Curriculum Vitae

Personal

Name:	Dipl.-Ing. Fabian Niess, PhD
Email:	fabian.niess@meduniwien.ac.at
Languages:	German, English (C2), Czech (A1), Slovak (A1)

Academic and Professional Record

Academic Record

07/2015 - 02/2020	Medical Physics (PhD), *Medical University of Vienna*
03/2012 - 06/2015	Biomedical Engineering (MSc), *Technical University of Graz*
02/2013 - 07/2013	Erasmus Exchange Program, *Czech Technical University Prag*
10/2007 - 02/2012	Biomedical Engineering (BSc), *Technical University of Graz*
10/2002 - 06/2007	Matura, *HTL Bulme Graz Gösting* (Technical School)

Professional Record

01/2024-	Postdoc (ERC funded) *Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna*
01/2022-01/2024	Research associate *Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna*
10/2021-01/2022	Postdoc (FWF funded) *Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna*
04/2021-10/2021	Postdoc (FWF funded) *Department of Medicine III, Division of Endocrinology and Metabolism, Medical University of Vienna*
01/2021-04/2021	Postdoc (FWF funded) *Department of Biomedical Imaging and Image-guided Therapy, Medical University of Vienna*
04/2020-01/2021	Postdoc (FWF funded) *Center for Medical Physics and Biomedical Engineering, Medical University of Vienna*
07/2015-03/2020	PhD Candidate (FWF funded) *Center for Medical Physics and Biomedical Engineering, Medical University of Vienna*
01/2015-06/2015	Master Candidate (FWF funded) *Center for Medical Physics and Biomedical Engineering, Medical University of Vienna*
08/2013-09/2013	Praktikum *Center for Medical Physics and Biomedical Engineering, Medical University of Vienna*

Main areas of research

- Non-invasive assessment of glucose metabolism at 3T and 7T using direct (2H-MRSI) and indirect (1H-MRSI) detection of deuterium labeled substrates.
- Pulse sequence development (Siemens IDEA) and data processing for MR spectroscopy and imaging at high field (3 T) and ultra high field (7 T) (dynamic ^{31}P spectroscopy, time resolved ^{1}H perfusion imaging, multi-nuclear interleaved NMR, Cartesian and non-Cartesian k-space sampling for MRSI)
- Intracellular high energy metabolism and oxygenation of healthy human muscle tissue (functional, hemodynamic and metabolic response to voluntary exercise and/or ischemia)
- Resting and post exercise lactate quantification in healthy human muscles (3D localized Double Quantum Filtered ^{1}H MR spectroscopy at 7 T)

Short Description

I am a biomedical engineer by training and focused during my master thesis and my PhD studies mainly on pulse sequence development on Siemens MR scanners using IDEA. The fact that a simultaneous acquisition of proton and X-nuclei signals was theoretically feasible, but technically challenging (requires hardware/software modification) and had not been implemented at ultra-high field (7 tesla), motivated me and became the main focus of my PhD thesis. This principle of interleaved multi-nuclear data acquisition was then applied to combine two individual pulse sequences (^{1}H Arterial Spin Labelling MRI and ^{31}P semi-laser MR spectroscopy), which allows for a simultaneous assessment of dynamic perfusion, T_2^*-weighted and metabolic data. The development and application of the method resulted in three individual first author manuscripts (*Magnetic Resonance in Medicine* 2017 and 2020, *NMR in Biomedicine* 2018), which were investigating inhomogeneities of the metabolic and functional response to exercise across the healthy human calf and along single muscle groups. In the first year of my Postdoc I implemented a double quantum filter ^{1}H MRS sequence with adiabatic refocusing pulses for application at 7T, which was tested in phantom containing a lactate solution, meat specimen with injected lactate and in vivo, quantified in a human calf muscle during rest, plantar flexion exercise and recovery. This resulted in another first author publication in *Magnetic Resonance in Medicine* 2021. Later I started working together with Prof. Wolfgang Bogner and switched my main area of interest from muscle energy metabolism to brain glucose metabolism mainly focusing on dynamic detection of deuterium labeled substrates (direct via 2H MRSI and indirect via 1H MRSI) which resulted in 4 top publications (3 as first author) during the year 2023 in *Nature in Biomedical Engineering* 2023, *Investigative Radiology* 2023 *Neuroimage* 2023 and *Human Brain Mapping* 2024.

Achievements and other activities

- Invited Educational Presentation on DMI, ISMRM Workshop: MR Spectroscopy: Frontiers in Molecular and Metabolic Imaging 15-18 October 2024 Boston, MA, USA
- Invited Educational Presentation, Annual Meeting ISMRM 04-09 May 2024 Singapore
- Invited Oral Presentation at 14th Annual Scientific Symposium UHF Magnetic Resonance, 08. September 2023, Max Delbrück Center Berlin, Germany
- Young Steam Engines for Innovations Award, 14th Annual Scientific Symposium UHF Magnetic Resonance, 08. September 2023, Max Delbrück Center Berlin, Germany
- ISMRM Summa Cum Laude Merit Award, Annual Meeting ISMRM 03-08 June 2023, Toronto, Canada. (Oral Presentation)

- ISMRM Magna Cum Laude Merit Award, Joint Annual Meeting ISMRM-ESMRMB 16-21 June 2018, Paris, France. (Oral Presentation)
- Best Poster Presentation, ISMRM MRS Workshop 2018 Utrecht, Netherlands
- Review activity for *NMR in Biomedicine* and *Magnetic Resonance in Medicine*

Grants

- Imaging dynamics of glioma metabolism via MRI (2022), Austrian Science Fund, Principal Investigator (€399k)

Publication summary (2015-2023)

Orcid: https://orcid.org/0000-0003-1235-7595
Google Scholar: https://scholar.google.com/citations?user=bLYQPC8AAAAJ&hl=de&oi=ao

h-factor: 8 (google scholar)
12 peer-reviewed publications (7 as first author)
11 first author conference contributions (7 oral presentation)

Publications

Niess F, Strasser B, Hingerl L, Bader V, Frese S, Clarke WT, Duguid A, Niess E, Motyka S, Hangel G, Kršňák M, Trattnig S, Scherer T, Lanzenberger R, Bogner W. Whole-brain deuterium metabolic imaging via concentric ring trajectory readout enables assessment of regional variations in neuronal glucose metabolism *Human Brain Mapping* 2024; doi: 10.1002/hbm.26686

Motyka S, Weiser P, Bachrata B, Hingerl L, Strasser B, Hangel G, Niess E, **Niess F**, Zaitsev M, Robinson SD, Langs G, Trattnig S, Bogner W. Predicting dynamic, motion-related changes in B0 field in the brain at a 7T MRI using a subject-specific fine-trained U-net. *Magnetic Resonance in Medicine* 2024; doi: 10.1002/mrm.29980

Klepochova R, **Niess F**, Meyerspeer M, Slukova D, Just I, Trattnig S, Ukropec J, Ukropcova B, Kautzky-Willer A, Leutner M, Kršňák M. Correlation between skeletal muscle acetylcarnitine and phosphocreatine metabolism during submaximal exercise and recovery: interleaved 1H/31P MRS 7 T study. *Scientific Reports* 14, 3254, 2024; doi: 10.1038/s41598-024-53221-x

Niess F, Strasser B, Hingerl L, Niess E, Motyka S, Hangel G, Kršňák M, Gruber S, Spurny-Dworak B, Trattnig S, Scherer T, Lanzenberger R, Bogner W. Reproducibility of 3D MRSI for imaging human brain glucose metabolism using direct (2H) and indirect (1H) detection of deuterium labeled compounds at 7T and clinical 3T. *Neuroimage* 2023; doi: 10.1016/j.neuroimage.2023.120250

Niess F, Hingerl L, Strasser B, Bednarik P, Goranovic D, Niess E, Hangel G, Kršňák M, Spurny-Dworak B, Scherer T, Lanzenberger R, Bogner W. Noninvasive 3-Dimensional 1H-Magnetic Resonance Spectroscopic Imaging of Human Brain Glucose and Neurotransmitter Metabolism Using Deuterium Labeling at 3T: Feasibility and Interscanner Reproducibility. *Investigative Radiology* 2023; doi:

10.1097/RLI.0000000000000953

Bednarik P, Goranovic D, Svatkova A, **Niess F**, Hingerl L, Strasser B, Deelchand D, Spurny-Dworak B, Krššák M, Trattnig S, Hangel G, Scherer T, Lanzenberger R, Bogner W. 1H magnetic resonance spectroscopic imaging of deuterated glucose and of neurotransmitter metabolism at 7T in the human brain. *Nature Biomedical Engineering* 2023; doi: 10.1038/s41551-023-01035-z

Niess F, Roat S, Bogner W, Krššák M, Kemp GJ, Schmid AI, Trattnig S, Moser E, Zaitsev M, Meyerspeer M. 3D localized lactate detetion in muscle tissue using double-quantum filtered ^{1}H MRS with adiabatic refocusing pulses at 7T. *Magnetic Resonance in Medicine* 2022; doi: 10.1002/mrm.29061

Niess F, Schmid AI, Bogner W, Wolzt M, Carlier P, Trattnig S, Moser E, Meyerspeer M. Interleaved ^{31}P MRS / ^{1}H ASL for analysis of metabolic and functional heterogeneity along human lower leg muscles at 7T. *Magnetic Resonance in Medicine* 2020; doi: 10.1002/mrm.28088

Niess F, Fiedler GB, Schmid AI, Laistler E, Frass-Kriegl R, Wolzt M, Moser E, Meyerspeer M. Dynamic multivoxel-localized ^{31}P MRS during plantar flexion exercise with variable knee angle. *NMR in Biomedicine* 2018;31:e3905 doi: 10.1002/nbm.3905

Niess F, Fiedler GB, Schmid AI, Goluch S, Kriegl R, Wolzt M, Moser E, Meyerspeer M. Interleaved multivoxel ^{31}P MR spectroscopy. *Magnetic Resonance in Medicine* 2017;77:921-927.
doi: 10.1002/mrm.26172

Fiedler GB, Meyerspeer M, Schmid AI, Goluch S, Schewzow K, Laistler E, Mirzahosseini A, **Niess F**, Unger E, Wolzt M, Moser E. Localized semi-LASER dynamic 31P magnetic resonance spectroscopy of the soleus during and following exercise at 7T. *Magnetic Resonance Materials in Physics* 28, pages 493–501, 2015; doi: 10.1007/s10334-015-0484-5

Fiedler GB, Schmid AI, Goluch S, Schewzow K, Laistler E, **Niess F**, Unger E, Wolzt M, Mirzahosseini A, Kemp GJ, Moser E, Meyerspeer M. Skeletal muscle ATP synthesis and cellular H+ handling measured by localized 31P-MRS during exercise and recovery. *Scientific Reports* 6, 32037, 2016; doi: 10.1038/srep32037

Wien, 24.06.2024