1 Objectives

Create agar phantom for laser heating and MRTI.

2 Work

2.1 Original Phantom Recipe

Egg White Phantom:

- 1.5% agar
  - 15 g agar for 1-L phantom volume (can go as low as 10 g, but not as firm), i.e. 1.5 g per 100 mL
  - food grade agar powder ∼$8 from Amazon
  - clinical grade (white bottle, red cap) ∼$250
- 2/3 volume distilled water
- 1/3 volume liquid egg whites

Directions:

- Keep egg whites warm (under 60°C) - hot plate with stir bar in beaker $\sim$ 50°C
- Put agar powder in water before heating - hot plate with stir bar in beaker
- Heat water and agar to 80-90°C to dissolve agar powder, will become translucent when ready (can use 2510 Branson sonicare to eliminate bubbles while stirring)
- Let water and agar cool to $\sim$ 60°C while stirring
- Pour egg whites into beaker with water and agar
- Remove stir bars from beaker
- Slowly pour solution into container and let cool until it sets

2.2 Second Scan Recipes

1 Agar Phantom:

- 1.5% agar (T1 = 2640 ms) (Mathur-De Vre et al, 1985)
- 350 mL total volume $\longrightarrow$ 5.25 g agar
- cylindrical hole left for fat reference (allow to set)
- trimmed container top first, covered with Al foil

1 Agar + Gd Phantom:

- 1.5% agar and 0.14 mM Gd
  - T1 = 791 ms (Walker et al, 1989)
  - (White matter T1 = 832 ms) (Wansapura et al, 1999)
- 350 mL total volume $\longrightarrow$ 5.25 g agar
- Gd dilution:
  - $C_1V_1 = C_2V_2$
  - $C_1 = 2.43$ mM Gd

- $V_1 = C_2V_2/C_1 = (0.14 \text{ mM Gd})\,(350 \text{ mL}) \,/\, (2.43 \text{ mM Gd}) = 20.16 \text{ mL Gadodiamide}$

- cylindrical hole left for fat reference (allow to set)
- trimmed container top first, covered with Al foil

Fat References:

- 1.5% agar
- 200 mL total volume $\longrightarrow$ 3.0 g agar
- 1:1 water:Crisco $\longrightarrow$ 100 mL water, 100 mL Crisco
- 1 Lecithin pill to disolve Crisco in water
- heat and stir until 80°C and comlete dissolution
- pour slowly and fill cylindrical hole left in phantom

3 Directions

Heat phantom and scan to acquire full k-space data in time.