

Publication

Simultaneous acquisition of image and navigator slices using CAIPIRINHA for 4D MRI

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 3188901**Author(s)** Celicanin, Zarko; Bieri, Oliver; Preiswerk, Frank; Cattin, Philippe; Scheffler, Klaus; Santini, Francesco**Author(s) at UniBasel** [Bieri, Oliver](#) ; [Scheffler, Klaus](#) ; [Cattin, Philippe Claude](#) ;**Year** 2015**Title** Simultaneous acquisition of image and navigator slices using CAIPIRINHA for 4D MRI**Journal** Magnetic resonance in medicine**Volume** 73**Number** 2**Pages / Article-Number** 669-676**Keywords** 4D-MRI, organ motion, CAIPIRINHA, navigator, steady state, motion tracking**Mesh terms** Algorithms; Artifacts; Brain Mapping, methods; Evoked Potentials, physiology; Feasibility Studies; Humans; Image Enhancement, methods; Image Interpretation, Computer-Assisted, methods; Imaging, Three-Dimensional, methods; Magnetic Resonance Imaging, methods; Motor Cortex, physiology; Movement, physiology; Reproducibility of Results; Sensitivity and Specificity

Respiratory organ motion is still the major challenge of various image-guided treatments in the abdomen. Dynamic organ motion tracking, necessary for the treatment control, can be performed with volumetric time-resolved MRI that sequentially acquires one image and one navigator slice. Here, a novel imaging method is proposed for truly simultaneous high temporal resolution acquisition.; A standard balanced steady state free precession sequence was modified to simultaneously acquire two superimposed slices with different phase cycles, namely an image and a navigator slice. Instead of multiband RF pulses, two separate RF pulses were used for the excitation. Images were reconstructed using offline CAIPIRINHA reconstruction. Phantom and in vivo measurements of healthy volunteers were performed and evaluated.; Phantom and in vivo measurements showed good image quality with high signal-to-noise ratio (SNR) and no reconstruction issues.; We present a novel imaging method for truly simultaneous acquisition of image and navigator slices for four-dimensional (4D) MRI of organ motion. In this method, the time lag between the sequential acquisitions is eliminated, leading to an improved accuracy of organ motion models, while CAIPIRINHA reconstruction results in an improved SNR compared with an existing 4D MRI approach.

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