

## CLAIMS

What is claimed is:

1. A computer apparatus to analyze a patient's multiparametric magnetic resonance imaging ("MRI") maps for pathology and generate a prescription comprising:

(a) a non-transitory memory storing one or more parametric maps of a patient, the one or more maps derived from an MRI sequence from which multiparametric maps are derivable;

(b) a program stored in the non-transitory memory and operatively configured to analyze the one or more parametric maps for a region including a pathology; and

(c) a computer processor in communication with the non-transitory memory and configured to perform the program by executing computer executable instructions, wherein the program is operatively configured to automatically generate a prescription based at least in part on the analysis of the one or more parametric maps.

2. The computer apparatus of claim 1, wherein the one or more parametric maps is derived at least in part from a water-fat separation sequence.

3. The computer apparatus of claim 1, wherein the one or more parametric maps are derived from a water-fat separation sequence that uses the iterative decomposition of water and fat with echo asymmetry and least-squares estimation ("IDEAL") technique and/or the Dixon technique.

4. The computer apparatus of claim 1, wherein the one or more parametric maps is derived at least in part from an MRI sequence that uses the gradient and spin echo (“GRASE”) technique.

5. The computer apparatus of claim 1, wherein the one or more parametric maps is derived from diffusion-weighted sequencing.

6. The computer apparatus of claim 1, wherein the analysis includes a search for at least one pathology selected from the list consisting of:

- a) fractures,
- b) osteoporosis,
- c) metastatic disease,
- d) degenerative disease,
- e) infarcts, and
- f) combinations thereof.

7. The computer apparatus of claim 1, wherein the one or more parametric maps include a map selected from the list consisting of:

- a) a T2 map describing transverse signal relaxation time affecting image contrast;
- b) a T2\* map describing signal relaxation caused by magnetic field abnormalities;
- c) a T2<sup>†</sup> map describing cancellous bone-induced intravoxel dephasing;
- d) a fat map; and
- e) a water map.

8. The computer apparatus of claim 1, wherein color-encoding is utilized to encode information from at least two of the MRI maps at once.

9. The computer apparatus of claim 1, wherein the prescription directs further imaging.

10. The computer apparatus of claim 1, wherein the prescription directs therapy.

11. The computer apparatus of claim 1, wherein the prescription directs a notification.

12. The computer apparatus of claim 1, wherein the parametric map is derived at least in part from MRI signal changes reflecting administration of a contrast agent to the patient.

13. A computer system configured to analyze a patient's magnetic resonance images for pathology and generate a prescription, the computer system comprising:

one or more processors; and

one or more hardware storage devices having stored thereon computer-executable instructions which are executable by the one or more processors to cause the computer system to at least:

- (a) receive magnetic resonance images of a patient;
- (b) derive one or more MRI parametric maps from the magnetic resonance images;
- (c) analyze one or more derived parametric maps for a region including a pathology; and
- (d) automatically generate a prescription based at least in part on the analysis of the one or more derived parametric maps.

14. The computer system of claim 13, wherein at least a portion of the magnetic resonance images received are contrast enhanced images associated with the administration of a contrast agent and the parametric map is derived at least in part based on MRI signal changes reflecting administration of the contrast agent.

15. The computer system of claim 13, wherein the one or more parametric maps is derived at least in part from a water-fat separation sequence that uses the IDEAL technique or the Dixon technique.

16. The computer system of claim 13, wherein the one or more parametric maps is derived at least in part from an MRI sequence that uses the gradient and spin echo ("GRASE") technique.

17. The computer system of claim 13, wherein the one or more parametric maps is derived from diffusion-weighted sequencing.

18. The computer system of claim 13, wherein the analysis includes a search for at least one pathology selected from the list consisting of:

- a) fractures,
- b) osteoporosis,
- c) metastatic disease,
- d) degenerative disease,
- e) infarcts, and
- f) combinations thereof.

19. The computer system of claim 13, wherein the one or more parametric maps include a map selected from the list consisting of:

- a) a T2 map including transverse signal relaxation time affecting image contrast;
- b) a T2\* map including signal relaxation caused by magnetic field abnormalities;
- c) a T2<sup>†</sup> map including cancellous bone-induced intravoxel dephasing;
- d) a fat map; and
- e) a water map.

20. The computer system of claim 13, wherein color-encoding is utilized to encode information from at least two of the MRI maps at once.

21. The computer system of claim 13, wherein the prescription directs further imaging.

22. The computer system of claim 13, wherein the prescription directs therapy.

23. The computer system of claim 13, wherein the prescription directs a notification.

24. The computer system of claim 13, wherein the prescription is generated while patient is still on the MRI scan table.

25. The computer system of claim 13, wherein the computer-executable instructions are derived at least in part utilizing machine learning.