of Claim 8, wherein stage (k) comprises the following verifications:

- if the maximum stimulation time (t_{max}) is exceeded, then finalizing;

- if the maximum stimulation time (t_{max}) is not exceeded, and the tissue impedance response measured in stage (j) is below the tolerance (NT) established in stage (d), repeating stage (h);

- if the tissue impedance response measured in stage (j) in the stimulation frequency bands determined in stage (g) exceed the tolerance (NT) established in stage (d), then finalizing.

11. The method of Claim 1, wherein at stage (a) a magnetic field stimulus is applied to a tissue by means of an arrangement of electromagnetic transducers that receive an activation signal the frequency of which varies from an initial tissue stimulating frequency (f_{im}) to a final tissue stimulation frequency (f_{fm}) with increments or decrements in steps of a frequency delta (Δf_m) during a time delta (Δt_m).

12. The method of Claim 11, wherein at stage (a), the magnetic field transducers are arranged such that they generate magnetic fields orthogonally to the electrical fields of the electrical field transducers.

13. The method of Claim 1, wherein at stage (e), the range of frequencies between the lower tissue stimulation frequency (f_{bx}) and the upper tissue stimulation frequency (f_{tx}) correspond to the central tissue frequencies.

14. The method of Claim 1, wherein the activation signal for the electrical field transducers changes with tissue temperature feedback.

15. The method of Claim 1, wherein the stimulated biological tissue is in an animal.

16. The method of Claim 1, wherein the stimulated biological tissue is an animal.

17. The method of Claim 1, wherein the electromagnetic transducers are in contact with an external surface of the tissue.

18. The method of Claim 1, wherein the electromagnetic transducers are located a determined distance from an external surface of the biological tissue.

19. The method of Claim 1, wherein a first portion of the electromagnetic transducers are in contact with an external surface of the biological tissue and a second portion of the electromagnetic transducers are located a determined distance from the external surface of the biological tissue.

20. The method of Claim 1, wherein the electromagnetic transducers are activated according to a defined sequence.

21. The method of Claim 1, wherein the electromagnetic transducers are activated randomly.

22. The method of Claim 1, wherein the activation signal is applied to each transducer at a determined time, sequentially, out of phase in relation to the other activation signal or to various stimulation signals, randomly or according to a program established for each one of the transducers.

23. A method for stimulating a tissue with magnetic fields, the method comprising:

a') applying a magnetic field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal, the frequency of which varies from an initial tissue stimulation frequency (f_{im}) to a final tissue stimulation frequency (f_{fm}) with increments or decrements in steps of a frequency delta (Δf_m) during a time delta (Δt_m);

b') measuring the tissue impedance response to the magnetic field stimulus through the electrical field transducers of the arrangement of electromagnetic transducers;

c') establishing a reference level with the tissue impedance response measured in stage (b');

d') establishing a tolerance (NT) to the reference level established in stage (c');

e') determining lower tissue stimulation frequencies (f_{bx}) as the point where the tissue impedance response falls below the tolerance (NT) established in stage (d');

f') determining upper tissue stimulation frequencies (f_{tx}) as the point where the tissue impedance response returns to the tolerance (NT) established in stage (d');

wherein the upper tissue stimulation frequencies (f_{tx}) are greater than the lower tissue stimulation frequencies (f_{bx}) and "x" is a natural number greater than or equal to 1.

24. The method of Claim 23, wherein the initial tissue stimulation frequency (f_{im}), the final tissue stimulation frequency (f_{fm}), the frequency delta (Δf_m), the time delta (Δt_m), the tolerance (NT), the lower tissue stimulation frequencies (f_{bx}) and the upper tissue stimulation frequencies (f_{tx}) are established by a user in a computing unit, and stored in memory.

25. The method of Claim 23, wherein the tolerance (NT) is between about 25% and about 50%.

26. The method of Claim 23, wherein, at stage (a') the activation signal is selected, among other things, from direct or alternating signal, pulsed signal or non-alternating pulse trains, squared wave signal with variation of the duty cycle, triangular wave signal, sawtooth wave signal, modulated by amplitude, modulated by frequency, modulated by phase, modulated by pulse positions, or combinations of these.

27. The method of Claim 23, wherein the initial tissue stimulating frequency (f_{im}) and the final tissue stimulating frequency (f_{fm}) are between about 0.1 Hz and about 1000 kHz.

28. The method of Claim 23, wherein the frequency delta (Δf_m) is a value between about 0.1 Hz and about 1 kHz.

29. The method of Claim 23, wherein the time delta (Δt_m) is between about 1 second and about 1 hour.

30. The method of Claim 23, wherein after stage (f'), the following stages are completed:

g') determining stimulation frequency bands based on the lower tissue stimulating frequencies (f_{bx}) determined in stage (e') along with the upper tissue stimulation frequencies (f_{tx}) determined in stage (f');

h') applying a magnetic field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal, the frequency of which varies by the stimulation frequency bands determined in stage (g') with increments or decrements in steps of a frequency delta (Δf_m) during a time delta (Δt_m);

i') establishing a maximum stimulation time (t_{max});

j') measuring the tissue impedance response to the stimulus of stage (h') by means of electrical field transducers of the arrangement of electromagnetic transducers;

k') verifying that the tissue impedance response measured in stage (j') in the stimulation frequency bands determined in stage (g') return to the tolerance (NT) established in stage (d') or exceed the maximum stimulation time (t_{max}).

31. The method of Claim 30, wherein the maximum stimulation time (t_{max}) is between about 1 hour and about 18 hours.

32. The method of Claim 30, wherein stage (k') comprises the following verifications:

- if the maximum stimulation time (t_{max}) is exceeded, then finalizing;

- if the maximum stimulation time (t_{max}) is not exceeded, and the tissue impedance response measured in stage (j') is below the tolerance (NT) established in stage (d'), repeating stage (h');

- if the tissue impedance response measured in stag (j') in the stimulation frequency bands determined in stage (g') exceed the tolerance (NT) established in stage (d'), then finalizing.

33. The method of Claim 30, wherein at stage (g'), the range of frequencies between the lower tissue stimulating frequency (f_{bx}) and the upper tissue stimulating frequency (f_{tx}) correspond to the central tissue frequencies.

34. The method of Claim 23, wherein the activation signal for the magnetic field transducers follows a pattern that changes with tissue temperature feedback.

35. The method of claim 23, wherein the activation signal obeys a defined pattern, which follows these steps:

A) defining an index for each magnetic field transducer in the arrangement of transducers;

B) selecting the index allocated to a transducer using the computing unit;

C) activating the magnetic field transducer that corresponds to the selected index, and stimulating the tissue using an initial tissue stimulating frequency (f_{im}) to a final tissue stimulating frequency (f_{fm}) in increments of a frequency delta (Δf_m) during a fixed time delta (Δt_m);

D) increasing the value of the index and repeating step C) until all of the attributed indices have been used.

36. The method of Claim 35, wherein at step D), the index value changes randomly and returns to step C).

37. The method of Claim 23, wherein the stimulated biological tissue is in an animal.

38. The method of Claim 23, wherein the stimulated biological tissue is an animal.

39. The method of Claim 23, wherein the electromagnetic transducers are in contact with an external surface of the tissue.

40. The method of Claim 23, wherein the electromagnetic transducers are located a determined distance from an external surface of the biological tissue.

41. The method of Claim 23, wherein a first portion of the electromagnetic transducers are in contact with an external surface of the biological tissue and a second

portion of the electromagnetic transducers are located a determined distance from the external surface of the biological tissue.

42. The method of Claim 23, wherein the electromagnetic transducers are activated according to a defined sequence.

43. The method of Claim 23, wherein the electromagnetic transducers are activated randomly.

44. The method of Claim 23, wherein the activation signal is applied to each transducer at a determined time, sequentially, out of phase in relation to the other activation signal or to various stimulation signals, randomly or according to a program established for each one of the transducers.

45. A method for stimulating a tissue with electric fields and magnetic fields, the method comprising:

a*) applying an electric field and a magnetic field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal, the parameters of which varies in time;

b*) measuring the tissue impedance response to the stimulus of stage (a*) through the arrangement of electromagnetic transducers and storing said measure in a memory register of a computing unit;

c*) changing the parameters of the activation signal according to the tissue impedance response measured in stage (b*) though the computing unit and returning to stage (a*);

wherein the parameters of the activation signal are, modulation, phase, frequency, amplitude, duration, duty cycle and shape.

46. A device for stimulating a tissue with electromagnetic fields, the device comprising:

- a computing unit;

- an external power source connected to the computing unit;

- a decoupling circuit connected to the external power source and to the computing unit; and

- an arrangement of electromagnetic transducers connected to the computing unit and to the decoupling circuit, the arrangement is functionally disposed over the tissue;

wherein the computing unit implements a method for stimulating a tissue with electromagnetic fields, the method comprising the stages of: a) applying an electric field stimulus to a tissue through an arrangement of electromagnetic transducers that receives an activation signal, the frequency of which varies from an initial tissue stimulation frequency (f_{ie}) to a final tissue stimulation frequency (f_{fe}) with increments or decrements in steps of a frequency delta (Δf_e) during a time delta (Δt_e); b) measuring the tissue impedance response to the stimulus of stage (a); c) establishing a reference level with the tissue impedance response measured in stage (b); d) establishing a tolerance (NT) to the reference level established in stage (c); e) determining lower tissue stimulation frequencies (f_{bx}) as the point where the tissue impedance response falls below the tolerance (NT) established in stage (d); f) determining upper tissue stimulation frequencies (f_{tx}) as the point where the tissue impedance response returns to the tolerance (NT) established in stage (d); wherein the upper tissue stimulation frequencies (f_{tx}) are greater than the lower tissue stimulation frequencies (f_{bx}) and "x" is a natural number greater than or equal to 1.

47. The device of Claim 46, wherein the tolerance (NT) is between about 25% and about 50%.

48. The device of Claim 46, wherein the initial tissue stimulation frequency (f_{ie}) and the final tissue stimulation frequency (f_{fe}) are between about 0.1 Hz and about 1000 kHz.

49. The device of Claim 46, wherein the frequency delta (Δf_e) is a value between about 0.1 Hz and about 1 kHz.

50. The device of Claim 46, wherein the time delta (Δt_e) is between about 1 second and about 1 hour.

51. The device of Claim 46, wherein after stage (f), the following stages are completed:

g) determining stimulation frequency bands based on the lower tissue stimulating frequencies (f_{bx}) determined in stage (e) along with the upper tissue stimulating frequencies (f_{tx}) determined in stage (f); and

h) applying a electric field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal the frequency of which varies by the stimulation frequency bands determined in stage (g) with increments or decrements in steps of a frequency delta (Δf_e) during a time delta (Δt_e);

i) establishing a maximum stimulation time (t_{max});

j) measuring the tissue impedance response to the stimulus of stage (h);

k) verifying that the tissue impedance response measured in stage (j) in the stimulation frequency bands determined in stage (g) return to the tolerance (NT) established in stage (d) or exceed the maximum stimulation time (t_{max}).

52. The device of Claim 51, wherein stage (k) comprises the following verifications:

- if the maximum stimulation time (t_{max}) is exceeded, then finalizing;

- if the maximum stimulation time (t_{max}) is not exceeded, and the tissue impedance response measured in stage (j) is below the tolerance (NT) established in stage (d), repeating stage (h);

- if the tissue impedance response measured in stage (j) in the stimulation frequency bands determined in stage (g) exceed the tolerance (NT) established in stage (d), then finalizing.

53. A device for stimulating a tissue with electromagnetic fields, the device comprising:

- a computing unit;

- an external power source connected to the computing unit;

- a decoupling circuit connected to the external power source and to the computing unit; and

- an arrangement of electromagnetic transducers connected to the computing unit and to the decoupling circuit, the arrangement is functionally disposed over the tissue;

wherein the computing unit implements a method for stimulating a tissue with magnetic fields, the method comprising the stages of: a') applying a magnetic field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal, the frequency of which varies from an initial tissue stimulation frequency (f_{im}) to a final tissue stimulation frequency (f_{fm}) with increments or decrements in steps of a frequency delta (Δf_m) during a time delta (Δt_m); b') measuring the tissue impedance response to the magnetic field stimulus through the electrical field transducers of the arrangement of electromagnetic transducers; c') establishing a reference level with the tissue impedance response measured in stage (b'); d') establishing a tolerance (NT) to the reference level established in stage (c'); e') determining lower tissue stimulation frequencies (f_{bx}) as the point where the tissue impedance response falls below the tolerance (NT) established in stage (d'); f') determining upper tissue stimulation frequencies (f_{tx}) as the point where the tissue impedance response returns to the tolerance (NT) established in stage (d'); wherein the upper tissue stimulation frequencies (f_{tx}) are greater than the lower tissue stimulation frequencies (f_{bx}) and "x" is a natural number greater than or equal to 1.

54. The device of Claim 53, wherein after stage (f'), the following stages are completed:

g') determining stimulation frequency bands based on the lower tissue stimulating frequencies (f_{bx}) determined in stage (e') along with the upper tissue stimulation frequencies (f_{tx}) determined in stage (f');

h') applying a magnetic field stimulus to a tissue through an arrangement of electromagnetic transducers that receive an activation signal, the frequency of which varies by the stimulation frequency bands determined in stage (g') with increments or decrements in steps of a frequency delta (Δf_m) during a time delta (Δt_m);

i') establishing a maximum stimulation time (t_{max});

j') measuring the tissue impedance response to the stimulus of stage (h') by means of electrical field transducers of the arrangement of electromagnetic transducers;

k') verifying that the tissue impedance response measured in stage (j') in the stimulation frequency bands determined in stage (g') return to the tolerance (NT) established in stage (d') or exceed the maximum stimulation time (t_{max}).

55. The device of Claim 46, wherein the computing unit is a special purpose computing unit comprising a central processor unit (CPU) (21a) connected to oscillators from a first OSC 1, a second oscillator OSC 2 to an oscillator OSC n each oscillator having an activation signal output; wherein n is a natural number equal or greater than cero.

56. The device of Claim 46, wherein the central processor unit is also connected to a peripheral device selected among others, from storage devices such as a memory unit, a database and a hard drive, input devices such as a keyboard, a camera, a touchscreen display, and a scanner, output devices such as a display and a printer.