

WHAT IS CLAIMED IS:

1. A method of planning a treatment using alternating electric fields at a given frequency in a portion of a subject's body, the method comprising the steps of:
 - (a) obtaining at least one image of the portion;
 - (b) generating, based on the obtained at least one image, a 3D model of electrical conductivity or resistivity at the given frequency within the portion;
 - (c) identifying a target volume within the 3D model, the target volume including a plurality of voxels;
 - (d) adding a first set of model electrodes to the 3D model, with the first set of model electrodes positioned at a first set of locations with respect to the 3D model;
 - (e) determining, for each of the voxels in the target volume, a power loss density that will be present when the first set of model electrodes positioned at the first set of locations is used to impose an alternating electric field in the target volume;
 - (f) adding a second set of model electrodes to the 3D model, with the second set of model electrodes positioned at a second set of locations with respect to the 3D model; and
 - (g) determining, for each of the voxels in the target volume, a power loss density that will be present when the second set of model electrodes positioned at the second set of locations is used to impose an alternating electric field in the target volume; and
 - (h) selecting a set of locations for the electrodes based on results of step (e) and step (g).
2. The method of claim 1, further comprising the step of outputting a description of the selected set of locations.
3. The method of claim 1, wherein step (e) and step (g) each comprises:
 - determining, for each of the voxels in the target volume, an electric field intensity that will be present when a respective set of model electrodes positioned at a respective set of locations is used to impose an alternating electric field in the target volume; and
 - determining a respective power loss density for each voxel in the target volume based on the conductivity of the 3D model at the voxel and the electric field intensity at the voxel.

4. The method of claim 3, wherein the power loss density for each voxel in the target volume is determined using the formula $L = \frac{1}{2} \sigma |E|^2$, where σ is the conductivity of the 3D model at the voxel and $|E|$ is the electric field intensity at the voxel.
5. The method of claim 1, wherein step (h) comprises selecting the set of locations that maximizes average power loss density in the target volume.
6. The method of claim 1, wherein step (h) comprises selecting the set of locations that maximizes the lowest power loss density in the target volume.
7. The method of claim 1, further comprising the steps of:
 - (h) adding a third set of model electrodes to the 3D model, with the third set of model electrodes positioned at a third set of locations with respect to the 3D model; and
 - (i) determining, for each of the voxels in the target volume, a power loss density that will be present when the third set of model electrodes positioned at the third set of locations is used to impose an alternating electric field in the target volume, andwherein the selecting comprises selecting a set of locations for the electrodes based on results of step (e), step (g), and step (i).
8. The method of claim 1, wherein the at least one image of the portion comprises an MRI image of the portion.
9. A method of planning a treatment using alternating electric fields at a given frequency in a portion of a subject's body, the method comprising the steps of:
 - (a) obtaining at least one image of the portion;
 - (b) generating, based on the obtained at least one image, a 3D model of electrical conductivity or resistivity at the given frequency within the portion;
 - (c) identifying a target volume within the 3D model, the target volume including a plurality of voxels;
 - (d) adding a first set of model electrodes to the 3D model, with the first set of model electrodes positioned at a first set of locations with respect to the 3D model;
 - (e) determining, for each of the voxels in the target volume, the smaller one of first and second power loss densities that will be present when the first set of model electrodes

positioned at the first set of locations is used to impose an alternating electric field in the target volume with first and second orientations, respectively;

(f) adding a second set of model electrodes to the 3D model, with the second set of model electrodes positioned at a second set of locations with respect to the 3D model; and

(g) determining, for each of the voxels in the target volume, the smaller one of first and second power loss densities that will be present when the second set of model electrodes positioned at the second set of locations is used to impose an alternating electric field in the target volume with first and second orientations, respectively; and

(h) selecting a set of locations for the electrodes based on results of step (e) and step (g).

10. The method of claim 9, further comprising the step of outputting a description of the selected set of locations.

11. The method of claim 9, wherein step (e) and step (g) each comprises:

determining, for each of the voxels in the target volume, a first orientation electric field intensity that will be present when a respective set of model electrodes positioned at a respective set of locations is used to impose an alternating electric field in the target volume with the first orientation;

determining a respective first-orientation power loss density for each voxel in the target volume based on the conductivity of the 3D model at the voxel and the first orientation electric field intensity at the voxel;

determining, for each of the voxels in the target volume, a second orientation electric field intensity that will be present when the respective set of model electrodes positioned at the respective set of locations is used to impose an alternating electric field in the target volume with the second orientation;

determining a respective second-orientation power loss density for each voxel in the target volume based on the conductivity of the 3D model at the voxel and the second orientation electric field intensity at the voxel; and

selecting, for each of the voxels in the target volume, the smaller of the respective first-orientation power loss density and the respective second-orientation power loss density.

12. The method of claim 11, wherein the respective first-orientation power loss density and the respective second-orientation power loss density for each voxel in the target volume

is determined using the formula $L = \frac{1}{2} \sigma |E|^2$, where σ is the conductivity of the 3D model at the voxel and $|E|$ is the respective electric field intensity at the voxel.

13. The method of claim 9, wherein step (h) comprises selecting the set of locations that maximizes average power loss density in the target volume.

14. The method of claim 9, wherein step (h) comprises selecting the set of locations that maximizes the lowest power loss density in the target volume.

15. The method of claim 9, further comprising the steps of:

(h) adding a third set of model electrodes to the 3D model, with the third set of model electrodes positioned at a third set of locations with respect to the 3D model; and

(i) determining, for each of the voxels in the target volume, the smaller one of first and second power loss densities that will be present when the third set of model electrodes positioned at the third set of locations is used to impose an alternating electric field in the target volume with first and second orientations, respectively, and

wherein the selecting comprises selecting a set of locations for the electrodes based on results of step (e), step (g), and step (i).

16. The method of claim 9, wherein the at least one image of the portion comprises an MRI image of the portion.

17. The method of claim 9, wherein the treatment using alternating electric fields is planned so that an average Local Minimum Power Density in the target volume is at least 1.0 mW/cm³.

18. A method of planning a treatment using alternating electric fields at a given frequency in a portion of a subject's body, the method comprising the steps of:

(a) obtaining at least one image of the portion;

(b) generating, based on the obtained at least one image, a 3D model of electrical conductivity or resistivity at the given frequency within the portion;

(c) identifying a target volume within the 3D model, the target volume including a plurality of voxels;

(d) adding a first set of model electrodes to the 3D model, with the first set of model electrodes positioned at a first set of locations with respect to the 3D model; and

(e) determining, for each of the voxels in the target volume, a power loss density that will be present when the first set of model electrodes positioned at the first set of locations is used to impose an alternating electric field in the target volume.