



Universiteit
Leiden
The Netherlands

Flow-based arterial spin labeling: from brain to body

Franklin, S.L.

Citation

Franklin, S. L. (2022, June 16). *Flow-based arterial spin labeling: from brain to body*. Retrieved from <https://hdl.handle.net/1887/3309826>

Version: Publisher's Version

License: [Licence agreement concerning inclusion of doctoral thesis in the Institutional Repository of the University of Leiden](#)

Downloaded from: <https://hdl.handle.net/1887/3309826>

Note: To cite this publication please use the final published version (if applicable).

Chapter 9

References

- [1] A. J. Pappano and W. Gil Wier, "The Microcirculation and Lymphatics," in *Cardiovascular Physiology*, Elsevier, 2013, pp. 153–170.
- [2] V. Paruchuri *et al.*, "Aortic Size Distribution in the General Population: Explaining the Size Paradox in Aortic Dissection," *Cardiology*, vol. 131, no. 4, pp. 265–272, Jul. 2015.
- [3] "Clinical Perfusion MRI: Techniques and Applications - Google Books." [Online]. Available: https://books.google.nl/books?id=Kbg0elHMDh4C&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false. [Accessed: 05-Mar-2021].
- [4] D. Hanahan and R. A. Weinberg, "Hallmarks of cancer: The next generation," *Cell*, vol. 144, no. 5, Cell, pp. 646–674, 04-Mar-2011.
- [5] P. Singh, S.-E. Ricksten, G. Bragadottir, B. Redfors, and L. Nordquist, "Renal oxygenation and haemodynamics in acute kidney injury and chronic kidney disease," *Clin. Exp. Pharmacol. Physiol.*, vol. 40, no. 2, pp. 138–147, Feb. 2013.
- [6] M. Wintermark *et al.*, "Comparative overview of brain perfusion imaging techniques.," *Stroke*, vol. 36, no. 9, pp. e83-99, Sep. 2005.
- [7] P. Sminia *et al.*, "NCS Report 26: Human exposure to ionising radiation for clinical and research purposes: radiation dose and risk estimates," Aug. 2020.
- [8] J. Hendrikse, E. T. Petersen, and X. Golay, "Vascular Disorders: Insights from Arterial Spin Labeling," *Neuroimaging Clinics of North America*, vol. 22, no. 2, Neuroimaging Clin N Am, pp. 259–269, May-2012.
- [9] J. Naqvi, K. H. Yap, G. Ahmad, and J. Ghosh, "Transcranial Doppler ultrasound: A review of the physical principles and major applications in critical care," *International Journal of Vascular Medicine*, vol. 2013, Int J Vasc Med, 2013.
- [10] J. Lohrke *et al.*, "25 Years of Contrast-Enhanced MRI: Developments, Current Challenges and Future Perspectives," *Adv. Ther.*, vol. 33, pp. 1–28, 2016.
- [11] R. Erlemann *et al.*, "Musculoskeletal neoplasms: static and dynamic Gd-DTPA-enhanced MR imaging," *Radiology*, vol. 171, no. 3, pp. 767–773, 1989.
- [12] B. R. Rosen, J. W. Belliveau, J. M. Vevea, and T. J. Brady, "Perfusion imaging with NMR contrast agents," *Magn. Reson. Med.*, vol. 14, no. 2, pp. 249–265, 1990.
- [13] D. C. Alsop *et al.*, "Recommended implementation of arterial spin-labeled perfusion MRI for clinical applications: A consensus of the ISMRM perfusion study group and the European consortium for ASL in dementia," *Magn. Reson. Med.*, vol. 73, no. 1, pp. 102–116, Jan. 2015.
- [14] N. A. Telischak, J. A. Detre, and G. Zaharchuk, "Arterial spin labeling MRI: Clinical applications in the brain," *J. Magn. Reson. Imaging*, vol. 41, no. 5, pp. 1165–1180, May 2015.
- [15] R. P. H. Bokkers, M. J. P. Van Osch, H. B. Van Der Worp, G. J. De Borst, W. P. T. M. Mali, and J. Hendrikse, "Symptomatic carotid artery stenosis: Impairment of cerebral autoregulation measured at the brain tissue level with arterial spin-labeling MR imaging," *Radiology*, vol. 256, no. 1, pp. 201–208, Jul. 2010.
- [16] G. Zaharchuk, "Arterial spin-labeled perfusion imaging in acute ischemic stroke," *Stroke*, vol. 45, no. 4, Lippincott Williams and Wilkins, pp. 1202–1207, 2014.
- [17] D. A. Wolk and J. A. Detre, "Arterial spin labeling MRI: An emerging biomarker for Alzheimer's disease and other neurodegenerative conditions," *Current Opinion in Neurology*, vol. 25, no. 4, NIH Public Access, pp. 421–428, Aug-2012.
- [18] A. Odudu *et al.*, "Arterial spin labelling MRI to measure renal perfusion: a systematic review and statement paper," *Nephrol. Dial. Transplant.*, vol. 33, pp. 15–21, 2018.
- [19] Z. Zun and C. Limperopoulos, "Placental perfusion imaging using velocity-selective arterial spin labeling," *Magn. Reson. Med.*, vol. 80, no. 3, pp. 1036–1047, Sep. 2018.

- [20] R. B. Lauffer, "Paramagnetic Metal Complexes as Water Proton Relaxation Agents for NMR Imaging: Theory and Design," *Chem. Rev.*, vol. 87, no. 5, pp. 901–927, Aug. 1987.
- [21] L. Østergaard, "Principles of cerebral perfusion imaging by bolus tracking," in *Journal of Magnetic Resonance Imaging*, 2005, vol. 22, no. 6, pp. 710–717.
- [22] G. H. Jahng, K. L. Li, L. Østergaard, and F. Calamante, "Perfusion magnetic resonance imaging: A comprehensive update on principles and techniques," *Korean Journal of Radiology*, vol. 15, no. 5. Korean Radiological Society, pp. 554–577, 01-Sep-2014.
- [23] F. Khalifa *et al.*, "Models and methods for analyzing DCE-MRI: A review," *Med. Phys.*, vol. 41, no. 12, p. 124301, Dec. 2014.
- [24] J. M. Provenzale, G. R. Wang, T. Brenner, J. R. Petrella, and A. G. Sorensen, "Comparison of permeability in high-grade and low-grade brain tumors using dynamic susceptibility contrast MR imaging," *Am. J. Roentgenol.*, vol. 178, no. 3, pp. 711–716, Nov. 2002.
- [25] F. Yuan *et al.*, "Vascular Permeability in a Human Tumor Xenograft: Molecular Size Dependence and Cutoff Size," *Cancer Res.*, vol. 55, no. 17, 1995.
- [26] Y. Gao and S. L. Heller, "Abbreviated and ultrafast breast MRI in clinical practice," *Radiographics*, vol. 40, no. 6. Radiological Society of North America Inc., pp. 1507–1527, 01-Oct-2020.
- [27] T. J. Fraum, D. R. Ludwig, M. R. Bashir, and K. J. Fowler, "Gadolinium-based contrast agents: A comprehensive risk assessment," *J. Magn. Reson. Imaging*, vol. 46, no. 2, pp. 338–353, Aug. 2017.
- [28] E. Kanal, "Gadolinium based contrast agents (GBCA): Safety overview after 3 decades of clinical experience," *Magn. Reson. Imaging*, vol. 34, no. 10, pp. 1341–1345, Dec. 2016.
- [29] R. J. McDonald *et al.*, "Gadolinium Retention: A Research Roadmap from the 2018 NIH/ACR/RSNA Workshop on Gadolinium Chelates," *Radiology*, vol. 289, no. 2, pp. 517–534, Nov. 2018.
- [30] A. Radbruch *et al.*, "Gadolinium retention in the dentate nucleus and globus pallidus is dependent on the class of contrast agent," *Radiology*, vol. 275, no. 3, pp. 783–791, Jun. 2015.
- [31] J. A. Detre, J. S. Leigh, D. S. Williams, and A. P. Koretsky, "Perfusion imaging.," *Magn. Reson. Med.*, vol. 23, no. 1, pp. 37–45, Jan. 1992.
- [32] E. C. Wong, "An introduction to ASL labeling techniques," *J. Magn. Reson. Imaging*, vol. 40, no. 1, pp. 1–10, 2014.
- [33] K. L. LEENDERS *et al.*, "CEREBRAL BLOOD FLOW, BLOOD VOLUME AND OXYGEN UTILIZATION," *Brain*, vol. 113, no. 1, pp. 27–47, Feb. 1990.
- [34] L. R. Williams and R. W. Leggett, "Reference values for resting blood flow to organs of man," *Clinical Physics and Physiological Measurement*, vol. 10, no. 3. Clin Phys Physiol Meas, pp. 187–217, 1989.
- [35] M. Taso, A. Guidon, and D. C. Alsop, "Influence of background suppression and retrospective realignment on free-breathing renal perfusion measurement using pseudo-continuous ASL," *Magn. Reson. Med.*, vol. 81, no. 4, pp. 2439–2449, Apr. 2019.
- [36] I. K. Bones *et al.*, "Enabling free-breathing background suppressed renal pCASL using fat imaging and retrospective motion correction," *Magn. Reson. Med.*, vol. 82, pp. 276–288, Mar. 2019.
- [37] D. M. Garcia, G. Duhamel, and D. C. Alsop, "Efficiency of inversion pulses for background suppressed arterial spin labeling," *Magn. Reson. Med.*, vol. 54, no. 2, pp. 366–372, Aug. 2005.
- [38] W. Dai, D. Garcia, C. de Bazelaire, and D. C. Alsop, "Continuous flow-driven inversion for arterial spin labeling using pulsed radio frequency and gradient fields.," *Magn. Reson. Med.*, vol. 60, no. 6, pp. 1488–97, Dec. 2008.
- [39] D. W. Kim *et al.*, "Measurement of arterial transit time and renal blood flow using pseudocontinuous ASL MRI with multiple post-labeling delays: Feasibility, reproducibility, and variation," *J. Magn. Reson. Imaging*, vol. 46, no. 3, pp. 813–819, Sep. 2017.

- [40] E. T. Petersen, K. Mouridsen, and X. Golay, "The QUASAR reproducibility study, Part II: Results from a multi-center Arterial Spin Labeling test-retest study," *Neuroimage*, vol. 49, no. 1, pp. 104–113, Jan. 2010.
- [41] J. Hendrikse, E. T. Petersen, P. J. Van Laar, and X. Golay, "Cerebral border zones between distal end branches of intracranial arteries: MR imaging," *Radiology*, vol. 246, no. 2, pp. 572–580, Feb. 2008.
- [42] R. P. H. Bokkers, H. B. Van Der Worp, W. P. T. M. Mali, and J. Hendrikse, "Noninvasive MR imaging of cerebral perfusion in patients with a carotid artery stenosis," *Neurology*, vol. 73, no. 11, pp. 869–875, Sep. 2009.
- [43] D. S. Bolar *et al.*, "Comparison of CBF measured with combined velocity-selective arterial spin-labeling and pulsed arterial spin-labeling to blood flow patterns assessed by conventional angiography in pediatric Moyamoya," *Am. J. Neuroradiol.*, vol. 40, no. 11, pp. 1842–1849, 2019.
- [44] P. Korovessis, P. Iliopoulos, A. Misiris, and G. Koureas, "Color Doppler Ultrasonography for Evaluation of Internal Mammary Artery Application in Adolescent Female Patients with Right-Convex Thoracic Idiopathic Scoliosis," *Spine (Phila. Pa. 1976)*, vol. 28, no. 15, pp. 1746–1748, Aug. 2003.
- [45] R. A. Jesinger, G. E. Lattin, E. A. Ballard, S. M. Zelasko, and L. M. Glassman, "Vascular abnormalities of the breast: Arterial and venous disorders, vascular masses, and mimic lesions with radiologic-pathologic correlation," *Radiographics*, vol. 31, no. 7. Radiological Society of North America , 08-Dec-2011.
- [46] L. Zhao, M. Vidorreta, S. Soman, J. A. Detre, and D. C. Alsop, "Improving the robustness of pseudo-continuous arterial spin labeling to off-resonance and pulsatile flow velocity," *Magn. Reson. Med.*, vol. 78, no. 4, pp. 1342–1351, Oct. 2017.
- [47] H. Jahanian, D. C. Noll, and L. Hernandez-Garcia, " B_0 field inhomogeneity considerations in pseudo-continuous arterial spin labeling (pCASL): effects on tagging efficiency and correction strategy," *NMR Biomed.*, vol. 24, no. 10, pp. 1202–1209, Dec. 2011.
- [48] S.-G. Kim, "Quantification of relative cerebral blood flow change by flow sensitive alternating inversion recovery (FAIR) technique: Application to functional mapping," *Magn. Reson. Med.*, vol. 34, no. 3, pp. 293–301, 1995.
- [49] E. C. Wong, M. Cronin, W. C. Wu, B. Inglis, L. R. Frank, and T. T. Liu, "Velocity-selective arterial spin labeling," *Magn. Reson. Med.*, vol. 55, no. 6, pp. 1334–1341, Jun. 2006.
- [50] W. C. Wu and E. C. Wong, "Intravascular effect in velocity-selective arterial spin labeling: The choice of inflow time and cutoff velocity," *Neuroimage*, 2006.
- [51] S. Schmid, E. Ghariq, W. M. Teeuwisse, A. Webb, and M. J. P. van Osch, "Acceleration-selective arterial spin labeling," *Magn. Reson. Med.*, vol. 71, no. 1, pp. 191–199, Jan. 2014.
- [52] J. Guo and E. C. Wong, "Increased SNR efficiency in velocity selective arterial spin labeling using multiple velocity selective saturation modules (mm-VSASL)," *Magn. Reson. Med.*, vol. 74, pp. 694–705, 2015.
- [53] Q. Qin and P. C. M. van Zijl, "Velocity-selective-inversion prepared arterial spin labeling," *Magn. Reson. Med.*, vol. 76, no. 4, pp. 1136–1148, 2016.
- [54] R. W. Brown, Y. C. N. Cheng, E. M. Haacke, M. R. Thompson, and R. Venkatesan, *Magnetic Resonance Imaging: Physical Principles and Sequence Design: Second Edition*, vol. 9780471720. Chichester, UK: John Wiley & Sons Ltd, 2014.
- [55] M. Kobari, F. Gotoh, Y. Fukuuchi, K. Tanaka, N. Suzuki, and D. Uematsu, "Blood Flow Velocity in the Pial Arteries of Cats, with Particular Reference to the Vessel Diameter," *J. Cereb. Blood Flow Metab.*, vol. 4, pp. 110–114, 1984.
- [56] W.-C. Wu and E. C. Wong, "Intravascular effect in velocity-selective arterial spin labeling: The choice of inflow time and cutoff velocity," 2006.

- [57] J. Guo, J. A. Meakin, P. Jezzard, and E. C. Wong, "An optimized design to reduce eddy current sensitivity in velocity-selective arterial spin labeling using symmetric BIR-8 pulses," *Magn. Reson. Med.*, vol. 73, no. 3, pp. 1085–1094, Mar. 2015.
- [58] L. De Rochefort, X. Maitre, J. Bittoun, and E. Durand, "Velocity-selective RF pulses in MRI," *Magn. Reson. Med.*, vol. 55, no. 1, pp. 171–176, 2006.
- [59] J. F. Schenck, "The role of magnetic susceptibility in magnetic resonance imaging: MRI magnetic compatibility of the first and second kinds," *Med. Phys.*, vol. 23, no. 6, pp. 815–850, Jun. 1996.
- [60] M. A. Bernstein, J. Huston, and H. A. Ward, "Imaging artifacts at 3.0T," *Journal of Magnetic Resonance Imaging*, vol. 24, no. 4. John Wiley & Sons, Ltd, pp. 735–746, 01-Oct-2006.
- [61] K. J. Chang, I. R. Kamel, K. J. Macura, and D. A. Bluemke, "3.0-T MR imaging of the Abdomen: Comparison with 1.5 T," *Radiographics*, vol. 28, no. 7, pp. 1983–1998, Nov. 2008.
- [62] F. Nery *et al.*, "Consensus-based technical recommendations for clinical translation of renal ASL MRI," *Magn. Reson. Mater. Physics, Biol. Med.*, vol. 33, pp. 141–161, 2020.
- [63] N. Ben-Eliezer, Y. Shrot, and L. Frydman, "High-definition, single-scan 2D MRI in inhomogeneous fields using spatial encoding methods," *Magn. Reson. Imaging*, vol. 28, no. 1, pp. 77–86, Jan. 2010.
- [64] N. Ben-Eliezer, M. Irani, and L. Frydman, "Super-resolved spatially encoded single-scan 2D MRI," *Magn. Reson. Med.*, vol. 63, no. 6, pp. 1594–1600, 2010.
- [65] C. H. Lee *et al.*, "Breast Cancer Screening With Imaging: Recommendations From the Society of Breast Imaging and the ACR on the Use of Mammography, Breast MRI, Breast Ultrasound, and Other Technologies for the Detection of Clinically Occult Breast Cancer," *J. Am. Coll. Radiol.*, vol. 7, no. 1, pp. 18–27, Jan. 2010.
- [66] R. M. Mann, C. K. Kuhl, and L. Moy, "Contrast-enhanced MRI for breast cancer screening," *Journal of Magnetic Resonance Imaging*, vol. 50, no. 2. John Wiley and Sons Inc., pp. 377–390, 01-Aug-2019.
- [67] J. O. P. Wanders *et al.*, "Volumetric breast density affects performance of digital screening mammography," *Breast Cancer Res. Treat.*, vol. 162, no. 1, pp. 95–103, Feb. 2017.
- [68] S. G. A. Veenhuizen *et al.*, "Supplemental breast MRI for women with extremely dense breasts: Results of the second screening round of the DENSE trial," *Radiology*, vol. 299, no. 2, pp. 278–286, Mar. 2021.
- [69] J. S. Sung *et al.*, "Breast cancers detected at screening mr imaging and mammography in patients at high risk: Method of detection reflects tumor histopathologic results," *Radiology*, vol. 280, no. 3, pp. 716–722, Sep. 2016.
- [70] J. Folkman, "Clinical Applications of Research on Angiogenesis," *N. Engl. J. Med.*, vol. 333, no. 26, pp. 1757–1763, Dec. 1995.
- [71] I. Griebisch *et al.*, "Cost-effectiveness of screening with contrast enhanced magnetic resonance imaging vs X-ray mammography of women at a high familial risk of breast cancer," *Br. J. Cancer*, vol. 95, no. 7, pp. 801–810, Oct. 2006.
- [72] S. J. Lord *et al.*, "A systematic review of the effectiveness of magnetic resonance imaging (MRI) as an addition to mammography and ultrasound in screening young women at high risk of breast cancer," *Eur. J. Cancer*, vol. 43, no. 13, pp. 1905–1917, Sep. 2007.
- [73] T. Kanda, K. Ishii, H. Kawaguchi, K. Kitajima, and D. Takenaka, "High signal intensity in the dentate nucleus and globus pallidus on unenhanced T1-weighted MR images: Relationship with increasing cumulative dose of a gadoliniumbased contrast material," *Radiology*, vol. 270, no. 3, pp. 834–841, 2014.
- [74] W. C. Wu, S. Englander, S. M. D., and D.-J. Wang, "Feasibility of arterial spin labeling in the measurement of breast perfusion," in *Proceedings of the International Society for Magnetic Resonance in Medicine*, 2007, vol. 13, p. 2801.
- [75] S. Buchbender *et al.*, "Arterial spin labelling perfusion MRI of breast cancer using FAIR TrueFISP: Initial results," *Clin. Radiol.*, vol. 68, no. 3, pp. e123–e127, Mar. 2013.

- [76] M. Han *et al.*, “Breast Perfusion Imaging Using Arterial Spin Labeling,” *Proc. Int. Soc. Magn. Reson. Med.*, vol. 18, 2010.
- [77] M. Kawashima, Y. Katada, T. Shukuya, M. Kojima, and M. Nozaki, “MR perfusion imaging using the arterial spin labeling technique for breast cancer,” *J. Magn. Reson. Imaging*, vol. 35, no. 2, pp. 436–440, Feb. 2012.
- [78] D. W. Holdsworth, C. J. D. Norley, R. Frayne, D. A. Steinman, and B. K. Rutt, “Characterization of common carotid artery blood-flow waveforms in normal human subjects,” *Physiol. Meas.*, vol. 20, no. 3, pp. 219–240, Aug. 1999.
- [79] L. Hernandez-Garcia, J.-F. Nielsen, and D. C. Noll, “Improved sensitivity and temporal resolution in perfusion fMRI using velocity selective inversion ASL,” *Magn. Reson. Med.*, Sep. 2018.
- [80] W.-C. Wu and E. C. Wong, “Feasibility of Velocity Selective Arterial Spin Labeling in Functional MRI,” *J. Cereb. Blood Flow Metab.*, vol. 27, no. 4, pp. 831–838, Apr. 2007.
- [81] W.-C. Wu, Y. Mazaheri, and E. C. Wong, “The effects of flow dispersion and cardiac pulsation in arterial spin labeling,” *IEEE Trans. Med. Imaging*, vol. 26, no. 1, pp. 84–92, 2007.
- [82] Y. Fushimi, T. Okada, A. Yamamoto, M. Kanagaki, K. Fujimoto, and K. Togashi, “Timing dependence of peripheral pulse-wave-triggered pulsed arterial spin labeling,” *NMR Biomed.*, vol. 26, no. 11, pp. 1527–1533, 2013.
- [83] Y. Li *et al.*, “Cardiac-triggered pseudo-continuous arterial-spin-labeling: A cost-effective scheme to further enhance the reliability of arterial-spin-labeling MRI,” *Magn. Reson. Med.*, vol. 975, no. January, pp. 969–975, 2018.
- [84] X. Golay, E. T. Petersen, and F. Hui, “Pulsed Star Labeling of Arterial Regions (PULSAR): A robust regional perfusion technique for high field imaging,” *Magn. Reson. Med.*, vol. 53, no. 1, pp. 15–21, Jan. 2005.
- [85] P. Liu, J. Uh, and H. Lu, “Determination of spin compartment in arterial spin labeling MRI,” *Magn. Reson. Med.*, vol. 65, no. 1, pp. 120–127, Jan. 2011.
- [86] Z. Chen, X. Zhang, C. Yuan, X. Zhao, and M. J. P. van Osch, “Measuring the labeling efficiency of pseudocontinuous arterial spin labeling,” *Magn. Reson. Med.*, vol. 77, no. 5, pp. 1841–1852, May 2017.
- [87] M. S. Dagli, J. E. Ingeholm, and J. V Haxby, “Localization of Cardiac-Induced Signal Change in fMRI.”
- [88] W.-C. Wen-Chau Wu, B. L. Edlow, M. A. Elliot, J. Jiongjiang Wang, and J. A. Detre, “Physiological Modulations in Arterial Spin Labeling Perfusion Magnetic Resonance Imaging,” *IEEE Trans. Med. Imaging*, vol. 28, no. 5, pp. 703–709, May 2009.
- [89] K. Restom, Y. Behzadi, and T. T. Liu, “Physiological noise reduction for arterial spin labeling functional MRI,” 2006.
- [90] J. Verbree and M. J. P. Van Osch, “Magnetic Resonance Materials in Physics , Biology and Medicine Influence of the cardiac cycle on pCASL : cardiac triggering of the end-of-labeling,” *Magn. Reson. Mater. Physics, Biol. Med.*, 2017.
- [91] M. S. Hassanpour *et al.*, “Cardiorespiratory noise correction improves the ASL signal,” *Hum. Brain Mapp.*, vol. 39, no. 6, pp. 2353–2367, Jun. 2018.
- [92] M. F. O’Rourke and M. E. Safar, “Relationship between aortic stiffening and microvascular disease in brain and kidney: Cause and logic of therapy,” *Hypertension*, vol. 46, no. 1, pp. 200–204, 2005.
- [93] G. F. Mitchell, “Effects of central arterial aging on the structure and function of the peripheral vasculature: implications for end-organ damage,” *J Appl Physiol*, vol. 105, no. 4, pp. 1652–1660, 2008.
- [94] W. H. Bouvy *et al.*, “Assessment of blood flow velocity and pulsatility in cerebral perforating arteries with 7-T quantitative flow MRI,” *NMR Biomed.*, vol. 29, no. 9, pp. 1295–1304, Sep. 2016.
- [95] D. Qiu, M. Straka, Z. Zun, R. Bammer, M. E. Moseley, and G. Zaharchuk, “CBF measurements using multidelay pseudocontinuous and velocity-selective arterial spin labeling in patients with long arterial

transit delays: Comparison with xenon CT CBF," *J. Magn. Reson. Imaging*, vol. 36, no. 1, pp. 110–119, Jul. 2012.

- [96] T. Shin, P. W. Worters, B. S. Hu, and D. G. Nishimura, "Non-contrast-enhanced renal and abdominal MR angiography using velocity-selective inversion preparation," *Magn. Reson. Med.*, vol. 69, no. 5, pp. 1268–1275, 2013.
- [97] I. K. Bones *et al.*, "Influence of labeling parameters of velocity selective arterial spin labeling for renal perfusion imaging," *Magn. Reson. Med.*, pp. 1–26, 2020.
- [98] W. Dai *et al.*, "Effects of arterial transit delay on cerebral blood flow quantification using arterial spin labeling in an elderly cohort," *J. Magn. Reson. Imaging*, vol. 45, no. 2, pp. 472–481, Feb. 2017.
- [99] O. Togao *et al.*, "Acceleration-selective Arterial Spin-labeling MR Angiography Used to Visualize Distal Cerebral Arteries and Collateral Vessels in Moyamoya Disease," *Radiology*, vol. 286, no. 2, pp. 611–621, Feb. 2018.
- [100] R. D. Safian and S. C. Textor, "Renal-Artery Stenosis," *N. Engl. J. Med.*, vol. 344, no. 6, pp. 431–442, Feb. 2001.
- [101] R. R. Edelman and I. Koktzoglou, "Noncontrast MR angiography: An update," *Journal of Magnetic Resonance Imaging*, vol. 49, no. 2. John Wiley and Sons Inc., pp. 355–373, 01-Feb-2019.
- [102] H. Jahanian, D. C. Noll, and L. Hernandez-Garcia, "B0 field inhomogeneity considerations in pseudo-continuous arterial spin labeling (pCASL): Effects on tagging efficiency and correction strategy," *NMR Biomed.*, vol. 24, no. 10, pp. 1202–1209, Dec. 2011.
- [103] J. S. Greer, Y. Wang, I. Pedrosa, and A. J. Madhuranthakam, "Pseudo-continuous arterial spin labeled renal perfusion imaging at 3T with improved robustness to off-resonance," *Proc. Int. Soc. Magn. Reson. Med. Montr. Canada#4959*, pp. 1–4, 2019.
- [104] N. M. Selby *et al.*, "Magnetic resonance imaging biomarkers for chronic kidney disease: a position paper from the European Cooperation in Science and Technology Action PARENCHIMA," *Nephrol. Dial. Transplant.*, vol. 33, no. suppl_2, pp. ii4–ii14, Sep. 2018.
- [105] D. G. Norris and C. Schwarzbauer, "Velocity Selective Radiofrequency Pulse Trains," *J Magn Reson*, vol. 137, pp. 231–236, 1999.
- [106] S. Schmid, E. T. Petersen, and M. J. P. Van Osch, "Insight into the labeling mechanism of acceleration selective arterial spin labeling," *Magn. Reson. Mater. Physics, Biol. Med.*, pp. 1–10, Oct. 2016.
- [107] R. J. Ogg, P. B. Kingsley, and J. S. Taylor, "WET, a T1- and B1-Insensitive Water-Suppression Method for in Vivo Localized 1H NMR Spectroscopy," *J. Magn. Reson. Ser. B*, vol. 104, no. 1, pp. 1–10, 1994.
- [108] A. A. Harteveld, A. de Boer, S. L. Franklin, T. Leiner, M. van Stralen, and C. Bos, "Comparison of multi-delay FAIR and pCASL labeling approaches for renal perfusion quantification at 3T MRI," *Magn. Reson. Mater. Physics, Biol. Med.*, vol. 33, no. 1, pp. 81–94, Feb. 2019.
- [109] W. Luh, E. C. Wong, P. A. Bandettini, and J. S. Hyde, "QUIPSS II with thin-slice T1I periodic saturation: A method for improving accuracy of quantitative perfusion imaging using pulsed arterial spin labeling," *Magn. Reson. Med.*, vol. 41, no. 6, pp. 1246–1254, Jun. 1999.
- [110] S. Clare and P. Jezzard, "RapidT1 mapping using multislice echo planar imaging," *Magn. Reson. Med.*, vol. 45, no. 4, pp. 630–634, Apr. 2001.
- [111] V. L. Yarnykh, "Actual flip-angle imaging in the pulsed steady state: A method for rapid three-dimensional mapping of the transmitted radiofrequency field," *Magn. Reson. Med.*, vol. 57, no. 1, pp. 192–200, Jan. 2007.
- [112] W. Penny, K. Friston, J. Ashburner, S. Kiebel, and T. Nichols, *Statistical Parametric Mapping: The Analysis of Functional Brain Images*. Elsevier Ltd, 2007.
- [113] F. Ritter *et al.*, "Medical image analysis," *IEEE Pulse*, vol. 2, no. 6, pp. 60–70, Nov. 2011.

- [114] W. Huizinga *et al.*, “PCA-based groupwise image registration for quantitative MRI,” *Med. Image Anal.*, vol. 29, pp. 65–78, Apr. 2016.
- [115] J. A. Meakin and P. Jezzard, “An optimized velocity selective arterial spin labeling module with reduced eddy current sensitivity for improved perfusion quantification,” *Magn. Reson. Med.*, vol. 69, no. 3, pp. 832–838, 2013.
- [116] T. L. Pallone, A. Edwards, and D. L. Mattson, “Renal medullary circulation,” *Compr. Physiol.*, vol. 2, no. 1, pp. 97–140, Jan. 2012.
- [117] P. M. Robson, A. J. Madhuranthakam, W. Dai, I. Pedrosa, N. M. Rofsky, and D. C. Alsop, “Strategies for reducing respiratory motion artifacts in renal perfusion imaging with arterial spin labeling,” *Magn. Reson. Med.*, vol. 61, no. 6, pp. 1374–1387, Jun. 2009.
- [118] S. L. Franklin, S. Schmid, C. Bos, and M. J. P. van Osch, “Influence of the cardiac cycle on velocity selective and acceleration selective arterial spin labeling,” *Magn. Reson. Med.*, vol. 83, no. 3, pp. 872–882, Mar. 2020.
- [119] R. Echeverria-Chasco, M. Vidorreta, V. Aramendia-Vidaurreta, G. Bastarrika, and M. A. Fernandez-Seara, “Optimization of Pseudo Continuous Arterial Spin Labeling for renal ASL,” *Proc. Int. Soc. Magn. Reson. Med. Montr. Canada#4954*, pp. 1–4, 2019.
- [120] M. Schmitt *et al.*, “Improved uniformity of RF-distribution in clinical whole body-imaging at 3T by means of dielectric pads,” in *Proceedings of International Society for Magnetic Resonance in medicine, Toronto, Canada, 2004*.
- [121] T. Shin, B. S. Hu, and D. G. Nishimura, “Off-resonance-robust velocity-selective magnetization preparation for non-contrast-enhanced peripheral MR angiography,” *Magn. Reson. Med.*, vol. 70, no. 5, pp. 1229–1240, 2013.
- [122] Q. Qin, T. Shin, M. Schär, H. Guo, H. Chen, and Y. Qiao, “Velocity-selective magnetization-prepared non-contrast-enhanced cerebral MR angiography at 3 Tesla: Improved immunity to B0/B1 inhomogeneity,” *Magn. Reson. Med.*, vol. 75, no. 3, pp. 1232–1241, Mar. 2016.
- [123] W. Li *et al.*, “Whole-brain arteriography and venography: Using improved velocity-selective saturation pulse trains,” *Magn. Reson. Med.*, vol. 79, no. 4, pp. 2014–2023, Apr. 2018.
- [124] D. Zhu *et al.*, “Non-contrast-enhanced abdominal MRA at 3 T using velocity-selective pulse trains,” *Magn Reson Med*, vol. 84, no. 3, pp. 1173–1183, Feb. 2020.
- [125] V. Landes, A. Javed, T. Jao, Q. Qin, and K. Nayak, “Improved velocity-selective labeling pulses for myocardial ASL,” *Magn. Reson. Med.*, vol. 84, no. 4, pp. 1909–1918, 2020.
- [126] M. Taso, A. Guidon, and D. C. Alsop, “Influence of background suppression and retrospective realignment on free-breathing renal perfusion measurement using pseudo-continuous ASL,” *Magn. Reson. Med.*, vol. 81, no. 4, pp. 2439–2449, Apr. 2019.
- [127] A. Matakos, J. M. Balter, and Y. Cao, “A Robust Method for Estimating B0 Inhomogeneity Field in the Liver by Mitigating Fat Signals and Phase-Wrapping,” *Magn Reson Med*, vol. 3, no. 2, pp. 79–88, 2017.
- [128] M. Schär, E.-J. Vonken, M. Stuber, and R. H. Morgan, “Simultaneous B 0-and B 1 +-map Acquisition for Fast Localized Shim, Frequency and RF Power Determination in the Heart at 3T,” vol. 63, no. 2, pp. 419–426, 2010.
- [129] M. A. Marino, T. Helbich, P. Baltzer, and K. Pinker-Domenig, “Multiparametric MRI of the breast: A review,” *J. Magn. Reson. Imaging*, vol. 47, no. 2, pp. 301–315, Feb. 2018.
- [130] D. Saslow *et al.*, “American Cancer Society Guidelines for Breast Screening with MRI as an Adjunct to Mammography,” *CA. Cancer J. Clin.*, vol. 57, no. 2, pp. 75–89, Mar. 2007.
- [131] R. M. Mann, N. Cho, and L. Moy, “Breast MRI: State of the art,” *Radiology*, vol. 292, no. 3, pp. 520–536, Jul. 2019.

- [132] H. Abe *et al.*, “Kinetic analysis of benign and malignant breast lesions with ultrafast dynamic contrast-enhanced MRI: Comparison with standard kinetic assessment,” *Am. J. Roentgenol.*, vol. 207, no. 5, pp. 1159–1166, Nov. 2016.
- [133] J. C. M. Van Zelst *et al.*, “Multireader Study on the Diagnostic Accuracy of Ultrafast Breast Magnetic Resonance Imaging for Breast Cancer Screening,” *Invest. Radiol.*, vol. 53, no. 10, pp. 579–586, Oct. 2018.
- [134] S.-G. Kim, “Quantification of relative cerebral blood flow change by flow-sensitive alternating inversion recovery (FAIR) technique: Application to functional mapping,” *Magn. Reson. Med.*, vol. 34, no. 3, pp. 293–301, Sep. 1995.
- [135] E. Kaldoudi, S. C. R. Williams, G. J. Barker, and P. S. Tofts, “A chemical shift selective inversion recovery sequence for fat-suppressed MRI: Theory and experimental validation,” *Magn. Reson. Imaging*, vol. 11, no. 3, pp. 341–355, 1993.
- [136] T. C. Lauenstein, P. Sharma, T. Hughes, K. Heberlein, D. Tudorascu, and D. R. Martin, “Evaluation of optimized inversion-recovery fat-suppression techniques for T2-weighted abdominal MR imaging,” *J. Magn. Reson. Imaging*, vol. 27, no. 6, pp. 1448–1454, May 2008.
- [137] C. D’Orsi, E. Sickles, E. Mendelson, and E. Morris, *Breast Imaging Reporting and Data System: ACR BI-RADS breast imaging atlas*, 5th ed. Reston: American College of Radiology, 2013.
- [138] D. Hanahan and J. Folkman, “Patterns and Emerging Mechanisms Review of the Angiogenic Switch during Tumorigenesis,” *Cell*, vol. 86, pp. 353–364, 1996.
- [139] W.-C. Wu, S. England, M. Schnell, and J. Wang, “Feasibility of arterial spin labeling in the measurement of breast perfusion,” 2007.
- [140] M. Goto *et al.*, “Diagnostic performance of initial enhancement analysis using ultra-fast dynamic contrast-enhanced MRI for breast lesions,” *Eur. Radiol.*, vol. 29, no. 3, pp. 1164–1174, Mar. 2019.
- [141] N. Onishi *et al.*, “Ultrafast dynamic contrast-enhanced breast MRI may generate prognostic imaging markers of breast cancer,” *Breast Cancer Res.*, vol. 22, no. 1, p. 58, May 2020.
- [142] A. C. Schmitz *et al.*, “Contrast-enhanced 3.0-T breast MRI for characterization of breast lesions: Increased specificity by using vascular maps,” *Eur. Radiol.*, vol. 18, no. 2, pp. 355–364, Feb. 2008.
- [143] C. Wu, F. Pineda, D. A. Hormuth, G. S. Karczmar, and T. E. Yankeelov, “Quantitative analysis of vascular properties derived from ultrafast DCE-MRI to discriminate malignant and benign breast tumors,” *Magn. Reson. Med.*, vol. 81, no. 3, pp. 2147–2160, Mar. 2019.
- [144] S. Mani, J. Pauly, S. Conolly, C. Meyer, and D. Nishimura, “Background suppression with multiple inversion recovery nulling: Applications to projective angiography,” *Magn. Reson. Med.*, vol. 37, no. 6, pp. 898–905, 1997.
- [145] S. L. Franklin *et al.*, “Multi-organ comparison of flow-based arterial spin labeling techniques: Spatially non-selective labeling for cerebral and renal perfusion imaging,” *Magn Reson Med*, pp. 7–8, 2020.
- [146] D. Liu, W. Li, F. Xu, D. Zhu, T. Shin, and Q. Qin, “Ensuring both velocity and spatial responses robust to field inhomogeneities for velocity-selective arterial spin labeling through dynamic phase-cycling,” *Magn. Reson. Med.*, p. mrm.28622, Dec. 2020.
- [147] L. Hernandez-Garcia, A. Lahiri, and J. Schollenberger, “Recent progress in ASL,” *NeuroImage*, vol. 187. Academic Press Inc., pp. 3–16, 15-Feb-2019.
- [148] S. L. Franklin *et al.*, “Multi-organ comparison of flow-based arterial spin labeling techniques: Spatially non-selective labeling for cerebral and renal perfusion imaging,” *Magn. Reson. Med.*, vol. 85, no. 5, pp. 2580–2594, May 2021.
- [149] A. A. Harteveld *et al.*, “Systematic evaluation of velocity-selective arterial spin labeling settings for placental perfusion measurement,” *Magn. Reson. Med.*, vol. 84, no. 4, pp. 1828–1843, Oct. 2020.

- [150] P. Martirosian *et al.*, “Spatial-temporal perfusion patterns of the human liver assessed by pseudo-continuous arterial spin labeling MRI,” *Z. Med. Phys.*, vol. 29, no. 2, pp. 173–183, May 2019.
- [151] S. C. Partridge, N. Nissan, H. Rahbar, A. E. Kitsch, and E. E. Sigmund, “Diffusion-weighted breast MRI: Clinical applications and emerging techniques,” *Journal of Magnetic Resonance Imaging*, vol. 45, no. 2. John Wiley and Sons Inc., pp. 337–355, 01-Feb-2017.
- [152] R. Goetti, R. O’gorman, N. Khan, C. J. Kellenberger, and I. Scheer, “Arterial spin labelling MRI for assessment of cerebral perfusion in children with moyamoya disease: comparison with dynamic susceptibility contrast MRI.”
- [153] W. G. Bradley, “MR Appearance of Hemorrhage in the Brain.”
- [154] A. Dumas *et al.*, “Functional magnetic resonance imaging detection of vascular reactivity in cerebral amyloid angiopathy,” *Ann. Neurol.*, vol. 72, no. 1, pp. 76–81, Jul. 2012.
- [155] Y. Shrot and L. Frydman, “Spatially encoded NMR and the acquisition of 2D magnetic resonance images within a single scan,” *J. Magn. Reson.*, vol. 172, no. 2, pp. 179–190, Feb. 2005.
- [156] N. Ben-Eliezer, U. Goerke, K. Ugurbil, and L. Frydman, “Functional MRI using super-resolved spatiotemporal encoding,” *Magn. Reson. Imaging*, vol. 30, no. 10, pp. 1401–1408, Dec. 2012.
- [157] E. Solomon, G. Liberman, N. Nissan, E. Furman-Haran, M. Sklair-Levy, and L. Frydman, “Diffusion-weighted breast MRI of malignancies with submillimeter resolution and immunity to artifacts by spatiotemporal encoding at 3T,” *Magn. Reson. Med.*, vol. 84, no. 3, pp. 1391–1403, Sep. 2020.
- [158] U. Goerke, M. Garwood, and K. Ugurbil, “Functional magnetic resonance imaging using RASER,” *Neuroimage*, vol. 54, no. 1, pp. 350–360, Jan. 2011.
- [159] A. M. Airaksinen *et al.*, “Simultaneous fMRI and local field potential measurements during epileptic seizures in medetomidine sedated rats using RASER pulse sequence.”
- [160] N. Ben-Eliezer, E. Solomon, E. Harel, N. Nevo, and L. Frydman, “Fully refocused multi-shot spatiotemporally encoded MRI: Robust imaging in the presence of metallic implants,” *Magn. Reson. Mater. Physics, Biol. Med.*, vol. 25, no. 6, pp. 433–442, Dec. 2012.
- [161] R. Schmidt, B. Baishya, N. Ben-Eliezer, A. Seginer, and L. Frydman, “Super-resolved Parallel MRI by Spatiotemporal Encoding,” *Magn. Reson. Imaging*, vol. 32, pp. 60–70, 2014.
- [162] N. Ben-Eliezer, Y. Shrot, L. Frydman, and D. K. Sodickson, “Parametric analysis of the spatial resolution and signal-to-noise ratio in super-resolved spatiotemporally encoded (SPEN) MRI,” *Magn. Reson. Med.*, vol. 72, no. 2, pp. 418–429, 2014.
- [163] A. Tal and L. Frydman, “Single-scan multidimensional magnetic resonance,” *Progress in Nuclear Magnetic Resonance Spectroscopy*, vol. 57, no. 3. Elsevier B.V., pp. 241–292, 01-Oct-2010.
- [164] G. Liberman, E. Solomon, M. Lustig, and L. Frydman, “Multiple-coil k-space interpolation enhances resolution in single-shot spatiotemporal MRI,” *Magn. Reson. Med.*, vol. 79, no. 2, pp. 796–805, Feb. 2018.
- [165] A. Seginer, R. Schmidt, A. Leftin, E. Solomon, and L. Frydman, “Referenceless reconstruction of spatiotemporally encoded imaging data: Principles and applications to real-time MRI,” *Magn. Reson. Med.*, vol. 72, no. 6, pp. 1687–1695, Dec. 2014.
- [166] S. F. Cousin, G. Liberman, E. Solomon, M. Otkovs, and L. Frydman, “A regularized reconstruction pipeline for high-definition diffusion MRI in challenging regions incorporating a per-shot image correction,” *Magn. Reson. Med.*, vol. 82, no. 4, pp. 1322–1330, Oct. 2019.
- [167] K. M. Koch, B. A. Hargreaves, K. B. Pauly, W. Chen, G. E. Gold, and K. F. King, “Magnetic resonance imaging near metal implants,” *Journal of magnetic resonance imaging : JMRI*, vol. 32, no. 4. John Wiley & Sons, Ltd, pp. 773–787, 01-Oct-2010.
- [168] L. Chen *et al.*, “Super-resolved enhancing and edge deghosting (SEED) for spatiotemporally encoded single-shot MRI,” *Med. Image Anal.*, vol. 23, no. 1, pp. 1–14, Jul. 2015.

- [169] F. Nery, E. De Vita, C. A. Clark, I. Gordon, and D. L. Thomas, "Robust kidney perfusion mapping in pediatric chronic kidney disease using single-shot 3D-GRASE ASL with optimized retrospective motion correction," *Magn. Reson. Med.*, vol. 81, no. 5, pp. 2972–2984, May 2019.
- [170] T. Nguyen, U. Goerke, S. Moeller, K. Ugurbil, and M. Garwood, "Parallel Imaging with RASER Using Multiband Frequency-Modulated Excitation Pulses (ISMRM 2009)." [Online]. Available: <https://archive.ismrm.org/2009/2738.html>. [Accessed: 05-Mar-2021].
- [171] R. Schmidt and L. Frydman, "New Spatiotemporal Approaches for Fully-Refocused, Multi-Slice Ultrafast 2D MRI," *Magn. Reson. Med.*, vol. 71, no. 2, p. 711, 2014.
- [172] T. Zhang *et al.*, "Ultrafast multi-slice spatiotemporally encoded MRI with slice-selective dimension segmented," *J. Magn. Reson.*, vol. 269, pp. 138–145, Aug. 2016.
- [173] R. Corti *et al.*, "Imaging of atherosclerosis: magnetic resonance imaging," *Eur. Heart J.*, vol. 32, no. 14, pp. 1709–19b, Jul. 2011.
- [174] K. Oshio and D. A. Feinberg, "GRASE (Gradient-and Spin-Echo) imaging: A novel fast MRI technique," *Magn. Reson. Med.*, vol. 20, no. 2, pp. 344–349, Aug. 1991.
- [175] J. Hennig and H. Friedburg, "Clinical applications and methodological developments of the RARE technique," *Magn. Reson. Imaging*, vol. 6, no. 4, pp. 391–395, Jul. 1988.
- [176] M. Taso, L. Zhao, A. Guidon, D. V. Litwiller, and D. C. Alsop, "Volumetric abdominal perfusion measurement using a pseudo-randomly sampled 3D fast-spin-echo (FSE) arterial spin labeling (ASL) sequence and compressed sensing reconstruction," *Magn. Reson. Med.*, vol. 82, no. 2, pp. 680–692, Aug. 2019.
- [177] J. S. Greer *et al.*, "Robust pCASL perfusion imaging using a 3D Cartesian acquisition with spiral profile reordering (CASPR)," *Magn. Reson. Med.*, vol. 82, no. 5, pp. 1713–1724, Nov. 2019.
- [178] Z. Zhang, M. Lustig, and L. Frydman, "Phase-encoded xSPEN: A novel high-resolution volumetric alternative to RARE MRI," *Magn. Reson. Med.*, vol. 80, no. 4, pp. 1492–1506, Oct. 2018.
- [179] "Handbook of MRI Pulse Sequences - Matt A. Bernstein, Kevin F. King, Xiaohong Joe Zhou - Google Books." [Online]. Available: https://books.google.nl/books/about/Handbook_of_MRI_Pulse_Sequences.html?id=d6PLHcyejEIC&redir_esc=y. [Accessed: 07-Mar-2021].
- [180] J. G. Pipe, "Spatial Encoding and Reconstruction in MRI with Quadratic Phase Profiles," *Magn. Reson. Med.*, vol. 33, no. 1, pp. 24–33, Jan. 1995.
- [181] D. WT, S. M, C. M, and S. GP, "Multiple inversion recovery reduces static tissue signal in angiograms," *Magn. Reson. Med.*, vol. 18, no. 2, pp. 257–268, 1991.
- [182] J. Baum, R. Tycko, and A. Pines, "Broadband and adiabatic inversion of a two-level system by phase-modulated pulses," *Phys. Rev. A*, vol. 32, no. 6, pp. 3435–3447, Dec. 1985.
- [183] A. Tannus and M. Garwood, "Adiabatic pulses," *NMR Biomed.*, vol. 10, pp. 423–434, 1997.
- [184] R. S. STAEWEN, A. J. JOHNSON, B. D. ROSS, T. PARRISH, H. MERKLE, and M. GARWOOD, "3-D FLASH Imaging Using a Single Surface Coil and a New Adiabatic Pulse, BIR-4," *Invest. Radiol.*, vol. 25, no. 5, pp. 559–567, May 1990.
- [185] R. J. Ordidge, M. Wylezinska, J. W. Hugg, E. Butterworth, and F. Franconi, "Frequency offset corrected inversion (FOCI) pulses for use in localized spectroscopy," *Magn. Reson. Med.*, vol. 36, no. 4, pp. 562–566, 1996.
- [186] M. N. Yongbi, C. A. Branch, and J. A. Helpert, "Perfusion imaging using FOCI RF pulses," *Magn. Reson. Med.*, vol. 40, no. 6, pp. 938–943, Dec. 1998.
- [187] H. Lu, C. Clingman, X. Golay, and P. C. M. van Zijl, "Determining the longitudinal relaxation time (T1) of blood at 3.0 Tesla," *Magn. Reson. Med.*, vol. 52, no. 3, pp. 679–682, Sep. 2004.
- [188] C. JJ and P. GB, "Human whole blood T2 relaxometry at 3 Tesla," *Magn. Reson. Med.*, vol. 61, no. 2, pp. 249–254, 2009.

- [189] D. Liu, F. Xu, W. Li, P. C. van Zijl, D. D. Lin, and Q. Qin, "Improved velocity-selective-inversion arterial spin labeling for cerebral blood flow mapping with 3D acquisition," *Magn. Reson. Med.*, vol. 84, no. 5, pp. 2512–2522, Nov. 2020.
- [190] N. T. Roberts, L. A. Hinshaw, T. J. Colgan, T. Li, D. Hernando, and S. B. Reeder, "B0 and B1 inhomogeneities in the liver at 1.5 T and 3.0 T," *Magn. Reson. Med.*, vol. 85, no. 4, pp. 2212–2220, Apr. 2021.
- [191] J. Moore, M. Jankiewicz, A. W. Anderson, and J. C. Gore, "Evaluation of non-selective refocusing pulses for 7 T MRI," *J. Magn. Reson.*, vol. 214, pp. 212–220, Jan. 2012.
- [192] J. Guo, S. Das, and L. Hernandez-Garcia, "Comparison of velocity-selective arterial spin labeling schemes," *Magn. Reson. Med.*, vol. 85, no. 4, pp. 2027–2039, Apr. 2021.
- [193] D. Liu, W. Li, F. Xu, D. Zhu, T. Shin, and Q. Qin, "Ensuring both velocity and spatial responses robust to B0/B1+ field inhomogeneities for velocity-selective arterial spin labeling through dynamic phase-cycling," *Magn. Reson. Med.*, vol. 85, no. 5, pp. 2723–2734, May 2021.
- [194] W. R. Nitz, "Fast and ultrafast non-echo-planar MR imaging techniques," *Eur. Radiol.*, vol. 12, no. 12, pp. 2866–2882, Dec. 2002.
- [195] A. de Boer *et al.*, "Multiparametric Renal MRI: An Intrasubject Test–Retest Repeatability Study," *J. Magn. Reson. Imaging*, vol. 53, no. 3, pp. 859–873, Mar. 2021.

