

## CONTENTS

### ■ SPECTROSCOPIC METHODOLOGY

#### Full Paper

- The pH Heterogeneity in Human Calf Muscle During Neuromuscular Electrical Stimulation,** Norman Stutzig, Reinhard Rzanny, Kevin Moll, Alexander Gussew, Jürgen R. Reichenbach, and Tobias Siebert ..... 2097  
*Published online 20 July 2016*

#### Note

- Reproducibility of Quantitative Indices of Lung Function and Microstructure from <sup>129</sup>Xe Chemical Shift Saturation Recovery (CSSR) MR Spectroscopy,** Neil J. Stewart, Felix C. Horn, Graham Norquay, Guilhem J. Collier, Denise P. Yates, Rod Lawson, Helen Marshall, and Jim M. Wild ..... 2107  
*Published online 1 July 2016*

### ■ PRECLINICAL AND CLINICAL SPECTROSCOPY

#### Full Paper

- Multiclass Imbalance Learning: Improving Classification of Pediatric Brain Tumors from Magnetic Resonance Spectroscopy,** Niloufar Zarinabad, Martin Wilson, Simrandip K. Gill, Karen A. Manias, Nigel P. Davies, and Andrew C. Peet ..... 2114  
*Published online 12 July 2016*

### ■ IMAGING METHODOLOGY

#### Full Papers

- Accelerated MRI of the Fetal Heart Using Compressed Sensing and Metric Optimized Gating,** Christopher W. Roy, Mike Seed, and Christopher K. Macgowan ..... 2125  
*Published online 2 June 2016*
- Measurement of Bound and Pore Water T<sub>1</sub> Relaxation Times in Cortical Bone Using Three-Dimensional Ultrashort Echo Time Cones Sequences,** Jun Chen, Eric Y. Chang, Michael Carl, Yajun Ma, Hongda Shao, Bimin Chen, Zhihong Wu, and Jiang Du ..... 2136  
*Published online 6 June 2016*

- MR Imaging of Iliofemoral Peripheral Vascular Calcifications using Proton Density-Weighted, In-Phase Three-Dimensional Stack-of-Stars Gradient Echo,** Marcos P. Ferreira Botelho, Ioannis Koktzoglou, Jeremy D. Collins, Shivraman Giri, James C. Carr, NavYash Gupta, and Robert R. Edelman ..... 2146  
*Published online 14 June 2016*

- High Resolution CBV Assessment With PEAK-EPI: k-t-Undersampling and Reconstruction in Echo Planar Imaging,** Rebecca Ramb, Irina Mader, Bernd Jung, Jürgen Hennig, and Maxim Zaitsev ..... 2153  
*Published online 25 June 2016*

- Two-Dimensional Single-Shot Diffusion-Weighted Stimulated EPI With Reduced FOV for Ultrahigh-b Radial Diffusion-Weighted Imaging of Spinal Cord,** Nabraj Sapkota, Xianfeng Shi, Lubdha M. Shah, Erica F. Bisson, John W. Rose, and Eun-Kee Jeong ..... 2167  
*Published online 14 June 2016*

- Rapid Measurement of Brain Macromolecular Proton Fraction With Transient Saturation Transfer MRI,** Peter van Gelderen, Xu Jiang, and Jeff H. Duyn ..... 2174  
*Published online 25 June 2016*

- SNR Efficiency of Combined Bipolar Gradient Echoes: Comparison of Three-Dimensional FLASH, MPRAGE, and Multiparameter Mapping With VFA-FLASH and MP2RAGE,** Jean-David Jutras, Keith Wachowicz, Guillaume Gilbert, and Nicola De Zanche ..... 2186  
*Published online 15 July 2016*

- A Linear Mixed Perfusion Model for Tissue Partial Volume Correction of Perfusion Estimates in Dynamic Susceptibility Contrast MRI: Impact on Absolute Quantification, Repeatability, and Agreement With Pseudo-Continuous Arterial Spin Labeling,** André Ahlgren, Ronnie Wirestam, Emelie Lind, Freddy Ståhlberg, and Linda Knutsson ..... 2203  
*Published online 20 June 2016*

# CONTENTS

**A Novel Profile/View Ordering With a Non-Convex Star Shutter for High-Resolution 3D Volumetric T<sub>1</sub> Mapping Under Multiple Breath-Holds,** Sui-Cheng Wang, Amit R. Patel, Akiko Tanaka, Hui Wang, Takeyoshi Ota, Roberto M. Lang, Timothy J. Carroll, and Keigo Kawaji ..... 2215  
*Published online 12 July 2016*

**Chemical Exchange Saturation Transfer (CEST) Imaging With Fast Variably-accelerated Sensitivity Encoding (vSENSE),** Yi Zhang, Hye-Young Heo, Dong-Hoon Lee, Shanshan Jiang, Xuna Zhao, Paul A. Bottomley, and Jinyuan Zhou ..... 2225  
*Published online 1 July 2016*

**Impact of Transcytolemmal Water Exchange on Estimates of Tissue Microstructural Properties Derived from Diffusion MRI,** Hua Li, Xiaoyu Jiang, Jingping Xie, John C. Gore, and Junzhong Xu ..... 2239  
*Published online 25 June 2016*

**Gradient Pre-Emphasis to Counteract First-Order Concomitant Fields on Asymmetric MRI Gradient Systems,** Shengzhen Tao, Paul T. Weavers, Joshua D. Trzasko, Yunhong Shu, John Huston III, Seung-Kyun Lee, Louis M. Frigo, and Matt A. Bernstein ..... 2250  
*Published online 4 July 2016*

**Characterization of Perfluorocarbon Relaxation Times and Their Influence on the Optimization of Fluorine-19 MRI at 3 Tesla,** Roberto Colotti, Jessica A.M. Bastiaansen, Anne Wilson, Ulrich Flögel, Christine Gonzales, Juerg Schwitter, Matthias Stuber, and Ruud B. van Heeswijk ..... 2263  
*Published online 6 July 2016*

**Amide Proton Transfer Imaging of Brain Tumors Using a Self-Corrected 3D Fast Spin-Echo Dixon Method: Comparison With Separate B<sub>0</sub> Correction,** Osamu Togao, Jochen Keupp, Akio Hiwatashi, Koji Yamashita, Kazufumi Kikuchi, Masami Yoneyama, and Hiroshi Honda ..... 2272  
*Published online 6 July 2016*

**Comparison of Pulsed Three-Dimensional CEST Acquisition Schemes at 7 Tesla: Steady State Versus Pseudosteady State,** Vitaliy Khlebnikov, Nicolas Geades, Dennis W. J. Klomp, Hans Hoogduin, Penny Gowland, and Olivier Mougin ..... 2280  
*Published online 25 July 2016*

## Notes

**Multiple Breath Washout of Hyperpolarized <sup>129</sup>Xe and <sup>3</sup>He in Human Lungs With Three-Dimensional Balanced Steady-State Free-Precession Imaging,** Felix C. Horn, Madhwesha Rao, Neil J. Stewart, and Jim M. Wild ..... 2288  
*Published online 12 July 2016*

**Fast Measurement of Blood T<sub>1</sub> in the Human Carotid Artery at 3T: Accuracy, Precision, and Reproducibility,** Wenbo Li, Peiyong Liu, Hanzhang Lu, John J. Strouse, Peter C.M. van Zijl, and Qin Qin ..... 2296  
*Published online 20 July 2016*

**Externally Calibrated Parallel Imaging for 3D Multispectral Imaging Near Metallic Implants Using Broadband Ultrashort Echo Time Imaging,** Curtis N. Wiens, Nathan S. Artz, Hyungseok Jang, Alan B. McMillan, and Scott B. Reeder ..... 2303  
*Published online 12 July 2016*

## ■ PRECLINICAL AND CLINICAL IMAGING

### Full Papers

**Assessment of Turbulent Flow Effects on the Vessel Wall Using Four-Dimensional Flow MRI,** Magnus Ziegler, Jonas Lantz, Tino Ebbers, and Petter Dyverfeldt ..... 2310  
*Published online 28 June 2016*

**Measurement of Extracellular Volume and Transit Time Heterogeneity Using Contrast-Enhanced Myocardial Perfusion MRI in Patients After Acute Myocardial Infarction,** Karl P. Kunze, Christoph Rischpler, Carmel Hayes, Tareq Ibrahim, Karl-Ludwig Laugwitz, Axel Haase, Markus Schwaiger, and Stephan G. Nekolla ..... 2320  
*Published online 1 July 2016*

**Joint Eigenvector Estimation from Mutually Anisotropic Tensors Improves Susceptibility Tensor Imaging of the Brain, Kidney, and Heart,** Russell Dibb and Chunlei Liu ..... 2331  
*Published online 6 July 2016*

**An Empirical Method for Reducing Variability and Complexity of Myocardial Perfusion Quantification by Dual Bolus Cardiac MRI,** Neil Chatterjee, Brandon C. Benefield, Kathleen R. Harris, Jacob U. Fluckiger, Timothy Carroll, and Daniel C. Lee ..... 2347  
*Published online 8 September 2016*

**Combining Hyperpolarized <sup>13</sup>C MRI With a Liver-Specific Gadolinium Contrast Agent for Selective Assessment of Hepatocyte Metabolism,** Michael A. Ohliger, Cornelius von Morze, Irene Marco-Rius, Jeremy Gordon, Peder E.Z. Larson, Robert Bok, Hsin-yu Chen, John Kurhanewicz, and Daniel Vigneron ..... 2356  
*Published online 14 June 2016*

**Empirical Model of Human Blood Transverse Relaxation at 3T Improves MRI T<sub>2</sub> Oximetry,** Adam Bush, Matthew Borzage, John Detterich, Roberta M. Kato, Herbert J. Meiselman, Thomas Coates, and John C. Wood ..... 2364  
*Published online 6 July 2016*

# CONTENTS

## ■ BIOPHYSICS AND BASIC BIOMEDICAL RESEARCH

### Full Papers

- EPR Analysis of Extra- and Intracellular Nitric Oxide in Liver Biopsies,** Sergiu D. Dumitrescu, Andras T. Meszaros, Stefan Puchner, Adelheid Weidinger, Mihaly Boros, Heinz Redl, and Andrey V. Kozlov ..... 2372  
*Published online 1 July 2016*

- Myocardial Effective Transverse Relaxation Time T2\* Correlates With Left Ventricular Wall Thickness: A 7.0 T MRI Study,** Till Huelnhagen, Fabian Hezel, Teresa Serradas Duarte, Andreas Pohlmann, Celal Oezerdem, Bert Flemming, Erdmann Seeliger, Marcel Prothmann, Jeanette Schulz-Menger, and Thoralf Niendorf..... 2381  
*Published online 25 June 2016*

## ■ COMPUTER PROCESSING AND MODELING

### Full Papers

- Fat-Water Separation Using a Region-Growing Algorithm With Self-Feeding Phasor Estimation,** Chuanli Cheng, Chao Zou, Changhong Liang, Xin Liu, and Hairong Zheng..... 2390  
*Published online 14 June 2016*

- Metallic Implant Geometry and Susceptibility Estimation Using Multispectral B<sub>0</sub> Field Maps,** Xinwei Shi, Daehyun Yoon, Kevin M. Koch, and Brian A. Hargreaves..... 2402  
*Published online 6 July 2016*

## Comparison of Linear and Nonlinear Implementation of the Compartmental Tissue Uptake Model for Dynamic Contrast-Enhanced MRI,

- Jesper F. Kallehauge, Steven Sourbron, Benjamin Irving, Kari Tanderup, Julia A. Schnabel, and Michael A. Chappell ..... 2414  
*Published online 8 September 2016*

## ■ HARDWARE AND INSTRUMENTATION

### Notes

- Focal Point Determination in Magnetic Resonance-Guided Focused Ultrasound Using Tracking Coils,** Bryant T. Svedin, Michael J. Beck, J. Rock Hadley, Robb Merrill, Joshua T. de Bever, Bradley D. Bolster Jr., Allison Payne, and Dennis L. Parker..... 2424  
*Published online 15 July 2016*

- Quadrature Operation of Segmented Dielectric Resonators Facilitated With Metallic Connectors,** Rita Schmidt, Wouter Teeuwisse, and Andrew Webb..... 2431  
*Published online 25 June 2016*

## ■ ESR

### Note

- In Vivo EPR Extracellular pH-metry in Tumors Using a Triphosphonated Trityl Radical,** Valérie Marchand, Philippe Levêque, Benoit Driesschaert, Jacqueline Marchand-Brynaert, and Bernard Gallez..... 2438  
*Published online 1 July 2016*