

The highlighted papers are those papers recognized by the reviewers as supporting MRM's goal of Reproducible Research.

## CONTENTS

### ■ SPECTROSCOPIC METHODOLOGY

#### Research Articles

- High-resolution, 3D multi-TE  $^1\text{H}$  MRSI using fast spatirospectral encoding and subspace imaging,** Zepeng Wang, Yahang Li, and Fan Lam ..... 1103  
*Published online 9 November 2021*

- Assessment of measurement precision in single-voxel spectroscopy at 7 T: Toward minimal detectable changes of metabolite concentrations in the human brain *in vivo*,** Layla Tabea Riemann, Christoph Stefan Aigner, Stephen L. R. Ellison, Rüdiger Brühl, Ralf Mekle, Sebastian Schmitter, Oliver Speck, Georg Rose, Bernd Ittermann, and Ariane Fillmer ..... 1119  
*Published online 16 November 2021*

- Dynamic  $^{13}\text{C}$  MR spectroscopy as an alternative to imaging for assessing cerebral metabolism using hyperpolarized pyruvate in humans,** Junjie Ma, Marco C. Pinho, Crystal E. Harrison, Jun Chen, Chenhao Sun, Edward P. Hackett, Jeff Liticker, James Ratnakar, Galen D. Reed, Albert P. Chen, A. Dean Sherry, Craig R. Malloy, Steven M. Wright, Christopher J. Madden, and Jae Mo Park ..... 1136  
*Published online 22 October 2021*

- Optimization of spectrally selective 180° radiofrequency pulse timings in J-difference editing (MEGA) of lactate,** Sandeep K. Ganji, Zhongxu An, Vivek Tiwari, Yongmin Chang, Toral R. Patel, Elizabeth A. Maher, and Changho Choi ..... 1150  
*Published online 17 October 2021*

#### Technical Notes

- Residual quadrupolar couplings observed in 7 Tesla deuterium MR spectra of skeletal muscle,** Ayhan Gursan, Martijn Froeling, Arjan D. Hendriks, Dimitri Welting, Arno P. M. Kentgens, Dennis W. J. Klomp, and Jeanine J. Prompers ..... 1165  
*Published online 17 October 2021*

- 3D localized lactate detection in muscle tissue using double-quantum filtered  $^1\text{H}$  MRS with adiabatic refocusing pulses at 7 T,** Fabian Niess, Sigrun Roat, Wolfgang Bogner, Martin Kršák, Graham J. Kemp, Albrecht I. Schmid, Siegfried Trattnig, Ewald Moser, Maxim Zaitsev, and Martin Meyerspeer ..... 1174  
*Published online 31 October 2021*

### ■ IMAGING METHODOLOGY

#### Guidelines

- Development, validation, qualification, and dissemination of quantitative MR methods: Overview and recommendations by the ISMRM quantitative MR study group,** Sebastian Weingärtner, Kimberly L. Desmond, Nancy A. Obuchowski, Bettina Baessler, Yuxin Zhang, Emma Biondetti, Dan Ma, Xavier Golay, Michael A. Boss, Jeffrey L. Gunter, Kathryn E. Keenan, and Diego Hernando ..... 1184  
*Published online 26 November 2021*

#### Rapid Communication

- Cerebrospinal fluid-tissue exchange revealed by phase alternate labeling with null recovery MRI,** Anna M. Li, and Jiadi Xu ..... 1207  
*Published online 19 November 2021*

#### Research Articles

- Shim optimization with region of interest-specific Tikhonov regularization: Application to second-order slice-wise shimming of the brain,** Yuhang Shi, Stuart Clare, and Signe Johanna Vannesjo ..... 1218  
*Published online 16 November 2021*

#### Fundamentals of turbulent flow spectrum

- imaging,** Hannes Dillinger, Charles McGrath, Christian Guenthner, Sebastian Kozerke ..... 1231  
*Published online 16 November 2021*

- Complex  $\mathbf{B}_1^+$  mapping with Carr-Purcell spin echoes and its application to electrical properties tomography,** Santhosh Iyyakkunnel, Matthias Weigel, Carl Ganter, and Oliver Bieri ..... 1250  
*Published online 9 November 2021*

#### Reduction of motion effects in myocardial arterial

- spin labeling,** Verónica Aramendia-Vidaurreta, Pedro M. Gordaliza, Marta Vidorreta, Rebeca Echeverría-Chasco, Gorka Bastarrika, Arrate Muñoz-Barrutia, and María A. Fernández-Seara ..... 1261  
*Published online 13 October 2021*

## CONTENTS

**Off-resonance saturation as an MRI method to quantify mineral-iron in the post-mortem brain,** Lucia Bossoni, Ingrid Hegeman-Kleinn, Sjoerd G. van Duijen, Marjolein Bulk, Lena H. P. Vroegindeweij, Janneke G. Langendonk, Lydiane Hirschler, Andrew Webb, and Louise van der Weerd.....1276  
*Published online 15 October 2021*

**QSMxT: Robust masking and artifact reduction for quantitative susceptibility mapping,** Ashley Wilton Stewart, Simon Daniel Robinson, Kieran O'Brien, Jin Jin, Georg Widhalm, Gilbert Hangel, Angela Walls, Jonathan Goodwin, Korbinian Eckstein, Monique Tourell, Catherine Morgan, Aswin Narayanan, Markus Barth, and Steffen Bollmann .....1289  
*Published online 22 October 2021*

**Enhancing the spatial resolution of hyperpolarized carbon-13 MRI of human brain metabolism using structure guidance,** Matthias J. Ehrhardt, Ferdia A. Gallagher, Mary A. McLean, and Carola-Bibiane Schönlieb.....1301  
*Published online 22 October 2021*

**Correlated noise in brain magnetic resonance elastography,** Ariel J. Hannum, Grace McIlvain, Damian Sowinski, Matthew D. J. McGarry, and Curtis L. Johnson .....1313  
*Published online 22 October 2021*

**Separating spin compartments in arterial spin labeling using delays alternating with nutation for tailored excitation (DANTE) pulse: A validation study using T<sub>2</sub>-relaxometry and application to arterial cerebral blood volume imaging,** Shota Ishida, Hirohiko Kimura, Naoyuki Takei, Yasuhiro Fujiwara, Tsuyoshi Matsuda, Masayuki Kanamoto, Yuki Matta, Nobuyuki Kosaka, and Eiji Kidoya.....1329  
*Published online 22 October 2021*

**A strategy to reduce the sensitivity of inhomogeneous magnetization transfer (ihMT) imaging to radiofrequency transmit field variations at 3 T,** Lucas Soustelle, Thomas Troalen, Andreea Hertanu, Samira Mchinda, Jean-Philippe Ranjeva, Maxime Guye, Gopal Varma, David C. Alsop, Guillaume Duhamel, and Olivier M. Girard .....1346  
*Published online 15 November 2021*

**Pulse encoding for ZTE imaging: RF excitation without dead-time penalty,** Romain Froidevaux, Markus Weiger, and Klaas P. Pruessmann .....1360  
*Published online 14 November 2021*

**Three-dimensional simultaneous brain mapping of T1, T2, T<sub>2</sub><sup>\*</sup>, and magnetic susceptibility with MR Multitasking,** Tianle Cao, Sen Ma, Nan Wang, Sara Gharabaghi, Yibin Xie, Zhaoyang Fan, Elliot Hogg, Chaowei Wu, Fei Han, Michele Tagliati, E. Mark Haacke, Anthony G. Christodoulou, and Debiao Li .....1375  
*Published online 27 October 2021*

**Measuring radiofrequency field-induced temperature variations in brain MRI exams with motion compensated MR thermometry and field monitoring,** Caroline Le Ster, Franck Mauconduit, Christian Mirkes, Alexandre Vignaud, and Nicolas Boulant .....1390  
*Published online 22 October 2021*

**Simultaneous 3D-TOF angiography and 4D-flow MRI with enhanced flow signal using multiple overlapping thin slab acquisition and magnetization transfer,** Dahan Kim, Laura Eisenmenger, Patrick Turski, and Kevin M. Johnson .....1401  
*Published online 27 October 2021*

**Optimization of spin-lock times in T<sub>1p</sub> mapping of knee cartilage: Cramér-Rao bounds versus matched sampling-fitting,** Marcelo V. W. Zibetti, Azadeh Sharifi, and Ravinder R. Regatte .....1418  
*Published online 4 November 2021*

**Microscopic multifrequency MR elastography for mapping viscoelasticity in zebrafish,** Jakob Ernst Luis Jordan, Gergely Bertalan, Tom Meyer, Heiko Tzschätzsch, Anton Gauert, Luca Bramè, Helge Herthum, Yasmine Safranou, Leif Schröder, Jürgen Braun, Anja I. H. Hagemann, and Ingolf Sack .....1435  
*Published online 9 November 2021*

**Temperature dependence, accuracy, and repeatability of T<sub>1</sub> and T<sub>2</sub> relaxation times for the ISMRM/NIST system phantom measured using MR fingerprinting,** Ben K. Statton, Joely Smith, Mary E. Finnegan, Gregor Koerzdoerfer, Rebecca A. Quest, and Matthew Grech-Sollars ....1446  
*Published online 9 November 2021*

**Quantitative susceptibility mapping of the head-and-neck using SMURF fat-water imaging with chemical shift and relaxation rate corrections,** Beata Bachrata, Siegfried Trattnig, and Simon Daniel Robinson .....1461  
*Published online 30 November 2021*

## CONTENTS

### Technical Notes

- In vivo hyperCEST imaging: Experimental considerations for a reliable contrast,** Christian T. McHugh, Michele Kelley, Nicholas J. Bryden, and Rosa T. Branca.....1480  
*Published online 2 October 2021*

- Utilizing flip angle/TR equivalence to reduce breath hold duration in hyperpolarized  $^{129}\text{Xe}$  1-point Dixon gas exchange imaging,** Peter J. Niedbalski, Junlan Lu, Chase S. Hall, Mario Castro, John P. Mugler III, Yun M. Shim, and Bastiaan Driehuys .....1490  
*Published online 13 October 2021*

- Mapping electric bulk conductivity in the human heart,** Ulrich Katscher, and Steffen Weiss.....1500  
*Published online 5 November 2021*

## ■ BIOPHYSICS AND BASIC BIOMEDICAL RESEARCH

### Rapid Communication

- Correlated functional connectivity and glucose metabolism in brain white matter revealed by simultaneous MRI/positron emission tomography,** Bin Guo, Fugen Zhou, Muwei Li, John C. Gore, and Zhaohua Ding .....1507  
*Published online 26 November 2021*

## ■ COMPUTER PROCESSING AND MODELING

### Research Articles

- Comparison of SAR distribution of hip and knee implantable devices in 1.5T conventional cylindrical-bore and 1.2T open-bore vertical MRI systems,** Kyoko Fujimoto, Tayeb A. Zaidi, David Lampman, Joshua W. Guag, Shawn Etheridge, Hideta Habara, and Sunder S. Rajan .....1515  
*Published online 14 November 2021*

- Deep neural network based CEST and AREX processing: Application in imaging a model of Alzheimer's disease at 3 T,** Jianpan Huang, Joseph H. C. Lai, Kai-Hei Tse, Gerald W. Y. Cheng, Yang Liu, Zilin Chen, Xiongqi Han, Lin Chen, Jiadi Xu, and Kannie W. Y. Chan .....1529  
*Published online 17 October 2021*

- Slab boundary artifact correction in multislab imaging using convolutional-neural-network-enabled inversion for slab profile encoding,** Jieying Zhang, Simin Liu, Erpeng Dai, Xinyu Ye, Diwei Shi, Yuhuan Wu, Jie Lu, and Hua Guo.....1546  
*Published online 15 October 2021*

- Extraction of a vascular function for a fully automated dynamic contrast-enhanced magnetic resonance brain image processing pipeline,** Wallace S. Loos, Roberto Souza, Linda B. Andersen, R. Marc Lebel, and Richard Frayne.....1561  
*Published online 27 October 2021*

### Technical Notes

- Aliasing-free reduced field-of-view parallel imaging,** Sen Jia, Zhilang Qiu, Lei Zhang, Haifeng Wang, Gang Yang, Xin Liu, Dong Liang, and Hairong Zheng.....1574  
*Published online 9 November 2021*

- QQ-NET – using deep learning to solve quantitative susceptibility mapping and quantitative blood oxygen level dependent magnitude (QSM+qBOLD or QQ) based oxygen extraction fraction (OEF) mapping,** Junghun Cho, Jinwei Zhang, Pascal Spincemaille, Hang Zhang, Simon Hubertus, Yan Wen, Ramin Jafari, Shun Zhang, Thanh D. Nguyen, Alexey V. Dimov, Ajay Gupta, and Yi Wang .....1583  
*Published online 31 October 2021*

- Ensuring respiratory phase consistency to improve cardiac function quantification in real-time CMR,** Chong Chen, Preethi Chandrasekaran, Yingmin Liu, Orlando P. Simonetti, Matthew Tong, and Rizwan Ahmad .....1595  
*Published online 31 October 2021*

## ■ HARDWARE AND INSTRUMENTATION

### Technical Notes

- An anthropomorphic pelvis phantom for MR-guided prostate interventions,** Dominik F. Bauer, Anne Adlung, Irène Brumer, Alena-Kathrin Golla, Tom Russ, Eva Oelschlegel, Fabian Tollens, Sven Clausen, Philipp Aumüller, Lothar R. Schad, Dominik Nörenberg, and Frank G. Zöllner.....1605  
*Published online 15 October 2021*

- Insertable inductively coupled volumetric coils for MR microscopy in a human 7T MR system,** Tomohisa Okada, Shinya Handa, Bill Ding, Shin-ichi Urayama, Koji Fujimoto, Atsushi Shima, Daisuke Yoshii, Takashi Ayaki, Nobukatsu Sawamoto, Ryosuke Takahashi, Hirotaka Onoe, Tadashi Isa, and Labros Petropoulos .....1613  
*Published online 1 November 2021*

## ■ ESR

### Research Article

- OxyChip embedded with radio-opaque gold nanoparticles for anatomic registration and oximetry in tissues,** Maciej M. Kmiec, Kendra A. Hebert, Dan Tse, Sassan Hodge, Benjamin B. Williams, Philip E. Schaner, and Periannan Kuppusamy .....1621  
*Published online 31 October 2021*