Curriculum Vitae

Junghun Cho

Assistant Professor
Biomedical Engineering
George Washington University
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EDUCATION

PhD: Cornell University, Biomedical Engineering   2014-2019
  Thesis: Biophysics model improvement in MRI: cerebral metabolic rate of oxygen
  Advisor: Yi Wang, PhD
MS: University of Wisconsin Madison, Physics   2009-2010
BS: University of Michigan Ann Arbor, Physics   2006-2008

PROFESSIONAL EXPERIENCE

Assistant Professor, Biomedical Engineering   8/2025-present
George Washington University, Washington, DC

Assistant Professor, Biomedical Engineering   9/2022-7/2025
The State University of New York at Buffalo (SUNY Buffalo), NY

Postdoctoral Associate, Radiology   1/2020-7/2022
Weill Cornell Medicine

GRANTS

Current Funding
1. **R01NS136369**, MRI-based quantitative mapping of oxygen extraction fraction in MS, sole PI: Junghun Cho, 04/01/2024-03/31/2029, NIH NINDS, $1,773,282

2. **R00NS123229**, Development and validation of MRI mapping of brain oxygen metabolism for clinical use, sole PI: Junghun Cho, 07/15/2023-06/30/2026, NIH NINDS, $746,999

Completed Funding
1. K99NS123229, Development and validation of MRI mapping of brain oxygen metabolism for clinical use, sole PI: Junghun Cho, 07/15/2021-06/30/2023, NIH NINDS, $183,107

AWARDS

2025 Oct	KBMES, "Young Innovator" Award
2024 May	SUNY Buffalo, BME faculty award: "Rookie of the Year" Award
2022	ISMRM "Summa cum laude" merit award
2021 July	**K99/R00 Career Development Award** (NIH NINDS, 2021-2026)**:** Development and validation of MRI mapping of brain oxygen metabolism for clinical use
2021	ISMRM "Summa cum laude" merit award
	Best Abstract Award - 1st place in ISMRM PET/MRI Study Group Meeting.
	Best Abstract Award - 3rd place in ISMRM Electro-Magnetic Study Group Meeting
2020	Editor's Pick for MRM publication
	ISMRM "Magna cum laude" merit award
2018	ISMRM "Summa cum laude" merit award
2016-2018	Educational Stipend from the ISMRM

2008	University honors in the University of Michigan at Ann Arbor
2004-2006	Designated as Excellent Student in the Tokyo University of Agriculture and Technology
2004-2006	Korea-Japan Joint Government Scholarship

PUBLICATIONS

Google Scholar:
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Thesis
"Biophysics model improvement in MRI: cerebral metabolic rate of oxygen", PhD, Cornell University, 2019

Book Chapters
Cho, J., Dimov, A., (2023), MRI Physics and Image Acquisition in Jakimovski. D., & Zivadinov, R., *Handbook of Imaging in Multiple Sclerosis* (ISBN:9780323957397)

Journal Topic Editor
Cho, J., Lv, H, Guo, L., Wen, H, Li, J., (2023), Neuroimaging of brain structure-function coupling mechanism in neuropsychiatric disorders. Frontiers in Neuroscience

Refereed Journal Articles
Published: Total: 42, 1st author: 12§, Corresponding author: 3*

J1. Salman, F., Ramesh, A., Jochmann, T., Prayer, M., Adegbemigun, A., Reeves, J., A., Wilding, G. E., **Cho, J.**, Jakimovski, D., Bersland, N., Dwyer M.G., Zivadinov, R., and Schweser, F. Reproducibility and sensitivity of quantitative susceptibility mapping for clinical research in deep gray matter. Human Brain Mapping. In Press

J2. Zhang, R., Lin, M., J. **Cho, J.**, Jiaerken, Y., Wang, S., Hong, H., Guan, X., Zhang, Y., Xie, L., Liu, L., Cui, L., Zhang, M., Siero, J., and Huang, P. (2024) Oxygen extraction fraction in small vessel disease: relationship to disease burden and progression. Brain. In Press

J3. Elanghovan, P., Nguyen, T., Spincemaille, P., Gupta, A., Wang, Y., and **Cho, J***. (2024) Sensitivity assessment of QSM+qBOLD (or QQ) in detecting physiological changes in oxygen extraction fraction (OEF). J Cereb Blood Flow Metab. 1-11

J4. Wu D., Li, Y., Zhang, S., Chen, Q., Fang, J., **Cho, J.**, Wang, Y., Yan, S., Zhu, W., Lin, J., Wang, Z., Zhang, Y. (2024) Trajectories and Sex Differences of Brain Structure, Oxygenation, and Perfusion Functions in Normal Aging. Neuroimage. ID120903

J5. Xie, Y., Zhang, S., Wu, D., Yao, Y., **Cho, J.**, Lu, J., Zhu, H., Wang, Y., Zhang, Y., and Zhu, W. (2024) The changes of oxygen extraction fraction in different types of lesions in relapsing-remitting multiple sclerosis: A cross-sectional and longitudinal study. Neurol Sci. PMID: 38492126

J6. **Cho, J. §,***, Zhang, J., Spincemaille, P., Zhang, H., Nguyen T.D., Zhang, S., Gupta, A., and Wang, Y. (2024) Multi-echo complex quantitative susceptibility mapping and quantitative blood oxygen level-dependent magnitude (mcQSM+qBOLD or mcQQ) for oxygen extraction fraction (OEF) mapping. Bioengineering. (11) 131.

J7. Yan, S., Lu, J., Li, Y., **Cho, J.**, Zhang, S., Zhu, W., Wang, Y. (2023) Spatiotemporal pattern of brain iron-oxygen metabolism in patients with Parkinson's disease. Eur Radiol. (34) 3074-3083.

J8. Van Grinsven, E.E., De Leeuw, J., Siero, J.C.W., Verhoeff, J.J.C., Van Zandvoort, M.J.E., **Cho, J.**, Philippens, M.E.P., and Bhogal, A.A. (2023) Evaluating physiological MRI parameters in patients with brain metastases undergoing stereotactic radiosurgery – a preliminary analysis and case report. Cancers. (15) 4298

J9. Biondetti, E., **Cho, J.**[§], Lee, Y. (2023) Cerebral oxygen metabolism from MRI susceptibility. Neuroimage. (276) ID 120189.

J10. Zhang, Q., Sui, C., **Cho, J.**, Yang, L., Chen, T., Guo, B., Gillen, K.M.C., Li, J., Guo, L., Wang, Y. (2023) Assessing cerebral oxygen metabolism changes in patients with preeclampsia using voxel-based morphometry of oxygen extraction fraction maps in magnetic resonance imaging. Korean J Radiol. (24) 324-337.

J11. Zhuang, H., **Cho, J.**, Chiang, G.C.Y, Kovanlikaya, I., Heier L.A., Dyke J.P., Wang,Y. (2023) Cerebral oxygen extraction fraction declines with ventricular enlargement in patients with normal pressure hydrocephalus. Clin. Imaging. (97) 22-27

J12. Yang, L., **Cho, J.**, Chen, T., Gillen, K.M., Li, J., Zhang, Q., Guo, L., and Wang, Y (2022). Oxygen extraction fraction (OEF) assesses cerebral oxygen metabolism of deep gray matter in patients with pre-eclampsia. Eur Radiol. (32) 6058-6069

J13. Chiang, G.C., **Cho, J.**[§], Dyke, J., Zhang, H., Zhang, Q., Tokov, M., Nguyen T., Kovanlikaya, I., Amoashiy, M., Leon, M.D., Wang, Y. Brain oxygen extraction and neural tissue susceptibility in cognitively impaired and intach elderly. J NueroImaging. (32) 697-709

J14. Kim, J., Ngyuen, T., Zhang, J., Gauthier, S., Marcille, M., Zhang, H., **Cho, J.**, Spincemaille, P., Wang, Y. (2022). Sub-second Accurate Myeline Water Fraction Reconstruction from FAST-T2 Data with 3D UNET. Magn Reson Med (87) 2979-2988

J15. **Cho, J.**[§], Zhang, J., Spincemaille, P., Zhang H., Hubertus, S., Wen, Y., Jafari, R., Zhang, S., Nguyen T.D., Gupta, A., Wang, Y. (2022). 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. Magn Reson Med (87) 1093-1637.

J16. Li, J., Huang, W., Luo, X., Wen, Y., **Cho, J.**, Kovanlikaya, I., Gauthier S., Nguyen, T.D., Spincemaille, P., and Wang, Y. (2022). The Central Vein Sign in Multiple Sclerosis Lesions: Susceptibility Relaxation Optimization from a routine MRI Multiecho Gradient Echo Sequence. J NeuroImaging (32) 48-56.

J17. **Cho, J.**[§], Nguyen, T., Huang, W., Sweeney, E., Luo, X., Kovanlikaya, I., Zhang, S., Gillen, K., Spincemaille, P., Guta, A., Gauthier, S., and Wang, Y. (2021). Brain oxygen extraction fraction mapping in patients with multiple sclerosis. J Cereb Blood Flow Metab (42) 338-348.

J18. Cho, H., Lee, H., Gong, Y., Kim, Y., **Cho, J.***, and Cho., H. (2021). Quantitative susceptibility mapping (QSM) and R1 measurement: determination of the myelin volume fraction in the aging ex vivo rat corpus callosum. NMR Biomed e4645

J19. Nanxi, S., Zhang, S., **Cho, J.**, Li, S., Zhang, J., Xie, Y., Wang, Y., Wenzhen, Z. (2021). Application of Cluster Analysis of Time Evolution for MRI Imaging-derived Oxygen Extraction Fraction Mapping: a promising strategy for the genetic profile prediction and grading of glioma. Front Neurosci (15) Article 736891

J20. Wu, D., Zhou, Y., **Cho, J.**, Li, S., Qin, Y., Zhang, G., Yan, S., Xie, Y., Zhang, S., Zhu, W., and Wang, Y. (2021). The Spatiotemporal Evolution of MRI-Derived Oxygen Extraction Fraction and Perfusion in Ischemic Stroke. Front Neurosci Article 716031

J21. **Cho, J.**[§], Spincemaille, P., Nguyen T.D., Gupta, A., and Wang, Y. (2021). Temporal clustering, tissue composition, and total variation for mapping oxygen extraction fraction using QSM and quantitative BOLD. Magn Reson Med (86) 2635-2646.

J22. Wen, Y., Spincemaille, P., Nguyen, T., **Cho, J.**, Kovanlikaya, I., Anderson, J., Wu, G., Yang, B., Fung, M., Li, K., Kelley, D., Benhamo, N., and Wang, Y. (2021). Multiecho complex total field inversion method (mcTFI) for improved signal modelling in quantitative susceptibility mapping. Magn Reson Med (84) 2165-2178.

J23. Jafari, R., Spincemaille, P., Zhang, J., Nguyen, T.D., Luo, X., **Cho, J.**, Margolis, D., Prince., MR, and Wang, Y. (2021). Deep neural network for water/fast separation: Supervised training, unsupervised training, and no training. Magn Reson Med (85) 2263-2277.

J24. **Cho, J.**[§], Ma, Y., Spincemaille, P., Pike GB, and Wang, Y. (2021). Cerebral oxygen extraction fraction: Comparison of dual-gas challenge BOLD with CBF and challenge-free gradient echo QSM+qBOLD. Magn Reson Med (85) 953-961.

J25. Ma, Y., Sun, H., **Cho, J.**, Mazerolle, E. L., Wang, Y., and Pike, B. (2020). Cerebral OEF quantification: A comparison study between quantitative susceptibility mapping and dual-gas calibrated BOLD imaging. Magn Reson Med (83) 68-82.

J26. **Cho, J.**[§], Lee, J., An, H., Goyal, M.S., Su, Y., and Wang, Y. (2020). Cerebral oxygen extraction fraction (OEF): Comparison of challenge-free gradient echo QSM+qBOLD (QQ) with ^{15}O PET in healthy adults. J Cereb Blood Flow Metab (41) 1658-1668.

J27.	Zhang, S., **Cho, J.**, Nguyen T.D., Spincemaille, P., Gupta, A., Zhu, W., and Wang, Y. (2020) Initial Experience of Challenge-Free MRI-based Oxygen Extraction Fraction Mapping of Ischemic Stroke at Various Stages: Comparison With Perfusion and Diffusion Mapping. Front Neurosci Article 535441.

J28.	Ma, Y., Mazerolle, E.L., **Cho, J.**, Sun, H., Wang, Y., and Pike, G.B. Quantification of brain oxygen extraction fraction using QSM and a hyperoxic challenge. Magn Reason Med (84) 3271-3285

J29.	Eskreis-Winkler, S., Simon, K., Reichman, M., Spincemaille, P., Nguyen, T.D., Kee, Y., **Cho, J.**, Christos, P.J., Drotman, M., Prince, M.R., Morris, E.A., and Wang, Y. (2019). Dipole modeling of multispectral signal for detecting metallic biopsy markers during MRI-guided breast biopsy: a pilot study. Magn Reson Med (83) 1380-1389.

J30.	**Cho, J.**[§] Zhang, S., Kee, Y., Spincemaille, P., Nguyen, T.D., Hubertus, S., Gupta, A., and Wang, Y. (2020). Cluster analysis of time evolution (CAT) for quantitative susceptibility mapping (QSM) and quantitative blood oxygen level-dependent magnitude (qBOLD)-based oxygen extraction fraction (OEF) and cerebral metabolic rate of oxygen (CMRO2). Magn Reson Med (83) 844-857.

J31.	Hubertus, S., Thomas, S., **Cho, J.**, Zhang, S., Wang, Y., and Schad, L.R. (2019). Using an artificial neural network for fast mapping of the oxygen extraction fraction with combined QSM and quantitative BOLD. Magn Reson Med (82) 2199-2211.

J32.	Hubertus, S., Thomas, S., **Cho, J.**, Zhang, S., Wang, Y., and Schad, L.R. (2019). Comparison of gradient echo and gradient echo sampling of spin echo sequence for the quantification of the oxygen extraction fraction from a combined quantitative susceptibility mapping and quantitative BOLD (QSM+qBOLD) approach. Magn Reson Med (82) 1491-1503.

J33.	**Cho, J.**[§] Zhou, D., Kee, Y., Spincemaille, P., and Wang, Y. (2019). Quantitative susceptibility mapping of magnetic quadrupole moments. Concepts in MR Part A. Article ID 7174937.

J34.	**Cho J.**[§], Kee, Y., Spincemaille, P., Nguyen, T.D., Zhang, J., Gupta, A., Zhang, S., and Wang, Y. (2018). Cerebral metabolic rate of oxygen (CMRO2) mapping by combining quantitative susceptibility mapping (QSM) and quantitative blood oxygenation level-dependent imaging (qBOLD). Magn Reson Med (80) 1595-1604.

J35.	Kee, Y., **Cho, J.**, Deh, K., Liu, Z., Spincemaille, P., and Wang, Y. (2018). Coherence enhancement in quantitative susceptibility mapping by means of anisotropic weighting in morphology enabled dipole inversion. Magn Reson Med (79) 1172-1180.

J36.	Zhang, J., **Cho, J.**, Zhou, D., Nguyen, T.D., Spincemaille, P., Gupta, A., and Wang, Y. (2018). Quantitative susceptibility mapping-based cerebral metabolic rate of oxygen mapping with minimum local variance. Magn Reson Med (79) 172-179.

J37.	Kee, Y., Liu, Z., Zhou, L., Dimov, A., **Cho, J.**, de Rochefort, L., Seo, J.K., and Wang, Y. (2017). Quantitative susceptibility mapping (QSM) algorithms: mathematical rationale and computational implementations. IEEE TRANS BIO ENGIN (64) 2531-2545.

J38.	Zhou, D., **Cho, J.**, Zhang, J., Spincemaille, P., and Wang, Y. (2017). Susceptibility underestimation in a high-susceptibility phantom: dependence on imaging resolution, magnitude contrast, and other parameters. Magn Reson Med (78),1080-1086

J39.	Jung, H., Jin, S., **Cho, J.**, Han, S., Lee, D., and Cho, H. (2016). UTE-ΔR2- ΔR2* combined MR whole brain angiogram using dual-contrast superparamagnetic iron oxide nanoparticles. NMR in Biomedicine 29 (6), 690-701.

J40.	Han, S., **Cho, J.**, Jung, H., Suh, J., Kim, J., Kim, Y., Cho, G., and Cho, H. (2015). Robust MR assessment of cerebral blood volume and mean vessel size using SPION-enhanced ultrashort echo acquisition. NeuroImage (112), 382-389.

J41.	Jung, H., Park, B., Lee, C., **Cho, J.**, Suh, J., Park, J., Kim, Y., Kim, J., Cho, G., and Cho, H. (2014). Dual MRI T1 and T2* contrast with size-controlled iron oxide nanoparticles. Nanomedicine: Nanotechnology, Biology, and Medicine (10), 1679-1689.

J42.	Kim, H., **Cho, J.**[§] Kim, Y., Song, Y., Chun, S., Suh, J., Kim, J., Ryu, Y., Choi, S., Cho, H., and Cho, G. (2014). Response of the Primary Auditory and Non-Auditory Cortices to Acoustic Stimulation: A Manganese-Enhanced MRI Study. PLoS One (9): e90427

*In Review: Total: 9, 1ˢᵗ author: 0§, Corresponding author: 5**

J43.	Velljos, G., Mehta, P., Khlil, M.H, Keyes, S., Shahraki, T., **Cho, J.**, Maclellan, C., Spincemaille, P., Wang, Y., Sloane, J., Soman, S. Oxygen Extraction Fraction Differences in Multiple Sclerosis: Evaluating Disease-Modifying Therapies Using Normalized WMH-NAWM Measures from QSM+qBOLD MRI. MAGMA

J44. Li, K., Zeng, Q., **Cho, J.,** Liu, X., Hong, H., Xu, Xi, Wang, S., Zhang, Y., Jiaerken, Y., Zhang, R., Zhang, Xi., Zhao S., Zhang, M, Chen, Y., Luo, X., Huang, P. Brain oxygen metabolism is differently affected by Alzheimer's and vascular factors across the early Alzheimer's disease continuum. Alzheimers Dement

J45. Praveena, E., Nguyen, H., Zhang, S., Wang, Y., Gauthier S., **Cho, J.*** Remyelination and its association with increased oxygen extraction fraction in acute multiple sclerosis lesion. J Cereb Blood Flow Metab

J46. Boyer, Q., Wu, D., Zhang, G., Zhang, S., **Cho, J.*** Dynamic Chanes in Oxygen Extraction Fraction as a Predictor of Long-Term Recovery in Ischemic Stroke Patients. J Cereb Blood Flow Metab.

J47. Misra, A., Wang, Y., Chiang, G., **Cho, J.*** Oxygen extraction fraction is differentially associated with pathological biomarker in Alzheimer's Diseases and non-Alzheimer's dementia. J Cereb Blood Flow Metab

J48. Misra, A., Oros-Peusquens, A., Reetz, K., Dogan, I., Schulz, J.B., Ma, C., Wang, Y., Shah N.J., **Cho, J.*** Assessing abnormal oxygen extraction fraction and neural tissue susceptibility in Parkinson's disease using a novel MRI technique, QQ. J Cereb Blood Flow Metab

J49. Zhang, S., Ma, J., Wu, S., Hu, Z., Yan, S., **Cho, J.,** Wang, Y., Dong, L., Zhang, S., Zhu, W. Evaluation of MRI-based brain oxygen extraction fraction mapping in patients with systemic lupus erythematosus. J Cereb Blood Flow Metab

J50. Yan, S., Lu, S., Duan, B., Zhang, S., Liu, D., Qin, Y., Dimov, A.V., **Cho, J.,** Li, Y., Zhu, W., and Wang, Y. Susceptibility source separation-derived components and oxygen extraction fraction to differentiate multiple system atrophy from Parkinson's Disease. Transl. Neurodegener.

J51. Candan, H.E., Lee, D., Lee, H., Lee, J., **Cho, J.***, Cho, H. Elevated cerebral oxygen extraction in Parkinson's disease correlates with motor impairment severity. Mov Disord.

Proceedings Articles
*Total: 49, 1st author: 15, Corresponding author: 10**

A1. Misra, A. and **Cho, J***. An Optimal, Routinely Application Multi-Echo Gradient Echo (mGRE) Data Acquisition Scheme for QQ-based Oxygen Extraction Fraction (OEF) Mapping, ISMRM 2025, Hawaii, abstract 7427.

A2. Misra, A., Chiang, G.C., and **Cho, J***. Oxygen extraction fraction is differently associated with pathological biomarkers in Alzheimer's Disease and non-Alzheimer's dementias. ISMRM 2025, Hawaii, abstract 7346

A3. Misra, A., Oros-Peusquens, A., Dogan, I., Reetz, K., Shah, N.J., and **Cho, J***. Assessing abnormal oxygen extraction fraction (OEF) and neural tissue susceptibility in Parkinson Disease. ISMRM 2025, Hawaii, abstract 0297.

A4. Boyer, Q., Wu, D., Zhang, S., and **Cho, J***. Dynamic Changes in Oxygen Extraction Fraction as a Predictor of Long-Term Recovery in Ischemic Stroke Patients. ISMRM 2025, Hawaii, abstract 9197.

A5. Boyer, Q. Lee, D., Cho, H, and **Cho, J***. QQ-based oxygen extraction fraction (OEF) mapping in mouse brain: Initial Experience. ISMRM 2025, Hawaii, abstract 9680.

A6. Elanghovan, P., Nguyen T., Zexter L., Zhang S., Wang, Y., ans Gauthier S.A., and **Cho, J.*** Remyelination and its association with oxygen extraction fraction differ between male and female in multiple sclerosis. ISMRM 2025, Hawaii, abstract 7301.

A7. Elanghovan, P., Nguen, Spincemaille, P., Wang, Y., and **Cho, J.*** Sensitivity assessment of QSM+qBOLD (or QQ) in detecting elevated oxygen extraction fraction (OEF) in physiological change. ISMRM 2025, Hawaii, abstract 6856.

A8. Yang, R., Ally, A., **Cho, J***. Enhanced QQ-based oxygen extraction fraction mapping by incorporating realistic water diffusion and vasculature: QQ-MASTER. ISMRM 2025, Hawaii, abstract 1031.

A9. Zlatopolsky, D., Hagger, I., Hsu, D., Kurt, N., **Cho, J.,** and Soman, S. Assessing Metabolic Dysfunction at cerebral microbleed sites using MRI-based quantitative oxygen extraction fraction mapping. ISMRM 2025, Hawaii, abstract 5439.

A10. Hawley, I., Lee, M., Stotesbury, H., Clark, C., Shmueli, K., **Cho, J.,** and Kirkham, F. Estimation of cerebral oxygen extraction fraction (OEF) by Haematocrit-Correctd QQ (qBOLD + QSM) in sickle cell anaemia. ISMRM 2025, Hawaii, abstract 0142.

A11. Oros-Peusquens, A., **Cho, J.,** Boers, F., Jaliseh, I.F., Langen, K., and Shah, N.J. A novel approach to the metabolic characterization of brain tumours: edema-corrected OEF. A hybrid MR-PET study. ISMRM 2025, Hawaii, abstract 9494.

A12. Candan, H.E., Lee, D., Lee, H., Lee, J., **Cho, J.,** Cho, H. Cerebral oxygen extraction fraction as an early biomarker for Parkinson's Disease correlates with motor impairment severity. ISMRM 2025, Hawaii, abstract 7694.

A13. Misra, A., Ana-Maria, O., and **Cho, J***. Investigating oxygen metabolism abnormalities in Parkinson Disease, RSNA 2024, USA, ID 17019.

A14. Ally, A. and **Cho, J***. A deep neural network for oxygen extraction fraction (OEF) mapping based on no training, ISMRM 2024, Singapore, abstract 3181.

A15. Candan, H., Lee, D., **Cho, J.**, Lee, H., and Cho, H. Increase in cerebral oxygen extraction fraction in early Parkinson's patients, ISMRM 2024, Singapore, abstract 4345.

A16. Oros-Penusquens, A., **Cho, J.**, Hau, L., Boers, F., Bittner, N., Caspers, S., Wang, Y., and Shah, N.J. Metabolic and vascular aspects of the ageing brain correlated with age, gender, lifestyle and intelligence, ISMRM 2024, Singapore, abstract 3885.

A17. **Cho, J.**, Spincemaille, P., Nguyen, T.D., Wang, Y. An improved data acquisition for robust oxygen extraction fraction (OEF) mapping using an integrative model of QSM and qBOLD (QSM+qBOLD=QQ), ISMRM 2023, Canada, abstract 4024.

A18. Leeuw, J.D., **Cho, J.**, Grinsven E.V., Siero, J., Philippens, M., Bhogal, A. Effects of radiotherapy on tissue in patients with brain metastases in terms of OEF and CMRO2, ISMRM 2023, Canada, abstract 3224

A19. Sui, C., Zhang, Q., **Cho, J.**, Yang, L., Chen, T., Guo, B., Gillen, K.M., Li, J., Guo, L., Wang, Y. Assessing cerebral oxygen metabolism changes in preeclampsia using voxel-based morphometry of oxygen extraction fraction (OEF) maps in MRI, ISMRM 2023, Canada, abstract 2102.

A20. Oros-Penusquens, A., Hau, L., **Cho, J.**, Bittner, N., Caspers, S., Wang, Y., Shah N.J. Pronounced gender and lifestyle effects in the oxygen extraction fraction (OEF) of the aging brain, ISMRM 2023, Canada, abstract 1303.

A21. Wang, J., **Cho, J.**, Zhang, C., Wang, Y., and Yu, B. Assessment of age-related changes of oxygen extraction fraction of normal adults using QSM and quantitative BOLD, ISMRM 2022, UK, abstract 2940.

A22. **Cho, J.**, Zhang, J., Spincemaille, P., Zhang, H., Nguyen, T.D., Gupta, A., and Wang, Y. Multi-echo Complex QSM+qBOLD (mcQQ) for Oxygen Extraction Fraction (OEF) mapping, ISMRM 2022, UK, abstract 0181.

A23. **Cho, J.**, Nguyen, T.D., Sweeney, E.M., Spincemaille, P., Gupta, A., Gauthier S.A., and Wang, Y. Increased oxygen extraction fraction (OEF) following acute multiple sclerosis (MS) lesion formation is associated with increased myelin repair, ISMRM 2022, UK, abstract 0136.

A24. **Cho, J.**, Gloria C.C., Dyke J., Zhang, H., Zhang, Q., Tokov, M., Nguyen T., Spincemaille, P., Kovanlikaya I., Amoashiy, M., Leon, M.D, and Wang, Y. Cerebral oxygen extraction fraction (OEF) mapping in cognitively impaired and intact elderly, ISMRM 2022, UK, abstract 2275.

A25. Zhuang, H., **Cho, J.**, Chiang, G., Kovanlikaya, I., Heier, L., and Wang, Y. Brain Oxygen Extraction Fraction in Patients with Normal Pressure Hydrocephalus, ISMRM 2022, UK, abstract 3982.

A26. **Cho, J.**, Lee, J., An, H., Goyal, M., Su, Y., and Wang, Y. Cerebral oxygen extraction fraction (OEF): comparison of challenge-free gradient echo QSM+qBOLD (QQ) with 15O PET in healthy adults, ISMRM 2021, virtual, abstract 0869.

A27. **Cho, J.**, Spincemaille, P., Nguyen T., Gupta, A., and Wang, Y. Combined cluster analysis of time evolution and tissue type with total variation denoising (CCTV) for QQ-based oxygen extract fraction mapping, ISMRM 2021, virtual, abstract 1283.

A28. Zhang, H., Zhang, J., **Cho, J.**, Gauthier, S., Spincemaille, P., Nguyen, T., and Wang Y. MS-voter: Learning Where to Vote for Confluent Multiple Sclerosis Lesion Separation, ISMRM 2021, virtual, abstract 2824.

A29. **Cho, J.**, Ma, Y., Spincemaille, P., Pike B., and Wang, Y. Cerebral oxygen extraction fraction mapping: comparison of dual-gas challenge calibrated BOLD and challenge-free gradient echo QSM+qBOLD, ISMRM, 2020, virtual, abstract 1781

A30. Wen, Y., Nguyen, T., **Cho, J.**, Spincemaille, P., and Wang Y. Improved signal modeling in Quantitative Susceptibility Mapping using multi-echo complex Total Field Inversion (mcTFI), ISMRM, 2020, virtual, abstract 3200.

A31. Jafari, R., Spincemaille, P., Nguyen T., **Cho, J.**, Prince, M., and Wang, Y. Quantitative Susceptibility Mapping from Deep-Learning Based Reconstruction of Undersampled Gradient-Recalled Echo Data, ISMRM 2020, virtual, abstract 2596.

A32. Guo, L., Zhou, L., Nguyen, T., Huang, W., **Cho, J.**, and Wang, Y. Quantitative susceptibility mapping of brain iron deposition in patients with cerebral small-vessel disease with cerebral microbleeds, ISMRM, 2020, virtual, abstract 1494.

A33. **Cho, J.**, Nguyen, T., Huang, W., Zhang, S., Luo, X., Gauthier, S., Spincemaille, P., Guta, A., Wang, Y. Regional oxygen extraction fraction mapping (rOEF) of multiple sclerosis brains, ISMRM, 2020, virtual, abstract 0064.

A34. **Cho, J.**, Lee, H., Zhang, J., Spincemaille, P., Zhang, H., Hubertus, S., Wen, Y., Jafari, R. Zhang, S., Nguyen, T., Gupta, A., and Wang, Y. Sparsity based machine learning algorithms for oxygen extraction mapping, ISMRM, 2020, virtual, abstract 3224.

A35. Hubertus, S., Thomas, S., **Cho, J.**, Zhang, S., Wang, Y., and Schad, L. Using an Artificial Neural Network for Fast Mapping of the Oxygen Extraction Fraction with Combined QSM and qBOLD, ISMRM, 2020, virtual, abstract 1867.

A36. **Cho, J.**, Zhang, S. Kee, Y., Spincemaille, P., Nguyen, T.D., Hubertus, S., Gupta, A., and Wang, Y. Data-driven regularized inversion (DRI) for improved QSM+qBOLD based CMRO2 Mapping: a feasibility study in healthy subjects and ischemic stroke patients, ISMRM, 2019, Canada, abstract 2724

A37. Hubertus, S. Thomas, S., **Cho, J.**, Zhang, S., Wang, Y., and Schad, L.R. Comparison of Gradient Echo and Gradient Echo Sampling of Spin Echo Sequence for the Quantification of the Oxygen Extraction Fraction by Combining Quantitative Susceptibility Mapping and Blood Oxygen level Dependency, ISMRM, 2019, Canada, abstract 2721

A38. Hubertus, S., Thomas, S., **Cho, J.**, Zhang, S., Kovalikaya, I., Wang, Y., Schad, L.R. MRI-based Oxygen Extraction Fraction and Cerebral Metabolic Rate of Oxygen Mapping in High-Grade Glioma Using a combined Quantitative Susceptibility Mapping and Quantitative Blood Oxygenation Level-Dependent Approach, ISMRM, 2019, Canada, abstract 0391

A39. Ma, Y., Sun, H., **Cho, J.**, Mazerolle, E., Wang, Y., and Pike, B. Whole-brain OEF quantification: a comparison study between QSM and dual-gas calibrated BOLD, ISMRM, 2019, Canada, abstract 3706

A40. **Cho, J.**, Zhang, J., Spincemaille, P., Zhang, H., Hubertus, S., Zhang, S., Nguyen, T.D., Gupta, A., and Wang, Y. DeepQQ – using deep learning to solve Quantitative Susceptibility Mapping and Quantitative Blood Level Dependent magnitude (QSM+qBOLD or QQ) based Oxygen Extraction Fraction (OEF) and Cerebral Metabolic Rate of Oxygen (CMRO2) Mapping, QSM Workshop, 2019, Korea

A41. **Cho, J.**, Zhang, S., Kee, Y., Spincemaille, P., Nguyen, T.D., Hubertus, S., Gupta, A., and Wang Y. Cluster analysis of time evolution (CAT) for Quantitative Susceptibility Mapping and Quantitative Blood Oxygen Level Dependent magnitude (QSM+qBOLD, QQ) based Oxygen Extraction Fraction (OEF) and Cerebral Metabolic Rate of Oxygen (CMRO2) Mapping, QSM Workshop, 2019, Korea

A42. Hubertus, S., Thomas, S., **Cho, J.**, Zhang, S., Wang, Y., and Schad L.R. Using an Artificial Neural Network for Fast Mapping of the Oxygen Extract Fraction with combined Quantitative Susceptibility Mapping and Quantitative BOLD, QSM Workshop, 2019, Korea

A43. **Cho, J.**, Kee, Y., Spincemaille, P., Nguyen, T.D., Zhang, J., Gupta, A., Zhang, S., and Wang, Y. Cerebral Metabolic Rate of Oxygen (CMRO2) mapping by a joint model of quantitative susceptibility mapping (QSM)-based method and quantitative BOLD (qBOLD), ISMRM, 2018, France, abstract 0179

A44. Kee, Y., **Cho, J.**, Nguyen, T.D., Spincemaille, P., and Wang, Y. Eight fold acceleration for isotropic T2w and T2FAIAR imaging using Multi-Contrast Second-Order Directional Total Generalized Variation (dTGV), ISMRM, 2018, France, abstract 2054

A45. Eskreis-Winkler, S., Simon, K., Kee, Y., **Cho, J.**, Nguyen, T.D., Spincemaille, P., Drotman, M., and Wang. Y. Feasibility of multispectral spin echo breast quantitative susceptibility mapping: an alternative to post-biopsy mammogram after MR-guided breast biopsy, ISMRM, 2018, France, abstract 4454

A46. Zhang, S., **Cho, J.**, Nguyen T.D., Spincemaille, P., Zhu, W., and Wang Y. Initial experience using combined quantitative susceptibility mapping and quantitative bold oxygen level dependent imaging (QSM+qBOLD) oxygen extraction fraction for evaluation of acute ischemic stroke, ISMRM, 2018, France, abstract 4805

A47. **Cho., J.**, Kee, Y., Spincemaille, P., Nguyen, T.D., Zhang, J., and Wang Y. Optimal Quantitative Mapping of Cerebral Metabolic Rate of Oxygen (CMRO2) by Combining Quantitative Susceptibility Mapping (QSM)-Based Method and Quantitative BOLD (QBOLD), ISMRM, 2017, Hawaii, USA, abstract 1110

A48. Kee, Y., Spincemaille, P., **Cho, J.**, and Wang Y. Coherence Enhancement in QSM Via Anisotropic Weighting in Morphology-Enabled Dipole Inversion, ISMRM, 2017, Hawaii, USA, abstract 3674

A49. **Cho, J.**, Zhou, D., Spincemaille, P., and Wang, Y. Quantitative susceptibility mapping of magnetic quadrupole moments, ISMRM, 2016, Singapore, abstract 1114

TECHNICAL PRESENTATIONS

<u>Invited Talks</u>

1. "Oxygen Extraction Fraction: A Novel Neuroimaging Biomarker for Neurologic Disorders", Georgetown Neuroscience Seminar, USA, 2025

2. "Advancing Neuroimage: Quantitative Oxygen Extraction Fraction (OEF) Mapping for Clinical Applications", Georgetown Neurology, USA, 2025
3. "Mapping Brain Oxygen Use: Oxygen Extraction Fraction", Kyungpook University, Korea, 2025
4. "A Novel Imaging Biomarker for Investigating Neurologic disorders: Oxygen Extraction Fraction", Korea Institute of Oriental Medicine, Korea, 2025
5. "Novel Oxygen Metabolism Mapping Technique for Routine Use", George Washington University, USA, 2025
6. "Quantitative Mapping of Brain Oxygen Metabolism Using Magnetic Resonance Imaging", Dartmouth University, USA, 2024
7. "Novel MRI Methodology for cerebral oxygen extraction fraction (OEF) mapping", Seoul National University Bundang Hospital, Korea, 2024
8. "Oxygen Extraction Fraction (OEF) Mapping Using MRI", Seoul St. Mary Hospital, Korea, 2024
9. "Novel MRI Methodology for Clinically Relevant Cerebral Oxygenation Measurement", Ulsan National Institute of Science and Technology, Korea, 2022
10. "Novel MRI Methodology for Clinically Relevant Cerebral Oxygenation Measurement", Ehwa Women's University, Korea, 2022
11. "MRI methodology for clinically relevant tissue properties including oxygen extraction fraction (OEF)", Daegu Gyeongbuk Institute of Science and Technology, Korea, 2022
12. "MRI Methodology for clinically relevant tissue properties including oxygen extraction fraction (OEF)", Weill Cornell Medicine, Radiology, 2021
13. "MRI Methodology for clinically relevant tissue properties including oxygen extraction fraction (OEF)", Rutgers University, BME, 2021
14. "MRI Methodology for clinically relevant tissue properties including oxygen extraction fraction (OEF)", SUNY Binghamton, BME, 2021
15. "MRI Methodology for clinically relevant tissue properties including oxygen extraction fraction (OEF)", Case Western Reverse University, BME, 2021
16. "Clinically Applicable MRI-based Brain Oxygen Extraction Fraction (OEF) Mapping", SUNY Buffalo, BME, 2021
17. "QSM+qBOLD approach for OEF mapping", Imaging Cerebral Physiology (ICP) Network Seminar, virtual, 2021
18. "Quantitative Susceptibility Mapping (QSM): Introduction and processing software", Korea Basic Science Institute, virtual, 2021
19. "Quantitative Susceptibility Mapping (QSM): Concept, improvement, and application", Korea Basic Science Institute and Ulsan National Institute of Science and Technology, Korea, 2019
20. "A novel MRI method for CMRO2 measurement", Ulsan National Institute of Science and technology and Korea Institute of Oriental Medicine, Korea, 2019

Conference Presentations
1. "Multi-echo Complex QSM+qBOLD (mcQQ) for Oxygen Extraction Fraction (OEF) mapping", ISMRM, London, England, UK, 2022
2. "Increased oxygen extraction fraction (OEF) following acute multiple sclerosis (MS) lesion formation is associated with increased myelin repair", ISMRM, London, England, UK, 2022
3. "Cerebral oxygen extraction fraction (OEF): comparison of challenge-free gradient echo QSM+qBOLD (QQ) with ^{15}O PET in healthy adults", ISMRM, virtual, 2022
4. "Regional oxygen extraction of multiple sclerosis brains", ISMRM, virtual, 2020
5. "Cluster analysis of time evolution (CAT) for Quantitative Susceptibility Mapping and Quantitative Blood Oxygen Level Dependent magnitude (QSM+qBOLD, QQ) based Oxygen Extraction Fraction and Cerebral Metabolic Rate of Oxygen (CMRO2) mapping", QSM workshop, Seoul, Korea, 2019
6. "Cerebral Metabolic Rate of Oxygen (CMRO2) mapping by a joint model of quantitative susceptibility mapping (QSM)-based method and quantitative BOLD (qBOLD)", ISMRM, Paris, France, 2018
7. "Optimal Quantitative Mapping of Cerebral Metabolic Rate of Oxygen (CMRO2) by Combing Quantitative Susceptibility Mapping (QSM)-based Method and Quantitative BOLD (qBOLD)", ISMRM, Honolulu, USA, 2017
8. "Quantitative Susceptibility Mapping of Magnetic Quadrupole Moments", ISMRM, Singapore, 2016

MENTORING GRADUATE STUDENTS

Dissertations/Thesis in Progress
Ph.D. degrees
1.   Renlong Yang   Aug 2023-present, degree expected May 2028
2.   Arpita Misra   Aug 2023-present, degree expected May 2028
3.   Liukailai Ding   Aug 2024-present, degree expected May 2029
4.   Tian Qiu   Aug 2024-present, degree expected May 2029

Undergraduate Students
5.   Jonathan Kang   Aug 2025-present
6.   Selah Koleth   Aug 2025-present

Dissertations/Thesis Completed
M.S. degrees
7.   Quinn Boyer   MS   May 2025, UB
8.   Ada Ally   MS   Aug 2024, UB
9.   Shamsher Khan   MS   May 2024, UB

Achievement of Graduate Students
1.   Renlong Yang   "Magna cum laude" merit award   May 2025, ISMRM
2.   Quinn Boyer   Master Research Excellence Award   May 2025, UB
3.   Arpita Misra   BME Poster Competition, 3rd place   Nov 2024, UB
4.   Ada Ally   Master Research Excellence Award   May 2024, UB

PROFESSIONAL ACTIVITIES

Leadership
   Topic Editor, Frontiers in Neuroscience, 2022-2023

Other Service
   Reviewer, AJNR, 2023-present
   Reviewer, Frontiers in Neuroscience, 2022
   Reviewer, Phenomics, 2022
   Reviewer, Scientific Reports, 2021
   Reviewer, NMR in Biomedicine, 2019

Membership in Professional and Honor Societies
   ISMRM, Member, 2015-present

RESEARCH/TEACHING EXPERIENCE

MRI Research
1. Cerebral Oxygen Extraction Fraction (OEF) Mapping   2016-present
    - Biophysics modeling for more realistic OEF models (QQ, mcQQ)
    - Data processing (Artificial Intelligence) for more accurate OEF estimation (CAT, CCTV, NET)
    - Validation with other techniques (Calibrated fMRI, ^{15}O-PET)
    - Clinical applications in dementia, stroke, AD, PD, multiple sclerosis, brain tumors, preeclampsia.

2. Quantitative Susceptibility Mapping (QSM) Algorithm Development   2017-2018
    - Investigation of susceptibility underestimation

- QSM coherence enhancement with anisotropic weighting

3. Quantitative Mapping of Magnetic Quadrupole Moments   2014-2016
    - Derivation of quadrupole moments from Maxwell's equations
    - Validation in numerical simulations, phantom, human brains

4. MR Contrast Analysis using Physics Simulations   2013-2014
    - Dual contrast generation from a single contrast agent by adjusting MR parameters
    - Monte Carlo simulation for transverse relaxation changes with MR contrast agents.

5. Neuroscience using Manganese-enhanced MRI   2011-2012
    - Investigation of auditory and non-auditory cortical responses to acoustic stimulation

Physics Research (BS and MS)
6. Nacre Growth Pattern Modeling   05/2010-12/2010
    - Construction and validation of biophysical models for nacre growth patterns

7. High Energy Physics Experiment (ATLAS)   08/2008-04/2009
    - Design, construction, and testing of muon signal detector prototypes for ATLAS upgrade

8. Dark Energy Survey   08/2007-04/2008
    - Setup and testing of various optical filters for transmission rate measurement

9. General Relativity   01/2007-04/2007
    - Derivation of the General Relativity

Teaching
George Washington University (Faculty)
2026 Spring   BME4830/6830: Introduction to Medical Imaging Methods: TBA

SUNY Buffalo (Faculty)
2024 Fall   BE400/500: Introduction to Biophysics Modeling in MRI, 11 students, evaluation: 4.5/5
2024 Spring   BE304: Principles of Medical Imaging (BME core), 49 students, evaluation: 3.9/5
2023 Fall   BE400/500: Introduction to Biophysics Modeling in MRI, 17 students, evaluation: 4.2/5
2023 Spring   BE500-SEM: Current Topics in Biomedical Engineering, evaluation: N/A
2022 Fall   BE400/500: Introduction to Biophysics Modeling in MRI, 11 students, evaluation: 4.3/5

Cornell University (TA): 2014
               Biomedical Engineering 6180: Principles of Magnetic Resonance Imaging

University of Wisconsin Madison (TA): 2009-2010
               Physics 103: General Physics (Mechanics, heat, waves)
               Physics 104: General Physics (Electricity and magnetism, light, optics, modern physics)
               Physics 201: General Physics (Calculus-based mechanics)

PROFICIENCIES

Programming Languages:	MATLAB, Python
Neuroimaging tools:	FSL, SPM, FreeSurfer, ITK-SNAP, ImageJ
Tools:	Bash scripting, Microsoft Office, Adobe Illustrator
Operating systems:	Linux, Windows
MRI vendors:	3T, 1.5T Siemens, GE, Philips
Languages:	English, Japanese, Korean (native)

MEDIA COVERAGE

1. UB awarded $1.77 million grant to create toolset for oxygen metabolism mapping (5/10/2024): https://www.buffalo.edu/news/releases/2024/05/oxygen-metabolism-mapping-grant.html
2. Cho receives grant to extend research on accessible MRI mapping of oxygen metabolism (12/22/2023): https://engineering.buffalo.edu/bme/news-events/latest_news.host.html/content/shared/engineering/home/articles/news-rticles/2023/cho-receives-grant-to-extend-research-on-accessible-mri-mapping-.detail.html