Three-dimensional Radial Echo-planar Spectroscopic Imaging for Hyperpolarized 13C MRSI in Vivo

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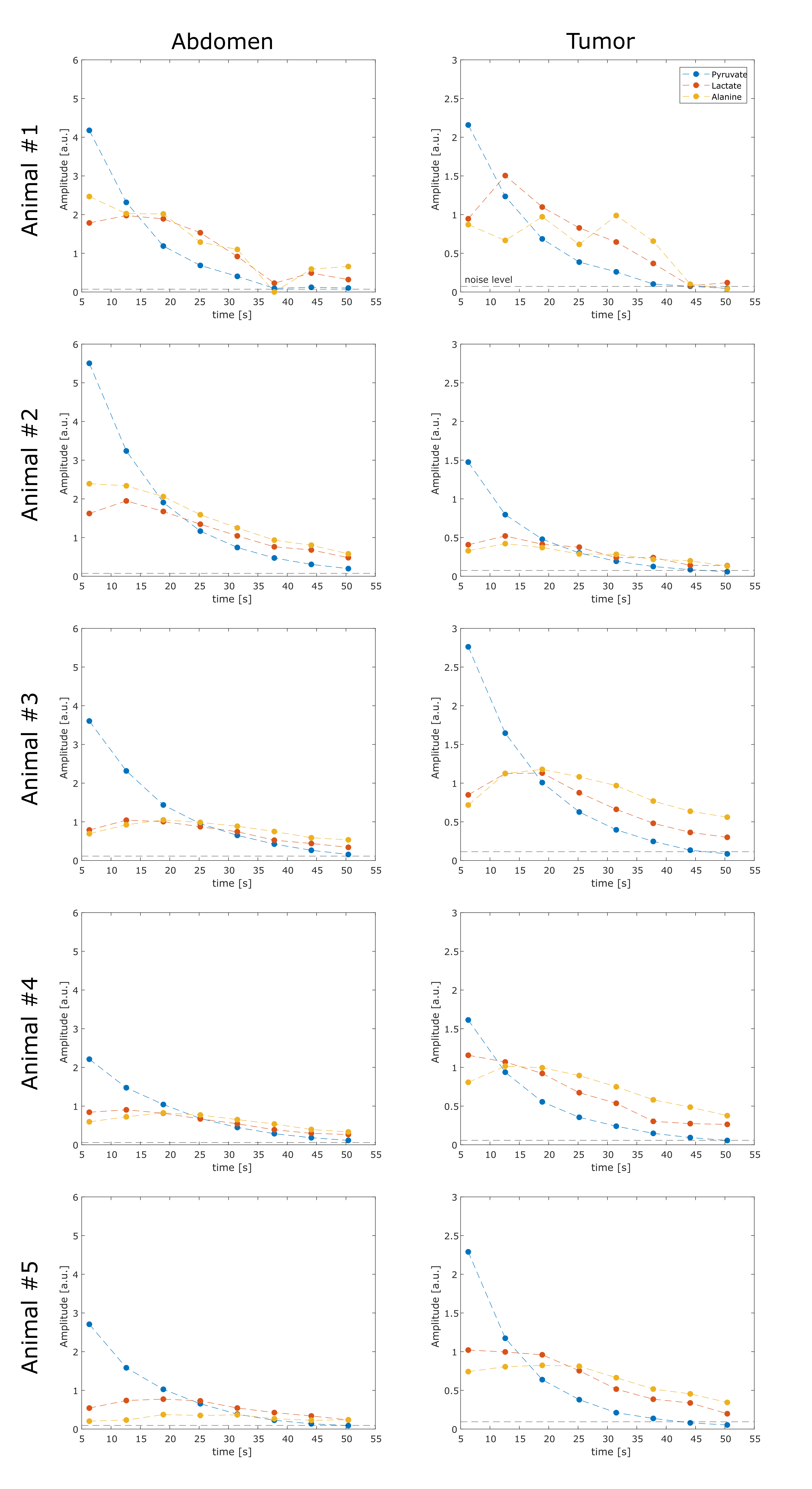
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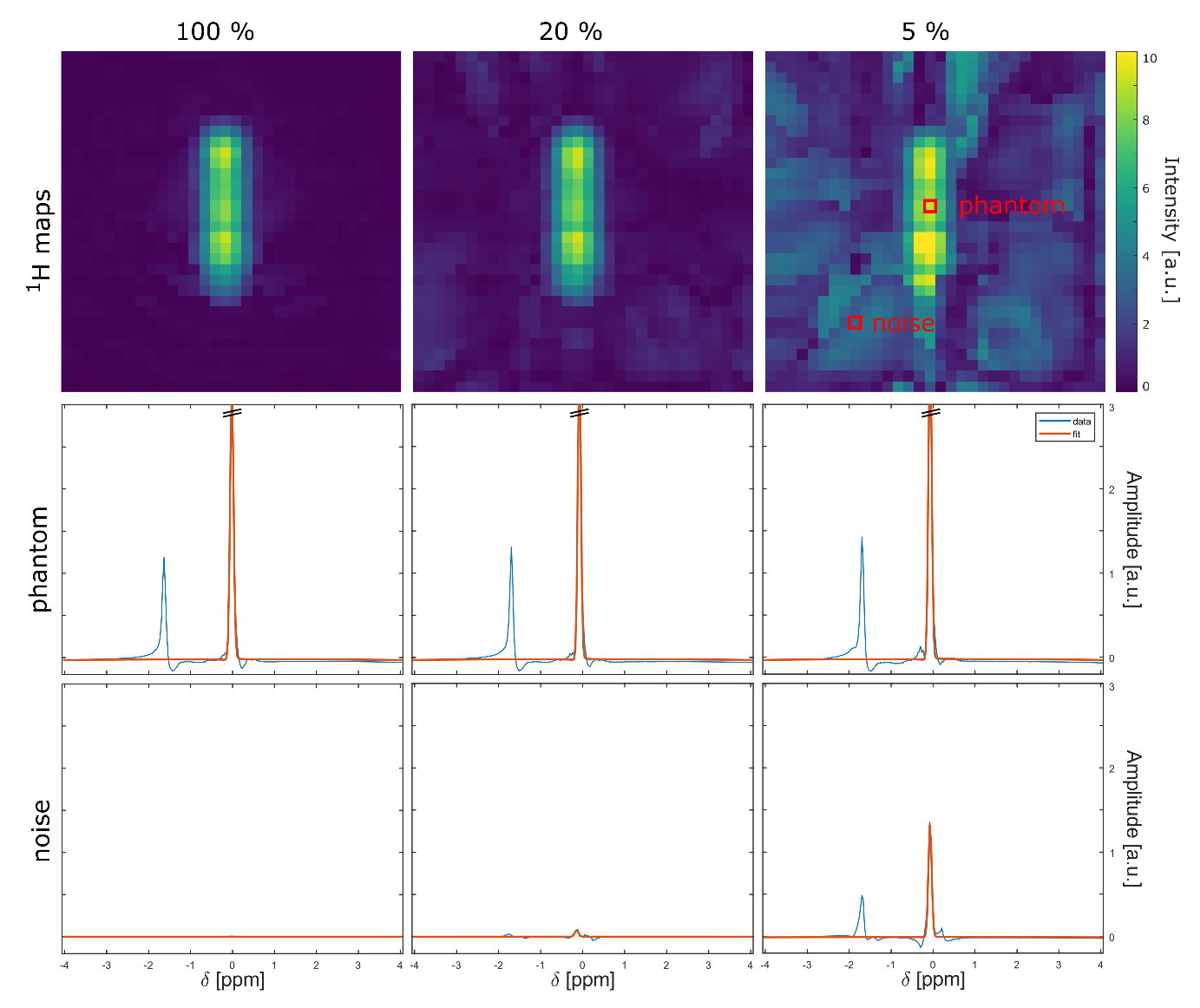
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**Supporting Information**



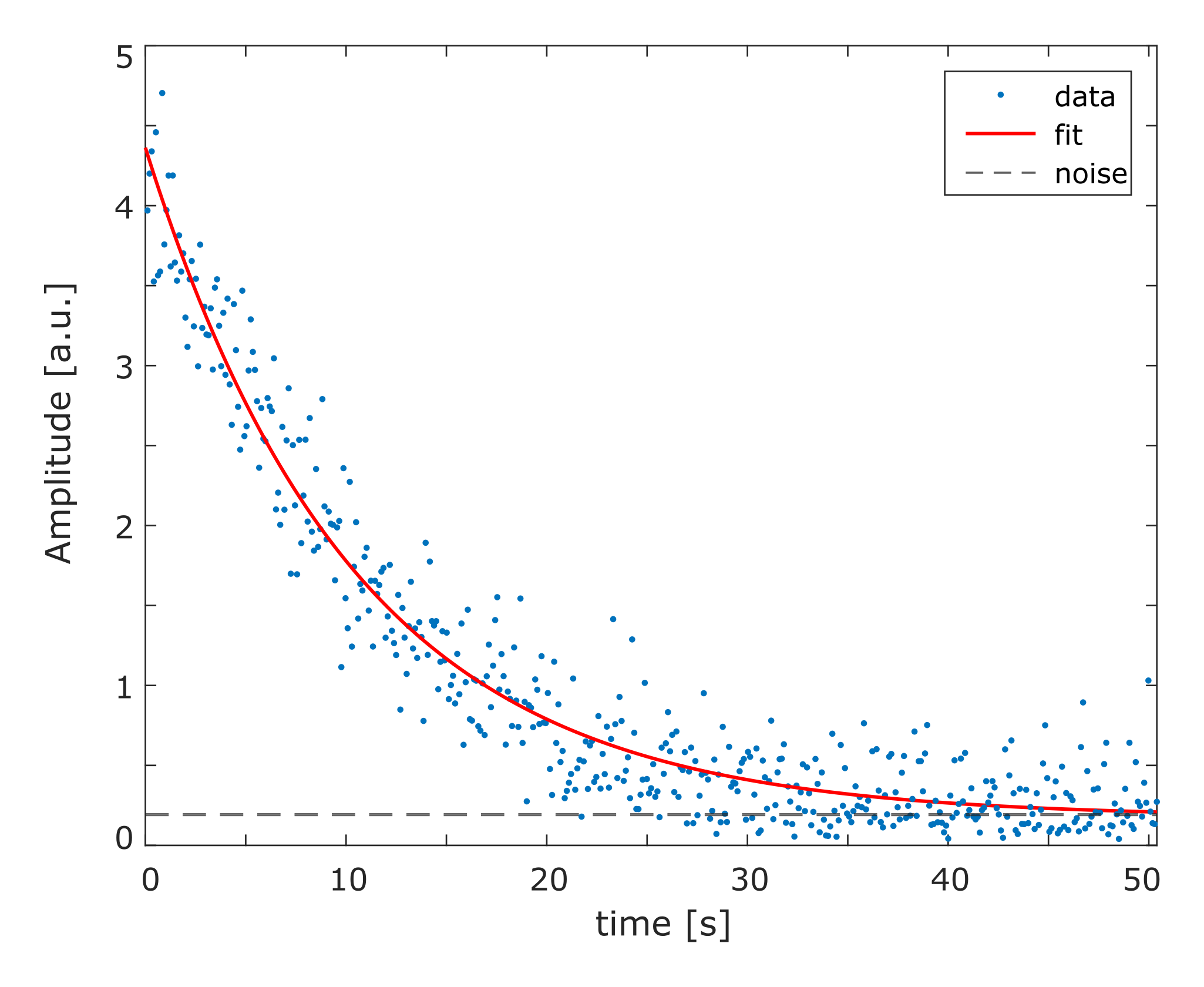
**Figure S1:** Quantified amplitudes of [1-13C]pyruvate (blue), [1-13C]lactate (red) and [1-13C]alanine (yellow) from the dynamic scan with eight timepoints and a temporal resolution of 6.3 s for 5 different rats (Animal #1 shows the data presented in the main text). The left column shows data from a selected voxel within the abdomen, the right column from the leg with an implanted tumor with a different scale for better visibility. The scale for pyruvate was divided by five in both columns. Note that in all cases pyruvate signals in the tumor are reduced compared to the abdominal voxel. The dotted line indicates the noise level.

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**Figure S2:** 1H ethylene glycol (EG) intensity maps of a representative coronal slice (top row) for decreasing spoke sampling percentage from left to right (100%, 20%, 5%). The voxel size after zero-filling is (6.23 mm)3. The intensity is determined by the fitted amplitude of the right resonance of the EG spectrum. Spectra of the indicated representative voxel within the phantom (middle row) and in the noise region (bottom row) are shown.

**Supporting Information S3:**

In the presented rEPSI scheme, the k-space center is traversed with each gradient after a time interval of TR. From these datapoints, a non-localized 13C spectrum can be reconstructed for each spoke. For the case of the in vivo measurement of Fig. 4, dynamic intra-acquisition data could be extracted with a total of 480 timepoints over 50.4 s. An exponential fit model was applied to the quantified amplitudes of [1-13C]pyruvate, which yielded the global effective T1 to be (10.4 ± 0.5) s.



**Figure S3:** [1-13C]pyruvate amplitudes extracted from the k-space centers of all spokes of the dynamic scan (8 x 60 = 480 timepoints) with a temporal resolution of TR = 105 ms. An exponential fit model estimated the effective T1 to be (10.4 ± 0.5) s.

**Supporting Information S4:**

For testing purposes, a vendor-agnostic implementation of the rEPSI sequence using PulSeq can be found under http://doi.org/10.5281/zenodo.13319810

Note that the data presented in this study were acquired using a Siemens IDEA implementation of the rEPSI sequence, and that users of the PulSeq implementation are solely responsible to guarantee its application within the system’s specifications.