



## Michael Iv

Clinical Associate Professor, Radiology

### CLINICAL OFFICES

- **Stanford Neuroimaging and Neurointervention**

300 Pasteur Dr Rm S031E

MC 5105

Stanford, CA 94305

**Tel** (650) 725-5384

**Fax** (650) 723-1909

### Bio

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#### BIO

Dr. Michael Iv received his medical degree from the David Geffen School of Medicine at UCLA. He completed his radiology residency training at Santa Clara Valley Medical Center and neuroradiology fellowship at Stanford University. He is board certified in Diagnostic Radiology and also holds a Certificate of Added Qualification in Neuroradiology. His primary research interest focuses on the use of advanced MRI techniques to probe the brain tumor microenvironment and improve our diagnostic capability to effectively monitor a tumor's response to treatment. Examples include using ferumoxytol-enhanced MRI to image tumor associated macrophages and MR perfusion-based fractional tumor burden to image tumor vascularity and neoangiogenesis. He has received multiple intramural and extramural grants including the Radiological Society of North America Research Scholar Grant and Musella Foundation for Brain Tumor Research Grant to support his work. He was also a co-editor of a published two volume book set entitled "Glioblastoma: State-of-the-Art Clinical Neuroimaging." In addition to research, he is actively involved in the clinical care of patients and regularly participates in multi-disciplinary conferences. He currently serves as the Director of Brain Tumor Imaging at the Stanford Brain Tumor Center.

#### CLINICAL FOCUS

- Diagnostic Radiology
- Neuroradiology
- Brain Tumor Imaging
- Vascular Imaging

#### ACADEMIC APPOINTMENTS

- Clinical Associate Professor, Radiology

#### ADMINISTRATIVE APPOINTMENTS

- Director of Brain Tumor Imaging, Stanford Brain Tumor Center, (2020- present)
- Co-director, Medical Student Neuroradiology Clerkship, (2015- present)
- Associate Program Director, Radiology Residency, (2016-2019)

- Senator, School of Medicine, Faculty Senate, (2015-2017)

## HONORS AND AWARDS

- Research Scholar Grant, RSNA (2015-2017)
- Grant, Musella Foundation for Brain Tumor Research (2015)
- Angel Grant, Stanford Radiology (2013)
- Chief Resident, Santa Clara Valley Medical Center (2009)
- Dean's Scholar for Outstanding Medical Student Thesis in Radiology, UCLA (2006)
- Ceslo Gonzalez/Lopo Family Fellowship Award for Academic Excellence and Leadership, UCLA (2003)
- Leadership Academy Scholarship, California Medical Association (2003)
- Magna Cum Laude, UCR (2003)

## BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Member, International Society for Magnetic Resonance in Medicine (ISMRM) (2013 - present)
- Member, American Society of Neuroradiology (ASNR) (2011 - present)
- Member, American College of Radiology (ACR) (2007 - present)
- Member, Radiological Society of North America (RSNA) (2006 - present)

## PROFESSIONAL EDUCATION

- Residency: Santa Clara Valley Medical Center (2011) CA
- Fellowship: Stanford University Pain Management Fellowship (2013) CA
- Medical Education: UCLA General Surgery Residency (2006) CA
- Internship: Cedars Sinai Medical Center Pediatric Residency Ended 2004 (2007) CA
- Board Certification, Neuroradiology, American Board of Radiology (2013)
- Board Certification: Diagnostic Radiology, American Board of Radiology (2011)

## Research & Scholarship

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### CURRENT RESEARCH AND SCHOLARLY INTERESTS

My clinical and research interests include brain tumor and vascular imaging in both the adult and pediatric populations, incorporating advanced MR imaging techniques and analyses using qualitative and quantitative methods.

## Publications

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### PUBLICATIONS

- **Brain Iron Assessment after Ferumoxytol-enhanced MRI in Children and Young Adults with Arteriovenous Malformations: A Case-Control Study.** *Radiology*  
Iv, M., Ng, N. N., Nair, S., Zhang, Y., Lavezo, J., Cheshier, S. H., Holdsworth, S. J., Moseley, M. E., Rosenberg, J., Grant, G. A., Yeom, K. W.  
2020; 200378
- **Deep Learning Enables Automatic Detection and Segmentation of Brain Metastases on Multisequence MRI** *JOURNAL OF MAGNETIC RESONANCE IMAGING*  
Grovik, E., Yi, D., Iv, M., Tong, E., Rubin, D., Zaharchuk, G.  
2020; 51 (1): 175–82
- **Advanced Imaging of Brain Metastases: From Augmenting Visualization and Improving Diagnosis to Evaluating Treatment Response.** *Frontiers in neurology*  
Tong, E., McCullagh, K. L., Iv, M.

2020; 11: 270

- **Arterial Spin-Labeling MRI Identifies Hypervascular Meningiomas.** *AJR. American journal of roentgenology*  
Mayercik, V., Ma, M., Holdsworth, S., Heit, J., Iv, M.  
2019: 1–5
- **Perfusion MRI-Based Fractional Tumor Burden Differentiates between Tumor and Treatment Effect in Recurrent Glioblastomas and Informs Clinical Decision-Making.** *AJNR. American journal of neuroradiology*  
Iv, M., Liu, X., Lavezo, J., Gentles, A. J., Ghanem, R., Lummus, S., Born, D. E., Soltys, S. G., Nagpal, S., Thomas, R., Recht, L., Fischbein, N.  
2019
- **Current Clinical State of Advanced Magnetic Resonance Imaging for Brain Tumor Diagnosis and Follow Up.** *Seminars in roentgenology*  
Iv, M., Yoon, B. C., Heit, J. J., Fischbein, N., Wintermark, M.  
2018; 53 (1): 45–61
- **Quantification of Macrophages in High-Grade Gliomas by Using Ferumoxytol-enhanced MRI: A Pilot Study.** *Radiology*  
Iv, M., Samghabadi, P., Holdsworth, S., Gentles, A., Rezaii, P., Harsh, G., Li, G., Thomas, R., Moseley, M., Daldrup-Link, H. E., Vogel, H., Wintermark, M., Cheshier, et al  
2018: 181204
- **MR Imaging-Based Radiomic Signatures of Distinct Molecular Subgroups of Medulloblastoma.** *AJNR. American journal of neuroradiology*  
Iv, M., Zhou, M., Shpanskaya, K., Perreault, S., Wang, Z., Tranvinh, E., Lanzman, B., Vajapeyam, S., Vitanza, N. A., Fisher, P. G., Cho, Y. J., Laughlin, S., Ramaswamy, et al  
2018
- **Evaluation of Thick-Slab Overlapping MIP Images of Contrast-Enhanced 3D T1-Weighted CUBE for Detection of Intracranial Metastases: A Pilot Study for Comparison of Lesion Detection, Interpretation Time, and Sensitivity with Nonoverlapping CUBE MIP, CUBE, and Inversion-Recovery-Prepared Fast-Spoiled Gradient Recalled Brain Volume.** *AJNR. American journal of neuroradiology*  
Yoon, B. C., Saad, A. F., Rezaii, P., Wintermark, M., Zaharchuk, G., Iv, M.  
2018
- **Radiomics in Brain Tumor: Image Assessment, Quantitative Feature Descriptors, and Machine-Learning Approaches.** *AJNR. American journal of neuroradiology*  
Zhou, M., Scott, J., Chaudhury, B., Hall, L., Goldgof, D., Yeom, K. W., Iv, M., Ou, Y., Kalpathy-Cramer, J., Napel, S., Gillies, R., Gevaert, O., Gatenby, et al  
2017
- **Clinical applications of iron oxide nanoparticles for magnetic resonance imaging of brain tumors** *NANOMEDICINE*  
Iv, M., Telischak, N., Feng, D., Holdsworth, S. J., Yeom, K. W., Daldrup-Link, H. E.  
2015; 10 (6): 993-1018
- **Management of brain tumors presenting in pregnancy: a case series and systematic review** *Management of brain tumors presenting in pregnancy: a case series and systematic review*  
Rodrigues, A.  
2021; 3 (1)
- **Management of brain tumors presenting in pregnancy: a case series and systematic review.** *American journal of obstetrics & gynecology MFM*  
Rodrigues, A. J., Waldrop, A. R., Suharwardy, S., Druzin, M. L., Iv, M., Ansari, J. R., Stone, S. A., Jaffe, R. A., Jin, M. C., Li, G., Hayden-Gephart, M.  
2021; 3 (1): 100256
- **Development and Validation of Operator Independent Measurements of Optic Nerve Sheath Cerebral Spinal Fluid Volume from MRI**  
Wasi, M., Iv, M., Wasi, T., Moss, H.  
ASSOC RESEARCH VISION OPHTHALMOLOGY INC.2020
- **Phase I study of BPM31510 and vitamin K in patients with high grade glioma recurrent after a bevacizumab-containing regimen.**  
Nagpal, S., Thomas, R., Bertrand, S., Yerraballa, H., Iv, M., Li, G., Klotz, A., Kiebish, M. A., Narain, N. R., Sarangarajan, R., Granger, E., Recht, L.  
AMER SOC CLINICAL ONCOLOGY.2020
- **Arterial-spin labeling MRI identifies residual cerebral arteriovenous malformation following stereotactic radiosurgery treatment** *JOURNAL OF NEURORADIOLOGY*  
Heit, J. J., Thakur, N. H., Iv, M., Fischbein, N. J., Wintermark, M., Dodd, R. L., Steinberg, G. K., Chang, S. D., Kapadia, K. B., Zaharchuk, G.  
2020; 47 (1): 13–19

- **Deep Learning for Pediatric Posterior Fossa Tumor Detection and Classification: A Multi-Institutional Study.** *AJNR. American journal of neuroradiology*  
Quon, J. L., Bala, W., Chen, L. C., Wright, J., Kim, L. H., Han, M., Shpanskaya, K., Lee, E. H., Tong, E., Iv, M., Seekins, J., Lungren, M. P., Braun, et al  
2020
- **Brain iron deposition after Ferumoxytol-enhanced MRI: A study of Porcine Brains.** *Nanotheranostics*  
Theruvath, A. J., Aghighi, M., Iv, M., Nejadnik, H., Lavezo, J., Pisani, L. J., Daldrup-Link, H. E.  
2020; 4 (4): 195–200
- **Utilization of Novel High-Resolution, MRI-Based Vascular Imaging Modality for Preoperative Stereoelectroencephalography Planning in Children: A Technical Note.** *Stereotactic and functional neurosurgery*  
Feng, A. Y., Ho, A. L., Kim, L. H., Sussman, E. S., Pendharkar, A. V., Iv, M., Yeom, K. W., Halpern, C. H., Grant, G. A.  
2020: 1–7
- **Critical illness-associated cerebral microbleeds in severe COVID-19 infection.** *Clinical imaging*  
Gupta, N. A., Lien, C., Iv, M.  
2020; 68: 239–41
- **Cerebrospinal Fluid Metals and the Association with Cerebral Small Vessel Disease.** *Journal of Alzheimer's disease : JAD*  
Shams, M., Martola, J., Charidimou, A., Granberg, T., Ferreira, D., Westman, E., Wintermark, M., Iv, M., Larvie, M., Kristoffersen Wiberg, M., Kaijser, M., Forsgard, N., Zetterberg, et al  
2020
- **Simultaneous time of flight-MRA and T2\* imaging for cerebrovascular MRI.** *Neuroradiology*  
Lanzman, B. A., Huang, Y., Lee, E. H., Iv, M., Moseley, M. E., Holdsworth, S. J., Yeom, K. W.  
2020
- **Variable Refocusing Flip Angle Single-Shot Imaging for Sedation-Free Fast Brain MRI.** *AJNR. American journal of neuroradiology*  
Jabarkheel, R., Tong, E., Lee, E. H., Cullen, T. M., Yousaf, U., Loening, A. M., Taviani, V., Iv, M., Grant, G. A., Holdsworth, S. J., Vasawala, S. S., Yeom, K. W.  
2020
- **A PHASE 1 STUDY OF BPM31510 PLUS VITAMIN K IN SUBJECTS WITH HIGH-GRADE GLIOMA THAT HAS RECURRENTED ON A BEVACIZUMAB-CONTAINING REGIMEN**  
Recht, L., Thomas, R., Bertrand, S., Yerballa, P., Li, G., Iv, M., Narain, N., Sarangarajan, R., Granger, E., Nagpal, S.  
OXFORD UNIV PRESS INC.2019: 27
- **Physiological motion of the optic chiasm and its impact on stereotactic radiosurgery dose.** *The British journal of radiology*  
Xiang, M., Chan, C., Wang, L., Jani, K., Holdsworth, S. J., Iv, M., Pollom, E., Soltys, S.  
2019: 20190170
- **The effects of repetitive transcranial magnetic stimulation in older adults with mild cognitive impairment: a protocol for a randomized, controlled three-arm trial.** *BMC neurology*  
Taylor, J. L., Hambro, B. C., Strossman, N. D., Bhatt, P., Hernandez, B., Ashford, J. W., Cheng, J. J., Iv, M., Adamson, M. M., Lazzeroni, L. C., McNerney, M. W.  
2019; 19 (1): 326
- **Malignant optic glioma masked by suspected optic neuritis and central retinal vein occlusion.** *Radiology case reports*  
Kalnins, A., Penta, M., El-Sawy, T., Liao, Y. J., Fischbein, N., Iv, M.  
2019; 14 (2): 226–29
- **Non-Contrast T2-Weighted MR Sequences for Long Term Monitoring of Asymptomatic Convexity Meningiomas.** *World neurosurgery*  
He, J. Q., Iv, M., Li, G., Zhang, M., Hayden-Gephart, M.  
2019
- **Nodular Leptomeningeal Disease - A Distinct Pattern of Recurrence After Post-Resection Stereotactic Radiosurgery for Brain Metastases: A Multi-Institutional Study of Inter-Observer Reliability.** *International journal of radiation oncology, biology, physics*  
Turner, B. E., Prabhu, R. S., Burri, S. H., Brown, P. D., Pollom, E. L., Milano, M. T., Weiss, S. E., Iv, M., Fischbein, N., Soliman, H., Lo, S. S., Chao, S. T., Cox, et al  
2019
- **Ferumoxytol-enhanced MRI for surveillance of pediatric cerebral arteriovenous malformations.** *Journal of neurosurgery. Pediatrics*  
Huang, Y., Singer, T. G., Iv, M., Lanzman, B., Nair, S., Stadler, J. A., Wang, J., Edwards, M. S., Grant, G. A., Cheshier, S. H., Yeom, K. W.

2019: 1–8

- **Macrophage Exclusion after Radiation Therapy (MERT): A First in Human Phase I/II Trial using a CXCR4 Inhibitor in Glioblastoma.** *Clinical cancer research : an official journal of the American Association for Cancer Research*  
Thomas, R. P., Nagpal, S., Iv, M., Soltys, S. G., Bertrand, S., Pelpola, J. S., Ball, R. L., Yang, J., Sundaram, V., Lavezo, J. L., Born, D. E., Vogel, H., Brown, et al  
2019
- **Utility of a Quantitative Approach Using Diffusion Tensor Imaging for Prognostication Regarding Motor and Functional Outcomes in Patients With Surgically Resected Deep Intracranial Cavernous Malformations.** *Neurosurgery*  
Abhinav, K., Nielsen, T. H., Singh, R., Weng, Y., Han, S. S., Iv, M., Steinberg, G. K.  
2019
- **Altered cerebral perfusion in children with Langerhans cell histiocytosis after chemotherapy.** *Pediatric blood & cancer*  
Han, M., Kim, L. H., Shpanskaya, K., Kim, C., Iv, M., Jeng, M., Yeom, K. W.  
2019: e28104
- **Patient-specific 3-dimensionally printed models for neurosurgical planning and education.** *Neurosurgical focus*  
Panesar, S. S., Magnetta, M., Mukherjee, D., Abhinav, K., Branstetter, B. F., Gardner, P. A., Iv, M., Fernandez-Miranda, J. C.  
2019; 47 (6): E12
- **Pediatric Stroke Imaging** *PEDIATRIC NEUROLOGY*  
Khalaf, A., Iv, M., Fullerton, H., Wintermark, M.  
2018; 86: 5–18
- **Conus Medullaris Dural Arteriovenous Fistula Arising From the Artery of the Filum Terminale: 2-Dimensional Operative Video.** *Operative neurosurgery (Hagerstown, Md.)*  
Lamsam, L., Quon, J., Fischbein, N., Iv, M., Dodd, R., Ratliff, J.  
2018
- **Practical Pearl: Use of MRI to Differentiate Pseudo-subarachnoid Hemorrhage from True Subarachnoid Hemorrhage.** *Neurocritical care*  
Ho, A. L., Sussman, E. S., Pendharkar, A. V., Iv, M., Hirsch, K. G., Fischbein, N. J., Dodd, R. L.  
2018
- **Lobular capillary hemangioma of the mandible: A case report.** *Clinical imaging*  
Chan, C., Iv, M., Fischbein, N., Dahmouh, H.  
2018; 50: 246–49
- **High-resolution 3D volumetric contrast-enhanced MR angiography with a blood pool agent (ferumoxytol) for diagnostic evaluation of pediatric brain arteriovenous malformations.** *Journal of neurosurgery. Pediatrics*  
Iv, M., Choudhri, O., Dodd, R. L., Vasanaawala, S. S., Alley, M. T., Moseley, M., Holdsworth, S. J., Grant, G., Cheshier, S., Yeom, K. W.  
2018: 1–10
- **Can diffusion- and perfusion-weighted imaging alone accurately triage anterior circulation acute ischemic stroke patients to endovascular therapy?** *Journal of neurointerventional surgery*  
Wolman, D. N., Iv, M., Wintermark, M., Zaharchuk, G., Marks, M. P., Do, H. M., Dodd, R. L., Albers, G. W., Lansberg, M. G., Heit, J. J.  
2018
- **CORRELATION OF VASARI-BASED MRI PHENOTYPES WITH MGMT AND IDH STATUS ACROSS GLIOMA GRADES: A STATISTICAL ANALYSIS IN 372 PATIENTS**  
Das, D., Yoon, B., Golden, L., Samghabadi, P., Vogel, H., Yeom, K., Iv, M., Massoud, T.  
OXFORD UNIV PRESS INC.2017: 150
- **THE EFFECT OF PATIENT AGE AT GLIOMA PRESENTATION ON MRI PHENOTYPE: A COMPREHENSIVE ANALYSIS OF VASARI-BASED FEATURE-SET CRITERIA IN 711 PATIENTS**  
Das, D., Yoon, B., Golden, L., Samghabadi, P., Vogel, H., Yeom, K., Iv, M., Massoud, T.  
OXFORD UNIV PRESS INC.2017: 158
- **Tumefactive demyelination associated with developmental venous anomaly: Report of two cases** *CLINICAL IMAGING*  
Ma, M., Chen, J. Y., Plowey, E. D., Fischbein, N., Iv, M.  
2017; 43: 194-198

- **Resting-State BOLD MRI for Perfusion and Ischemia.** *Topics in magnetic resonance imaging*  
Kroll, H., Zaharchuk, G., Christen, T., Heit, J. J., Iv, M.  
2017; 26 (2): 91-96
- **Imaging of Intracranial Hemorrhage.** *Journal of stroke*  
Heit, J. J., Iv, M., Wintermark, M.  
2017; 19 (1): 11-27
- **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): 315-321
- **Clinical and Arterial Spin Labeling Brain MRI Features of Transitional Venous Anomalies.** *Journal of neuroimaging : official journal of the American Society of Neuroimaging*  
Zhang, M., Telischak, N. A., Fischbein, N. J., Steinberg, G. K., Marks, M., Zaharchuk, G., Heit, J. J., Iv, M.  
2017
- **Magnetic resonance perfusion image features uncover an angiogenic subgroup of glioblastoma patients with poor survival and better response to antiangiogenic treatment.** *Neuro-oncology*  
Liu, T. T., Achrol, A. S., Mitchell, L. A., Rodriguez, S. A., Feroze, A., Kim, C., Chaudhary, N., Gevaert, O., Stuart, J. M., Harsh, G. R., Chang, S. D., Rubin, D. L.  
2016
- **Central Nervous System Perfusion Patterns in Childhood Langerhans Cell Histiocytosis**  
Yeom, K., Kim, C., Iv, M., Jeng, M.  
WILEY-BLACKWELL.2016: S36
- **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
- **Intensity-Corrected Dual-Echo Echo-Planar Imaging (DE-EPI) for Improved Pediatric Brain Diffusion Imaging** *PLOS ONE*  
Yeom, K. W., Straka, M., Iv, M., Moseley, M. E., Barnes, P. D., Skare, S., Holdsworth, S. J.  
2015; 10 (6)
- **Congenital Brain Malformations in the Neonatal and Early Infancy Period** *SEMINARS IN ULTRASOUND CT AND MRI*  
Kim, C., Yeom, K. W., Iv, M.  
2015; 36 (2): 97-119
- **Imaging Neck Masses in the Neonate and Young Infant** *SEMINARS IN ULTRASOUND CT AND MRI*  
Tranvinh, E., Yeom, K. W., Iv, M.  
2015; 36 (2): 120-137
- **Association of developmental venous anomalies with perfusion abnormalities on arterial spin labeling and bolus perfusion-weighted imaging.** *Journal of neuroimaging*  
Iv, M., Fischbein, N. J., Zaharchuk, G.  
2015; 25 (2): 243-250
- **Imaging Manifestations of Primary and Disseminated Coccidioidomycosis** *Applied Radiology*  
Gupta, N. A., Iv, M., Pandit, R. P., Patel, M. R.  
2015; 44 (2): 9-21
- **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
- **Imaging Spectrum of CNS Coccidioidomycosis: Prevalence and Significance of Concurrent Brain and Spinal Disease** *AMERICAN JOURNAL OF ROENTGENOLOGY*  
Lammering, J. C., Iv, M., Gupta, N., Pandit, R., Patel, M. R.  
2013; 200 (6): 1334-1346

- **Comparison of Readout-Segmented Echo-Planar Imaging (EPI) and Single-Shot EPI in Clinical Application of Diffusion-Weighted Imaging of the Pediatric Brain.** *AJR. American journal of roentgenology*  
Yeom, K. W., Holdsworth, S. J., Van, A. T., Iv, M., Skare, S., Lober, R. M., Bammer, R.  
2013; 200 (5): W437-43
- **Informatics in Radiology Use of a Macro Scripting Editor to Facilitate Transfer of Dual-Energy X-ray Absorptiometry Reports into an Existing Departmental Voice Recognition Dictation System** *RADIOGRAPHICS*  
Iv, M., Patel, M. R., Santos, A., Kang, Y. S.  
2011; 31 (4): 1181-1189
- **Left ventricular ejection fraction using 64-slice CT coronary angiography and new evaluation software: initial experience** *BRITISH JOURNAL OF RADIOLOGY*  
Krishnam, M. S., Tomasian, A., Iv, M., Ruehm, S. G., Salieh, R., Panknin, C., Goldin, J. G.  
2008; 81 (966): 450-455
- **Cardiac hemangioma: Features on cardiovascular magnetic resonance** *JOURNAL OF CARDIOVASCULAR MAGNETIC RESONANCE*  
Tomasian, A., Iv, M., Lai, C., Jalili, M., Krishnam, M. S.  
2007; 9 (6): 873-876
- **Pyridines in cigarette smoke inhibit hamster oviductal functioning in picomolar doses** *REPRODUCTIVE TOXICOLOGY*  
Riveles, K., Iv, M., Arey, J., Talbot, P.  
2003; 17 (2): 191-202