



Michael Zeineh

Associate Professor of Radiology (Neuroimaging and Neurointervention) at the Stanford University Medical Center

CLINICAL OFFICES

- **Clinical Neuroradiology**

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Bio

BIO

Dr. Michael Zeineh received a B.S. in Biology at Caltech in 1995 and obtained his M.D.-Ph.D. from UCLA in 2003. After internship also at UCLA, he went on to radiology residency and neuroradiology fellowship both at Stanford. He has been an assistant professor of radiology since 2010. Combining clinical acumen in neuroradiology with advanced MRI acquisition and image processing as well as histologic validation, Dr. Zeineh hopes to advance the care of patients with neurodegenerative disorders. In particular, he is interested in Alzheimer's disease, sports-related mild traumatic brain injury, and chronic fatigue syndrome. Additionally, he is specifically interested and has over 20 years of experience studying hippocampal anatomy and pathology.

CLINICAL FOCUS

- Clinical Functional MRI
- Clinical Diffusion Tensor Imaging
- Diagnostic Radiology

ACADEMIC APPOINTMENTS

- Associate Professor - Med Center Line, Radiology
- Member, Bio-X
- Member, Wu Tsai Neurosciences Institute

HONORS AND AWARDS

- Clinical Scientist Development Award, Doris Duke Charitable Foundation (7/1/15-6/30/18)
- Research Scholar Award, RSNA (7/1/13-6/30/16)
- ISMRM Clinical Stipend, International Society for Magnetic Resonance in Medicine (2013)
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- ISMRM Clinical Stipend, International Society for Magnetic Resonance in Medicine (2011)
- ISMRM Travel Award, International Society for Magnetic Resonance in Medicine (2010)

- Emil Bogen Research Prize, UCLA (2003)
- Western Student Medical Research Forum, Bertakis Speaker Award (2002)
- Burroughs Wellcome Travel Award for Research in England, Burroughs Wellcome Fund (2001)
- Human Brain Mapping Travel Award, Organization for Human Brain Mapping (2001)
- Kavan Prize for Neuroscience, UCLA (2001)
- Hortense Fischbaugh Pollack Scholarship, UCLA (2000)
- NIMH NRSA MH12167 (Bookheimer PI) Project: Unfolding the Human Hippocampus with Functional MRI, National Institutes of Health (NIH) (1998-2000)
- Merit Award/Scholarship, Caltech (1994-1995)
- Summer Undergraduate Research Fellowship, Caltech (1994)
- Merit Award/Scholarship, Caltech (1993-1994)
- Barry M. Goldwater Scholarship, Servite High School (1993)
- Tau Beta Pi, Caltech (1993)

PROFESSIONAL EDUCATION

- Internship: UCLA GME Office (2004) CA
- Medical Education: UCLA GME Office (2003) CA
- Board Certification: Neuroradiology, American Board of Radiology (2011)
- Fellowship: Stanford University - Fellowship (2009) CA
- Board Certification: Diagnostic Radiology, American Board of Radiology (2008)
- Residency: Stanford University - Fellowship (2008) CA

LINKS

- My Lab Website: <http://med.stanford.edu/zeinehlab.html>

Teaching

STANFORD ADVISEES

Postdoctoral Faculty Sponsor

Zara Dana, Marios Georgiadis, Mahta Karimpoor, Sam Raymond, Zhou Zhou

Doctoral Dissertation Co-Advisor (NonAC)

Mackenzie Carlson, Phillip DiGiacomo

Publications

PUBLICATIONS

- **COVID-19-induced anosmia associated with olfactory bulb atrophy.** *Neuroradiology*
Chiu, A., Fischbein, N., Wintermark, M., Zaharchuk, G., Yun, P. T., Zeineh, M.
2020
- **Simultaneous FDG-PET/MRI detects hippocampal subfield metabolic differences in AD/MCI.** *Scientific reports*
Carlson, M. L., DiGiacomo, P. S., Fan, A. P., Goubran, M., Khalighi, M. M., Chao, S. Z., Vasawala, M., Wintermark, M., Mormino, E., Zaharchuk, G., James, M. L., Zeineh, M. M.
2020; 10 (1): 12064
- **Deep Flow-Net for EPI Distortion Estimation.** *NeuroImage*
Zahneisen, B., Baeumler, K., Zaharchuk, G., Fleischmann, D., Zeineh, M.

2020: 116886

- **Longitudinal alteration of cortical thickness and volume in high-impact sports.** *NeuroImage*
Mills, B. D., Goubran, M., Parivash, S. N., Dennis, E. L., Rezaei, P., Akers, C., Bian, W., Mitchell, L. A., Boldt, B., Douglas, D., Sami, S., Mouchawar, N., Wilson, et al
2020: 116864
- **A within-coil optical prospective motion-correction system for brain imaging at 7T.** *Magnetic resonance in medicine*
DiGiacomo, P., Maclaren, J., Aksoy, M., Tong, E., Carlson, M., Lanzman, B., Hashmi, S., Watkins, R., Rosenberg, J., Burns, B., Skloss, T. W., Rettmann, D., Rutt, et al
2020
- **Lateral impacts correlate with falx cerebri displacement and corpus callosum trauma in sports-related concussions.** *Biomechanics and modeling in mechanobiology*
Hernandez, F., Giordano, C., Goubran, M., Parivash, S., Grant, G., Zeineh, M., Camarillo, D.
2019
- **Longitudinal changes in hippocampal subfield volume associated with collegiate football.** *Journal of neurotrauma*
Parivash, S. N., Goubran, M., Mills, B. D., Rezaei, P., Thaler, C., Wolman, D., Bian, W., Mitchell, L. A., Boldt, B., Douglas, D., Wilson, E., Choi, J., Xie, et al
2019
- **MR susceptibility contrast imaging using a 2D simultaneous multi-slice gradient-echo sequence at 7T.** *PLoS one*
Bian, W., Kerr, A. B., Tranvinh, E., Parivash, S., Zahneisen, B., Han, M. H., Lock, C. B., Goubran, M., Zhu, K., Rutt, B. K., Zeineh, M. M.
2019; 14 (7): e0219705
- **Multimodal image registration and connectivity analysis for integration of connectomic data from microscopy to MRI.** *Nature communications*
Goubran, M., Leuze, C., Hsueh, B., Aswendt, M., Ye, L., Tian, Q., Cheng, M. Y., Crow, A., Steinberg, G. K., McNab, J. A., Deisseroth, K., Zeineh, M.
2019; 10 (1): 5504
- **Direct Visualization and Mapping of the Spatial Course of Fiber Tracts at Microscopic Resolution in the Human Hippocampus** *CEREBRAL CORTEX*
Zeineh, M. M., Palomero-Gallagher, N., Axer, M., Graessel, D., Goubran, M., Wree, A., Woods, R., Amunts, K., Zilles, G.
2017; 27 (3): 1779-1794
- **The "White Gray Sign" Identifies the Central Sulcus on 3T High-Resolution T1-Weighted Images** *AMERICAN JOURNAL OF NEURORADIOLOGY*
Kaneko, O. F., Fischbein, N. J., Rosenberg, J., Wintermark, M., Zeineh, M. M.
2017; 38 (2): 276-280
- **In Vivo 7T MR Quantitative Susceptibility Mapping Reveals Opposite Susceptibility Contrast between Cortical and White Matter Lesions in Multiple Sclerosis** *AMERICAN JOURNAL OF NEURORADIOLOGY*
Bian, W., Tranvinh, E., Tourdias, T., Han, M., Liu, T., Wang, Y., Rutt, B., Zeineh, M. M.
2016; 37 (10): 1808-1815
- **Activated iron-containing microglia in the human hippocampus identified by magnetic resonance imaging in Alzheimer disease.** *Neurobiology of aging*
Zeineh, M. M., Chen, Y., Kitzler, H. H., Hammond, R., Vogel, H., Rutt, B. K.
2015; 36 (9): 2483-2500
- **Ultra-high resolution in-vivo 7.0 T structural imaging of the human hippocampus reveals the endfolial pathway** *NEUROIMAGE*
Parekh, M. B., Rutt, B. K., Purcell, R., Chen, Y., Zeineh, M. M.
2015; 112: 1-6
- **Right arcuate fasciculus abnormality in chronic fatigue syndrome.** *Radiology*
Zeineh, M. M., Kang, J., Atlas, S. W., Raman, M. M., Reiss, A. L., Norris, J. L., Valencia, I., Montoya, J. G.
2015; 274 (2): 517-526
- **Ultra-high-resolution imaging of the human brain with phase-cycled balanced steady-state free precession at 7 T.** *Investigative radiology*
Zeineh, M. M., Parekh, M. B., Zaharchuk, G., Su, J. H., Rosenberg, J., Fischbein, N. J., Rutt, B. K.
2014; 49 (5): 278-289
- **Ultra-high resolution diffusion tensor imaging of the microscopic pathways of the medial temporal lobe** *NEUROIMAGE*
Zeineh, M. M., Holdsworth, S., Skare, S., Atlas, S. W., Bammer, R.
2012; 62 (3): 2065-2082

- **Advances in high-resolution imaging and computational unfolding of the human hippocampus** *NEUROIMAGE*
Ekstrom, A. D., Bazih, A. J., Suthana, N. A., Al-Hakim, R., Ogura, K., Zeineh, M., Burggren, A. C., Bookheimer, S. Y.
2009; 47 (1): 42-49
- **Reduced cortical thickness in hippocampal subregions among cognitively normal apolipoprotein E e4 carriers** *NEUROIMAGE*
Burggren, A. C., Zeineh, M. M., Ekstrom, A. D., Braskie, M. N., Thompson, P. M., Small, G. W., Bookheimer, S. Y.
2008; 41 (4): 1177-1183
- **A dissociation of encoding and retrieval processes in the human hippocampus** *JOURNAL OF NEUROSCIENCE*
Eldridge, L. L., Engel, S. A., Zeineh, M. M., Bookheimer, S. Y., Knowlton, B. J.
2005; 25 (13): 3280-3286
- **Dynamics of the hippocampus during encoding and retrieval of face-name pairs** *SCIENCE*
Zeineh, M. M., Engel, S. A., Thompson, P. M., Bookheimer, S. Y.
2003; 299 (5606): 577-580
- **Application of cortical unfolding techniques to functional MRI of the human hippocampal region** *NEUROIMAGE*
Zeineh, M. M., Engel, S. A., Bookheimer, S. Y.
2000; 11 (6): 668-683
- **Electrophysiological dynamics of antagonistic brain networks reflect attentional fluctuations.** *Nature communications*
Kucyi, A., Daitch, A., Raccach, O., Zhao, B., Zhang, C., Esterman, M., Zeineh, M., Halpern, C. H., Zhang, K., Zhang, J., Parvizi, J.
2020; 11 (1): 325
- **Validation and Comparison of Instrumented Mouthguards for Measuring Head Kinematics and Assessing Brain Deformation in Football Impacts.** *Annals of biomedical engineering*
Liu, Y., Domel, A. G., Yousefsani, S. A., Kondic, J., Grant, G., Zeineh, M., Camarillo, D. B.
2020
- **Substantia Nigra Volume Dissociates Bradykinesia and Rigidity from Tremor in Parkinson's Disease: A 7 Tesla Imaging Study.** *Journal of Parkinson's disease*
Poston, K. L., Ua Cruadhloich, M. A., Santoso, L. F., Bernstein, J. D., Liu, T., Wang, Y., Rutt, B., Kerchner, G. A., Zeineh, M. M.
2020; 10 (2): 591-604
- **Tau PET imaging with 18F-PI-2620 in aging and neurodegenerative diseases.** *European journal of nuclear medicine and molecular imaging*
Mormino, E. C., Toueg, T. N., Azevedo, C., Castillo, J. B., Guo, W., Nadiadwala, A., Corso, N. K., Hall, J. N., Fan, A., Trelle, A. N., Harrison, M. B., Hunt, M. P., Sha, et al
2020
- **The ENIGMA sports injury working group:- an international collaboration to further our understanding of sport-related brain injury.** *Brain imaging and behavior*
Koerte, I. K., Esopenko, C., Hinds, S. R., Shenton, M. E., Bonke, E. M., Bazarian, J. J., Bickart, K. C., Bigler, E. D., Bouix, S., Buckley, T. A., Choe, M. C., Echlin, P. S., Gill, et al
2020
- **Stability of Blood Biomarkers of Traumatic Brain Injury.** *Journal of neurotrauma*
Rezaii, P., Grant, G., Zeineh, M., Richardson, K. J., Coburn, M. L., Bet, A. M., Weber, A., Jiang, B., Li, Y., Ubungen, K., Routh, G., Wheatcroft, A. M., Paulino, et al
2019
- **Nusinersen Efficacy in Adults with Spinal Muscular Atrophy**
Day, J., Wolford, C., MacPherson, C., Martens, W., McDermott, M., Darras, B., De Vivo, D., Cunningham, Z., Finkel, R., Zeineh, M., Sampson, J., Hagerman, K., Duong, et al
LIPPINCOTT WILLIAMS & WILKINS.2019
- **Hippocampal CA1 subfield predicts episodic memory impairment in Parkinson's disease.** *NeuroImage. Clinical*
La, C., Linortner, P., Bernstein, J. D., Ua Cruadhloich, M. A., Fenesy, M., Deutsch, G. K., Rutt, B. K., Tian, L., Wagner, A. D., Zeineh, M., Kerchner, G. A., Poston, K. L.
2019; 23: 101824
- **Rigid Motion Correction for Brain PET/MR Imaging using Optical Tracking.** *IEEE transactions on radiation and plasma medical sciences*

- Spangler-Bickell, M. G., Khalighi, M. M., Hoo, C., DiGiacomo, P. S., Maclaren, J., Aksoy, M., Rettmann, D., Bammer, R., Zaharchuk, G., Zeineh, M., Jansen, F. 2019; 3 (4): 498–503
- **Validation of the NeuroImaging Radiological Interpretation System for Acute Traumatic Brain Injury.** *Journal of computer assisted tomography*
Zhou, B., Ding, V. Y., Li, Y., Ball, R. L., Jiang, B., Zhu, G., Boothroyd, D., Zeineh, M., Gean, A., Wintermark, M.
2019
 - **Experience using Spinraza to treat adults with spinal muscular atrophy**
Day, J., Wolford, C., Macpherson, C., Hagerman, K., Paulose, S., Zeineh, M., Martens, W., McDermott, M., Darras, B., De Vivo, D., Cunningham, Z., Finkel, R., Sampson, et al
PERGAMON-ELSEVIER SCIENCE LTD.2018: S81
 - **Resting-State Functional MRI: Everything That Nonexperts Have Always Wanted to Know.** *AJNR. American journal of neuroradiology*
Lv, H., Wang, Z., Tong, E., Williams, L. M., Zaharchuk, G., Zeineh, M., Goldstein-Piekarski, A. N., Ball, T. M., Liao, C., Wintermark, M.
2018; 39 (8): 1390–99
 - **NeuroImaging Radiological Interpretation System (NIRIS) for Acute Traumatic Brain Injury (TBI).** *Journal of neurotrauma*
Wintermark, M., Li, Y., Ding, V. Y., Xu, Y., Jiang, B., Ball, R. L., Zeineh, M., Gean, A., Sanelli, P.
2018
 - **Diffusion MRI tractography for improved transcranial MRI-guided focused ultrasound thalamotomy targeting for essential tremor.** *NeuroImage. Clinical*
Tian, Q., Wintermark, M., Jeffrey Elias, W., Ghanouni, P., Halpern, C. H., Henderson, J. M., Huss, D. S., Goubran, M., Thaler, C., Airan, R., Zeineh, M., Pauly, K. B., McNab, et al
2018; 19: 572–80
 - **RNA-Sequencing Analysis Revealed a Distinct Motor Cortex Transcriptome in Spontaneously Recovered Mice After Stroke.** *Stroke*
Ito, M., Aswendt, M., Lee, A. G., Ishizaka, S., Cao, Z., Wang, E. H., Levy, S. L., Smerin, D. L., McNab, J. A., Zeineh, M., Leuze, C., Goubran, M., Cheng, et al
2018; 49 (9): 2191–99
 - **The separate effects of lipids and proteins on brain MRI contrast revealed through tissue clearing.** *NeuroImage*
Leuze, C., Aswendt, M., Ferenczi, E., Liu, C. W., Hsueh, B., Goubran, M., Tian, Q., Steinberg, G., Zeineh, M. M., Deisseroth, K., McNab, J. A.
2017
 - **Reducing Functional MR Imaging Acquisition Times by Optimizing Workflow.** *Radiographics*
Chwang, W. B., Iv, M., Smith, J., Kalnins, A., Mickelsen, J., Bammer, R., Fleischmann, D., Larson, D. B., Wintermark, M., Zeineh, M.
2017; 37 (1): 316-322
 - **MRI and histopathologic study of a novel cholesterol-fed rabbit model of xanthogranuloma.** *Journal of magnetic resonance imaging*
Chen, Y., Hamilton, A. M., Parkins, K. M., Wang, J., Rogers, K. A., Zeineh, M. M., Rutt, B. K., Ronald, J. A.
2016; 44 (3): 673-682
 - **Non-Relative Value Unit-Generating Activities Represent One-Fifth of Academic Neuroradiologist Productivity.** *AJNR. American journal of neuroradiology*
Wintermark, M., Zeineh, M., Zaharchuk, G., Srivastava, A., Fischbein, N.
2016; 37 (7): 1206-1208
 - **Seven-Tesla MRI and neuroimaging biomarkers for Alzheimer's disease** *NEUROSURGICAL FOCUS*
Ali, R., Goubran, M., Choudhri, O., Zeineh, M. M.
2015; 39 (5)
 - **Diffusion Tensor Imaging of TBI: Potentials and Challenges.** *Topics in magnetic resonance imaging*
Douglas, D. B., Iv, M., Douglas, P. K., Anderson, A., Vos, S. B., Bammer, R., Zeineh, M., Wintermark, M.
2015; 24 (5): 241-251
 - **Quantitative comparison of 21 protocols for labeling hippocampal subfields and parahippocampal subregions in in vivo MRI: Towards a harmonized segmentation protocol** *NEUROIMAGE*
Yushkevich, P. A., Amaral, R. S., Augustinack, J. C., Bender, A. R., Bernstein, J. D., Boccardi, M., Bocchetta, M., Burggren, A. C., Carr, V. A., Chakravarty, M. M., Chetelat, G., Daugherty, A. M., Davachi, et al
2015; 111: 526-541
 - **Prolonged survival of patients with non-small-cell lung cancer with leptomeningeal carcinomatosis in the modern treatment era.** *Clinical lung cancer*
Riess, J. W., Nagpal, S., Iv, M., Zeineh, M., Gubens, M. A., Ramchandran, K., Neal, J. W., Wakelee, H. A.

2014; 15 (3): 202-206

- **Shared vulnerability of two synaptically-connected medial temporal lobe areas to age and cognitive decline: a seven tesla magnetic resonance imaging study.** *journal of neuroscience*
Kerchner, G. A., Bernstein, J. D., Fenesy, M. C., Deutsch, G. K., Saranathan, M., Zeineh, M. M., Rutt, B. K.
2013; 33 (42): 16666-16672
- **Hippocampal CA1 apical neuropil atrophy and memory performance in Alzheimer's disease** *NEUROIMAGE*
Kerchner, G. A., Deutsch, G. K., Zeineh, M., Dougherty, R. F., Saranathan, M., Rutt, B. K.
2012; 63 (1): 194-202
- **Deficient MWF mapping in multiple sclerosis using 3D whole-brain multi-component relaxation MRI** *NEUROIMAGE*
Kitzler, H. H., Su, J., Zeineh, M., Harper-Little, C., Leung, A., Krmenchutsky, M., Deoni, S. C., Rutt, B. K.
2012; 59 (3): 2670-2677
- **Challenges of High-resolution Diffusion Imaging of the Human Medial Temporal Lobe in Alzheimer Disease.** *Topics in magnetic resonance imaging*
Zeineh, M. M., Holdsworth, S., Skare, S., Atlas, S. W., Bammer, R.
2010; 21 (6): 355-365
- **Double reverse intestinal malrotation: a novel rotational anomaly and its surgical correction** *JOURNAL OF PEDIATRIC SURGERY*
Nehra, D., Zeineh, M., Rodriguez, F., Dutta, S.
2007; 42 (3): 578-581
- **Unfolding the human hippocampus with high resolution structural and functional MRI** *ANATOMICAL RECORD*
Zeineh, M. M., Engel, S. A., Thompson, P. M., Bookheimer, S. Y.
2001; 265 (2): 111-120
- **Rapid and effective correction of RF inhomogeneity for high field magnetic resonance imaging** *HUMAN BRAIN MAPPING*
Cohen, M. S., DuBois, R. M., Zeineh, M. M.
2000; 10 (4): 204-211