Claims

1. A system for generating pulsed electromagnetic fields (PEMFs) for application to target tissues or target cells during a plurality of successive PEMF sessions, comprising:

a set of PEMF coils;

a memory module;

a pulse generator coupled to the set of PEMF coils and configured to generate an output of electrical pulses to drive the set of PEMF coils; and

a controller in communication with the memory module and the pulse generator, wherein the controller is configured to:

control the output of the pulse generator such that during each PEMF session, the set of PEMF coils generates a plurality of PEMF pulses across a PEMF exposure time of at least 5 minutes but not longer than 15 minutes, wherein each PEMF pulse has a peak magnetic flux density between 0.1 – 5.0 mT and a rate of magnetic flux density change between 10 – 100 T/s.

2. The system as claimed in claim 1, wherein during each PEMF session, each PEMF pulse has a rate of magnetic flux density change between 35 – 65 T/s.

3. The system as claimed in claim 1, wherein the memory module and/or a database store PEMF session signal parameters corresponding to multiple distinct target tissue types or target cell types, wherein the PEMF session signal parameters for each distinct target tissue type or target cell type comprise one of more of: amplitude, frequency, symmetry, field gradient, uniformity, and direction and duration of the PEMF pulses emitted by the set of PEMF coils during PEMF sessions corresponding to the target tissue type or target cell type, as well as a maximum PEMF exposure time or magnetic flux density dose for PEMF sessions corresponding to the target tissue type or target cell type, and wherein the controller is configured to retrieve PEMF session signal parameters from the memory module for controlling the output of the pulse generator.

4. The system as claimed in claim 3, wherein the PEMF session signal parameters corresponding to distinct target tissue types or target cell types comprise at least two of:

myoblast parameters specifying for each PEMF session a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 1.5 mT;

skeletal muscle parameters specifying for each PEMF session a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density between 1.5 – 3.0 mT;

cardiac muscle parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 3.0 mT;

lymphocyte parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 2.0 mT;

mesenchymal stem cell parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 3.0 mT;

chondrocyte parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 2.0 mT;

adipocyte parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 1.0 mT; and

smooth muscle parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 3.0 mT.

5. The system as claimed in claim 3, wherein the memory module further stores PEMF regimen parameters indicating for each distinct target tissue type or target cell type a minimum time period between successive PEMF sessions for the target tissue type or target cell type and/or a maximum number of PEMF sessions to which the target tissue type or target cell type is to be exposed within a certain amount of time.

6. The system as claimed in claim 5, wherein for each target tissue type or target cell type, the PEMF regimen parameters specify a maximum number of PEMF sessions per week less than or equal to 3.

7. The system as claimed in claim 1, wherein the set of PEMF coils is configured to generate magnetic field lines in a downward direction vertical with gravity.

8. The system as claimed in claim 1, wherein the set of PEMF coils comprises a plurality of coils configured to accommodate portions of a subject's leg.

9. The system as claimed in claim 1, wherein the set of PEMF coils comprises a pair of opposing saddle coils.

10. The system as claimed in claim 1, further comprising a seating device configured for supporting a subject in a seated position, and wherein the set of PEMF coils is configured to apply PEMF pulses through portions of the seating device.

11. The system as claimed in claim 10, wherein the set of PEMF coils is built into the seating device.

12. The system as claimed in claim 1, wherein the set of PEMF coils is disposed at an animal feeding station.

13. The system as claimed in claim 1, wherein the set of PEMF coils comprises a Magnetic Resonance Imaging (MRI) system coil.

14. The system as claimed in claim 1, wherein the set of PEMF coils is configured to apply PEMF pulses to a cell culture medium containing the target cells during each PEMF session.

15. A method of configuring a pulsed electromagnetic field (PEMF) system, comprising:

providing (i) a set of PEMF coils, (ii) a pulse generator coupled to the set of PEMF coils and configured to generate an output of electrical pulses to drive the set of PEMF coils, (iii) a memory module, and (iv) a controller coupled to the memory module and the pulse generator, and which is configured to control the output of the pulse generator to produce PEMF pulses during a plurality of successive PEMF sessions;

configuring the controller to control the pulse generator such that during each PEMF session, the set of PEMF coils generates a plurality of PEMF pulses, wherein each PEMF pulse has a peak magnetic flux density between 0.1 – 5 mT and a rate of magnetic flux density change between 10 – 100 T/s; and

configuring the controller to prevent the pulse generator from outputting electrical pulses to drive the set of PEMF coils for longer than 15 minutes during each PEMF session, to thereby prevent the generation of PEMF pulses for longer than 15 minutes during each PEMF session.

16. The method of claim 15, wherein configuring the controller comprises configuring the controller to control the output of the pulse generator such that during each PEMF session, each PEMF pulse has a rate of magnetic flux density change between 35 – 65 T/s.

17. The method of claim 15, further comprising:

storing in the memory module and/or a database a plurality of PEMF session signal parameter sets, wherein each PEMF session signal parameter set corresponds to a distinct target tissue type or target cell type, and wherein the plurality of PEMF session signal parameter sets comprises at least two of:

myoblast parameters specifying for each PEMF session a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 1.5 mT;

skeletal muscle parameters specifying for each PEMF session a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density between 1.5 – 3.0 mT;

cardiac muscle parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 3 mT;

lymphocyte parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 2 mT;

mesenchymal stem cell parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 3 mT;

chondrocyte parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 2 mT;

adipocyte parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 1 mT; and

smooth muscle parameters specifying a PEMF exposure time of 10 minutes and/or a peak PEMF pulse magnetic flux density of 3 mT;

and

accessing the memory module and/or the database with the controller to retrieve a set of PEMF session signal parameters prior to the initiation of a PEMF session; and

configuring the pulse generator with the controller prior to PEMF pulse generation such that the set of PEMF coils outputs PEMF pulses in accordance with the retrieved set of PEMF session signal parameters.