Supporting Figures

## anatomical



🕻 vessel 🔿 left kidney (ROI for tracking and B, calibration)

## bolus tracking



pyruvate images of pyruvate/lactate dynamic imaging



lactate images of pyruvate/lactate dynamic imaging



Supporting Figure S1: Results of bolus tracking and pyruvate/lactate dynamic imaging of the experiment described in Fig. 4. Fig. 4 shows every other <sup>13</sup>C image in this figure. 2

## anatomical



(C) tumor (ROI for tracking and B<sub>1</sub> calibration)

## bolus tracking (before center frequency calibration)



bolus tracking (after center frequency calibration)



pyruvate images of pyruvate/lactate dynamic imaging



lactate images of pyruvate/lactate dynamic imaging



Supporting Figure S2: Results of bolus tracking and pyruvate/lactate dynamic imaging of the experiment described in Fig. 5. Fig. 5 shows every other  $^{13}$ C image in this figure.

Pyruvate dynamic images (maxSNR = 669)



Supporting Figure S3: The first twenty time points of multi-slice dynamic images for the hyperpolarized  $[1^{-13}C]$ pyruvate human study as described in Fig. 7.