

CLAIMS

1. An imaging phantom comprising:
a reference member disposed within a housing, the reference member having a rod-like shape extending parallel to a long axis of the housing, the reference member formed from a material comprising a plurality of microchannels arranged longitudinally along at least a portion of the reference member, and wherein a diameter of the housing varies along the long axis of the housing to emulate a shape of a human torso.
2. The imaging phantom of claim 1, wherein a fill material is disposed within the housing and around the reference member, the fill material providing various densities throughout the housing.
3. The imaging phantom of claim 1, wherein a plurality of sections of fill material are disposed around the reference member, each of the plurality of sections of fill material formed from a different material.
4. The imaging phantom of claim 3, wherein at least one of the plurality of sections of fill material is formed from a material having a different diffusion characteristic than another one of the plurality of sections of the fill material.
5. The imaging phantom of claim 1, further comprising a second reference member, the second reference member having different diffusion characteristics than the reference member.
6. The imaging phantom of claim 1, wherein the reference member has a diffusion characteristic that is longitudinally isotropic and radially anisotropic.
7. The imaging phantom of claim 1, wherein the reference member is formed from a plurality of polymer fibers.

8. An apparatus comprising:
 - a phantom, wherein the phantom comprises: a reference member disposed along a long axis of the phantom, the reference member comprising a plurality of hollow fibers, wherein the phantom is configured to be received by a magnetic resonance imaging apparatus; and
 - a housing disposed around the reference member, wherein a diameter of the housing varies along the long axis of the phantom to emulate a shape of a human torso.
9. The apparatus of claim 8, wherein the reference member has a direction of elongation, and the plurality of hollow fibers are aligned with the direction of elongation.
10. The apparatus of claim 8, wherein the phantom comprises a human torso shaped portion.
11. The apparatus of claim 8, wherein the hollow fibers comprise a polymer.
12. The apparatus of claim 8, wherein the housing includes a plurality of slices of fill material disposed normally to the reference member.
13. The apparatus of claim 12, wherein each of the plurality of slices of the fill material is formed from a different material.
14. The apparatus of claim 13, wherein at least one of the plurality of slices of the fill material has a different diffusion characteristic than another one of the plurality of slices of fill material.
15. The apparatus of claim 8, wherein the reference member includes a liquid.
16. A method comprising:
 - obtaining diffusion-weighted images of a calibration phantom, wherein a diameter of the calibration phantom varies along a length of the phantom to emulate a shape of

human torso and the calibration phantom comprises: at least one reference member extending a length of the phantom, the at least one reference member including a plurality of microchannels,

determining diffusion values of the at least one reference member including the plurality of microchannels based on the diffusion-weighted images; and

establishing a relationship between the determined diffusion values of the at least one reference member including the plurality of microchannels and modeled diffusion values of the at least one reference member including the plurality of microchannels.

17. The method of claim 16, wherein establishing a relationship between the determined diffusion values of the at least one reference member including the plurality of microchannels and the modeled diffusion values of the at least one reference member including the plurality of microchannels comprises:

comparing the determined diffusion values of the at least one reference member including the plurality of microchannels to the modeled diffusion values of the at least one reference member including the plurality of microchannels; and

determining a statistical relationship between the determined diffusion values of the at least one reference member including the plurality of microchannels and the modeled diffusion values of the at least one reference member including the plurality of microchannels.

18. The method of claim 16, further comprising:

obtaining diffusion-weighted images of a patient;

determining diffusion values of the patient based on the diffusion-weighted images;

and

adjusting the diffusion values of the patient based on the relationship between the determined diffusion values of at least the one reference member including the plurality of microchannels and the modeled diffusion values of the at least one reference member including the plurality of microchannels.

19. The method of claim 16, wherein obtaining diffusion-weighted images of a calibration phantom, wherein the calibration phantom emulates a human torso and includes at least one reference member extending a length of the phantom, the at least one reference member including a plurality of microchannels comprises:

transmitting a sequence of magnetic pulses through the calibration phantom;

measuring the magnetic response of the calibration phantom after each pulse of the sequence of magnetic pulses; and

constructing the diffusion-weighted images of the calibration phantom based on the measured magnetic responses of the calibration phantom after each pulse of the sequence of magnetic pulses.

20. The method of claim 19, wherein obtaining diffusion-weighted images of a calibration phantom, wherein the calibration phantom emulates a human torso and includes at least one reference member extending a length of the phantom, the at least one reference member including a plurality of microchannels is performed on a magnetic imaging device.

21. The method of claim 16, wherein the diffusion values are apparent diffusion coefficient values.

22. An imaging phantom comprising:

a housing including a reference member and a plurality of partitions, wherein the reference member is configured to mimic a human spinal cord and is disposed parallel to and extends a long axis of the housing, wherein the reference member includes microchannels extending at least a portion of the reference member, and wherein each of the plurality of partitions includes a respective fill material.

23. The imaging phantom of claim 22, wherein a size and shape of the housing simulates a human torso.

24. The imaging phantom of claim 22, wherein each of the plurality of partitions are disposed around a respective portion of the reference member and between the respective portion of the reference member and a shell of the housing.

25. The imaging phantom of claim 22, wherein a density of fill material of each of the plurality of partitions is different.

26. The imaging phantom of claim 22, wherein the microchannels are formed from hollow fibers.