# Supplementary Material

## Appendix 1

*Emulsion preparation*

The fat emulsions E1 and E4 were prepared as follows to obtain the desired properties:

E1 was prepared by mixing 240 g rapeseed oil with 360 g of a 2.7-weight percent polysorbate 80 (Palsgaard) solution by using a rotor stator homogenizer (MICCRA D 15, 25-mm rotor stator; MICCRA) at $10{,}500 \times g$ and 50°C for 5 min. A fine emulsion was created by passing this mixture through a microfluidizer 3 times at 200 bar (model M110Y equipped with an H30Z 200-mm and F20Y 75-mm chamber, Microfluidics). This fine emulsion was diluted 1 to 1 with water to achieve the final composition.

E4 was prepared by mixing 240 g rapeseed oil and 3 g distilled monoglyceride (Dimodan HP-M; DuPont Danisco) with 957 g 1.25-weight percent sodium caseinate (DMV International) solution by using the rotor stator homogenizer at $10{,}500 \times g$ and 70°C for 5 min. A fine emulsion was created by passing these mixtures through the microfluidizer twice at 300 bar.

**Appendix 2**

*MR sequence parameters*

1. Volume scans

   Steady-state free-precession sequence; echo time 1.31 s, repetition time 2.6 ms, flip angle 60°, voxel size 2.3x2.0 mm$^2$

   a. Gastric

      20 transverse slices, slice thickness 8 mm, field of view 350x258 mm$^2$, scan duration 7 s

   b. Duodenal

      7 sagittal slices; slice thickness 6 mm, field of view 350x258 mm$^2$, scan duration 5 s

2. IDEAL scans

   6-point multi-echo gradient echo sequence with flyback gradients; first echo time 1.25 ms, echo time spacing 1.54 ms; repetition time 10 ms, flip angle 10°, voxel size 2.3x2.0 mm$^2$

   a. Gastric

      20 transverse slices, slice thickness 8 mm, field of view 350x258 mm$^2$, scan duration 34 s

   b. Duodenal

      7 sagittal slices; slice thickness 6 mm, field of view 350x258 mm$^2$, 2 averages, scan duration 21 s

3. Fat-selective scan (gastric)

   Single-shot turbo spin-echo sequence with a spectral inversion recovery pre-pulse for water suppression; echo time 80 ms, repetition time 732 ms, flip angle 90°, voxel size 2.3x2.0 mm$^2$, 20 transverse slices, slice thickness 8 mm, field of view 350x258 mm$^2$, scan duration 15 s

4. High-resolution volume scan (gastric)

   Steady-state free-precession sequence; echo time 1.7 s; repetition time 3.4 ms, flip angle 60°, voxel size 1.5x1.5 mm$^2$, 30 transverse slices, slice thickness 6 mm, field of view 350x259 mm$^2$, scan duration 19 s
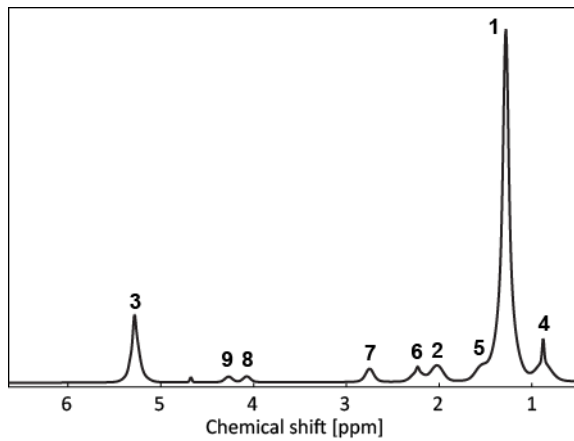
**Appendix 3**

*Model equation*

Fat layering was modelled with a robust 5-parameter fit according to

$$ff(x) = ff_0 + ff_1 \left( \frac{x^n}{x^n + x_0^n} + e^{(x - x_F)S} \right).$$

**Supplemental Fig. 1**



**MR spectrum of rapeseed oil.** The fat peaks are indicated by bold numbers sorted in descending order of amplitude. The chemical shift and relative area of all nine fat peak were included into the fat model.

**Supplemental Fig. 2**



**Aspirated gastric samples.** Gastric samples of E1 (left) and E4 (right) of one subject, sorted from left to right in ascending order of aspiration time. Samples of E1 had a homogenous milky appearance whereas in samples of E4 the fat and aqueous phase were largely separated.

**Supplemental Fig. 3**
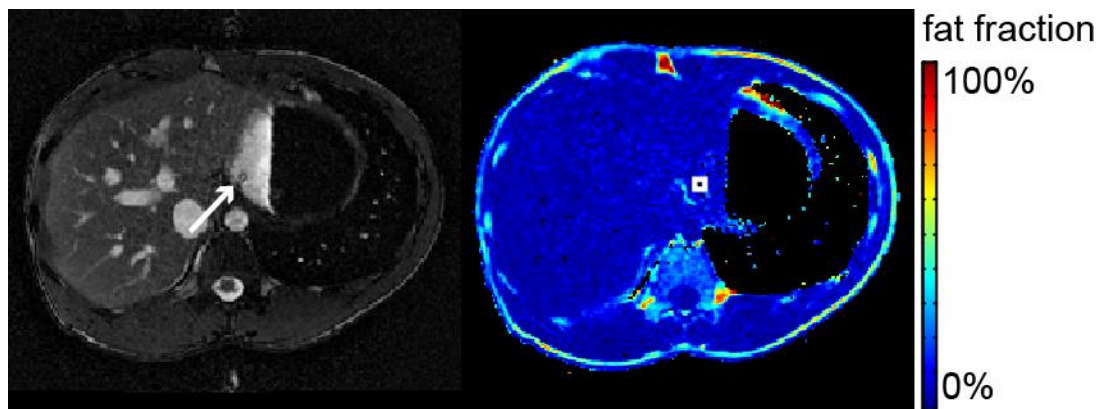


**Detection of the tip of the nasogastric tube in the image data.** The detected tip of the nasogastric tube is indicated by the white arrow in the high resolution volume image data (left). The corresponding ROI used for FF calculations in the fat fraction map (right) is indicated by the white rectangle.