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BIOGRAPHICAL SKETCH

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NAME: Silva, Alvin C.

eRA COMMONS USER NAME (credential, e.g., agency login):

POSITION TITLE: Associate Professor of Radiology, Mayo Clinic College of Medicine

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
University of Dayton, Dayton, OH	BA	1983-1987	Chemistry
Wright State University School of Medicine, Dayton, OH	MD	1987-1991	Medicine
Riverside Methodist Hospital, Columbus, OH		1991-1992	Transitional Internship
Loyola University Medical Center, Maywood, IL	Residency	1992-1996	Diagnostic Radiology
Georgetown University Medical Center, Washington, DC	Fellowship	1996-1997	Body Imaging

A. Personal Statement

As Director of Body MRI at Mayo Clinic Arizona, my clinical and research focus has been on multimodality imaging of the abdomen, with emphasis on validation and implementation of novel techniques. In this respect, a sample of our work includes: beta site for determining clinical utility and optimization of the HDCT Dual Energy with Advanced Statistical Iterative Reconstruction (ASIR) system (2nd site worldwide); beta site for pre-release MR sequences/hardware including MR Elastography; and clinical trial site for US elastography (Acoustic Radiation Force Impulse – ARFI). In addition, I am an imaging co-investigator for two advanced HCC trials (N1153 and MC1148). N1153 is a multi-center Phase IB/II clinical trial in patients with advanced HCC. The purpose of the study is to assess the safety and efficacy of TH-302, a novel hypoxia activated nitroimidazole in combination with sorafenib, in patients with advanced HCC in the first line setting. Centralized imaging review has been incorporated into the study design to ensure uniformity and quality of imaging data. MC1148 is a single-institution Phase I clinical study of patients with advanced HCC who are refractory/intolerant to sorafenib based therapy. The purpose of the study is to evaluate the safety and preliminary efficacy of Vesicular Stomatitis Virus Human Interferon Beta (VSV-hIFNβ), a novel oncolytic virotherapeutic agent, in this subset of patients. Multi-time point tissue acquisition for translational assessments and imaging correlation has been incorporated into the study design. Furthermore, I am the co-founder and medical director for our Clinical Outcomes and Response Evaluation (*i*CORE) imaging lab, supporting oncologic trials with comprehensive, quantitative imaging services. We are particularly interested in studying radiogenomics within the scope of our imaging and novel therapeutic efforts and have established collaborations internally and externally in this regard. Through these activities, I have gained expertise in the implementation of advanced MR and CT techniques in research studies, as well as providing quality control image management, infrastructure and standardized therapeutic response analysis for clinical trials.

1. Silva AC, Lawder HJ, Hara A, Kujak J, Pavlicek W. Innovations in CT dose reduction strategy: application of the adaptive statistical iterative reconstruction algorithm. AJR. American journal of roentgenology. 2010; 194(1):191-9. PubMed [journal] PMID: 20028923
2. Silva AC, Morse BG, Hara AK, Paden RG, Hongo N, et al. Dual-energy (spectral) CT: applications in abdominal imaging. Radiographics : a review publication of the Radiological Society of North America, Inc. 2011; 31(4):1031-46; discussion 1047-50. PubMed [journal] PMID: 21768237
3. Borad MJ, Champion MD, Egan JB, Liang WS, Fonseca R, Bryce AH, McCullough AE, Barrett MT, Hunt K, Patel MD, Young SW, Collins JM, Silva AC, Condjella RM, Block M, McWilliams RR, Lazaridis KN, Klee EW, Bible KC, Harris P, Oliver GR, Bhavsar JD, Nair AA, Middha S, Asmann Y, Kocher JP, Schahl K, Kipp BR, Barr Fritcher EG, Baker A, Aldrich J, Kurdoglu A, Izatt T, Christoforides A, Cherni I, Nasser S, Reiman R, Phillips L, McDonald J, Adkins J, Mastrian SD, Placek P, Watanabe AT, Lobello J, Han H, Von Hoff D, Craig DW, Stewart AK, Carpten JD. Integrated genomic characterization reveals novel, therapeutically relevant drug targets in FGFR and EGFR pathways in sporadic intrahepatic cholangiocarcinoma. PLoS Genet. 2014 Feb 13;10(2):e1004135. doi: 10.1371/journal.pgen.1004135. eCollection 2014 Feb. PubMed PMID: 24550739; PubMed Central PMCID: PMC3923676.
4. Silva AM, Grimm RC, Glaser KJ, Fu Y, Wu T, Ehman RL, Silva AC. Magnetic resonance elastography: evaluation of new inversion algorithm and quantitative analysis method. Abdom Imaging. 2015 Apr;40(4):810-7. doi: 10.1007/s00261-015-0372-5. PubMed PMID: 25742725.

B. Positions and Honors

Positions and Employment

1997 – 2000 Assistant Professor of Radiology-Allegheny University Hospitals, Pittsburgh, PA
2003 – 2005 Instructor of Radiology, Mayo Clinic College of Medicine, Scottsdale, AZ
2003 – Present Consultant, Department of Radiology, Mayo Clinic, Scottsdale, AZ
2005 – 2012 Assistant Professor of Radiology, Mayo Clinic College of Medicine, Scottsdale, AZ
2012 – Present Associate Professor of Radiology, Mayo Clinic College of Medicine, Scottsdale, AZ

Other Experience and Professional Memberships

Member, Society of Abdominal Radiology
Member, American Roentgen Ray Society
Member, Arizona Medical Association
Member, International Society for Magnetic Resonance in Medicine
Member, Radiological Society of North America
2003-2016 Radiology Education Committee, Mayo Clinic Arizona
2003-2015 Radiology Research Committee, Mayo Clinic Arizona
2004-Present Associate Program Director, Body MRI Fellowship, Mayo Clinic Arizona
2005-2007 Section Chief, Body MRI, Mayo Clinic Arizona
2007-2012 Section Chief, Abdominal Imaging, Mayo Clinic Arizona
2012-Present Director, Body MRI, Mayo Clinic Arizona
2014-Present Cancer Center Research Committee, Mayo Clinic Arizona
2015-Present Co-Chair, Radiology Research DWG

2016-Present Education Committee, Mayo Clinic Arizona
2016-Present Chair, Radiology Education Committee, Mayo Clinic Arizona

Honors

1986 Member, Alpha Epsilon Delta National Premedical Honor Society
1988 Academy of Medicine Award Finalist
1990 OB-GYN Clerkship Award
1990 Alpha Omega Alpha Honor Society - Wright State University School of Medicine
1997 – 1998 Residents' Teaching Appreciation Award - Allegheny University Hospital
1998 Certificate of Merit - Education Exhibit - American Roentgen Ray Society
2003 Certificate of Merit - Exhibit - Radiological Society of North America
2003 Cum Laude Citation - Exhibit - Radiological Society of North America
2003 – 2016 Best Doctors in America
2004 Cum Laude Citation - Exhibit - Radiological Society of North America
2004 Excellence in Design Citation - Exhibit - Radiological Society of North America
2005 Blue Ribbon Best Scientific (Category of Body and Cardiac MRI) - Poster - ISMRM
2005 Certificate of Merit - Exhibit - Radiological Society of North America
2005 Certificate of Merit & AMA PRA Category 1 Credit: Radiological Society of North America
2006 Academic Excellence Day: Second Place Award - Clinical Research-Fellows
2006 Certificate of Merit - Exhibit - Radiological Society of North America
2006 Excellence in Design Citation - Exhibit - Radiological Society of North America
2007 Certificate of Merit – Education Exhibit - Radiological Society of North America
2009 Certificate of Merit - Exhibit - Radiological Society of North America
2009 Excellence in Design Citation - Exhibit - Radiological Society of North America
2010 Cum Laude Citation - Exhibit - Radiological Society of North America
2011 Certificate of Merit - Exhibit - Radiological Society of North America
2011 First Place Paper Award from the SUR – SGR/SUR Annual Meeting
2011 Faculty Presentation Award – Mayo School of CPD
2012 Academic Excellence Day: First Place Award - Clinical Research-Fellows
2012 Young Investigator Award (*Fellow Mentor*) – International Liver Congress 2012
2013 Cum Laude Award - ARRS 2013 Annual Meeting – Scientific Program
2013 Certificate of Merit - Exhibit - Radiological Society of North America
2013 Cum Laude Citation - Exhibit - Radiological Society of North America
2013 Magna Cum Laude Citation - Exhibit - Radiological Society of North America
2014 Magna Cum Laude Citation - Exhibit - Radiological Society of North America
2015 Cum Laude Award - Education Exhibit - Radiological Society of North America
2016 Best Video Award - American Urological Association Annual Meeting

C. Contribution to Science

1. My early work with novel imaging techniques originated with CT Colonography (CTC), a radiologic procedure that utilizes low radiation dose CT and computer technology to noninvasively evaluate the colon for polyps and cancer. I was a co-investigator for "CTC of the Unprepped Colon: Optimization & Validation" (NIH 1221-00) and facilitated the initial implementation of this technique into our clinical practice. My CTC publications were initially presented at RSNA, an international forum that draws over 54,000 attendees annually, garnering cum laude (2), certificate of merit, and excellence in design (2) awards. These were subsequently published in RadioGraphics, one of the premier education journals in diagnostic radiology
    a. Silva AC, Hara AK, Leighton JA, Heppell JP. CT colonography with intravenous contrast material: varied appearances of colorectal carcinoma. Radiographics. 2005 Sep-Oct;25(5):1321-34. Review. PubMed PMID: 16160114.
    b. Silva AC, Vens EA, Hara AK, Fletcher JG, Fidler JL, Johnson CD. Evaluation of benign and malignant rectal lesions with CT colonography and endoscopic correlation. Radiographics. 2006 Jul-Aug;26(4):1085-99. Review. PubMed PMID: 16844933.
    c. Silva AC, Wellnitz CV, Hara AK. Three-dimensional virtual dissection at CT colonography: unraveling the colon to search for lesions. Radiographics. 2006 Nov-Dec;26(6):1669-86. Review. PubMed PMID: 17102043.
    d. Fletcher JG, Silva AC, Fidler JL, Cernigliaro JG, Manduca A, Limburg PJ, Wilson LA, Engelby TA, Spencer G, Harmsen WS, Mandrekar J, Johnson CD. Noncathartic CT colonography: Image quality assessment and performance and in a screening cohort. AJR Am J Roentgenol. 2013 Oct;201(4):787-94. doi: 10.2214/AJR.12.9225. PubMed PMID: 24059367; PubMed Central PMCID: PMC3919488.

2. My next contribution was in addressing CT radiation dose issues. Working with industry, we helped optimize a new reconstruction algorithm, adaptive statistical iterative reconstruction (ASIR), which preserved CT image quality by moderating the increased noise inherent in a lower radiation dose exam. Our January 2010 manuscript was one of the top cited in AJR that year, currently with 554 citations. We have subsequently helped implement a CT dose reduction standard throughout the Mayo sites, with our average CT dose consistently below the national average.
    a. Silva AC, Lawder HJ, Hara A, Kujak J, Pavlicek W. Innovations in CT dose reduction strategy: application of the adaptive statistical iterative reconstruction algorithm. AJR Am J Roentgenol. 2010 Jan;194(1):191-9. doi: 10.2214/AJR.09.2953. Review. PubMed PMID: 20028923.
    b. Flicek KT, Hara AK, Silva AC, Wu Q, Peter MB, Johnson CD. Reducing the radiation dose for CT colonography using adaptive statistical iterative reconstruction: A pilot study. AJR Am J Roentgenol. 2010 Jul;195(1):126-31. doi: 10.2214/AJR.09.3855. PubMed PMID: 20566805.
    c. Sagara Y, Hara AK, Pavlicek W, Silva AC, Paden RG, Wu Q. Abdominal CT: comparison of low-dose CT with adaptive statistical iterative reconstruction and routine-dose CT with filtered back projection in 53 patients. AJR Am J Roentgenol. 2010 Sep;195(3):713-9. doi: 10.2214/AJR.09.2989. PubMed PMID: 20729451.
    d. Fletcher JG, Hara AK, Fidler JL, Silva AC, Barlow JM, Carter RE, Bartley A, Shiung M, Holmes DR 3rd, Weber NK, Bruining DH, Yu L, McCollough CH. Observer performance for adaptive, image-based denoising and filtered back

projection compared to scanner-based iterative reconstruction for lower dose CT enterography. Abdom Imaging. 2015 Mar 1. [Epub ahead of print] PubMed PMID: 25725794.

3. Dual Energy CT (DECT) was the next imaging development that was also a collaborative industry effort. By generating two simultaneous data sets, DECT exploits the energy-related attenuation of different materials in the body to improve lesion detection and characterization above that capable by single-energy (ie, conventional) CT. I was involved with optimization and protocol development for abdominal applications, which included implementing organ-specific workflows as well as radiation dose management. Because DECT is able to generate novel quantitative data sets (material basis pairs, effective-z, and monochromatic images), we are currently investigating its role in oncologic imaging, including tumor treatment response.
    a. Silva AC, Morse BG, Hara AK, Paden RG, Hongo N, Pavlicek W. Dual-energy (spectral) CT: applications in abdominal imaging. Radiographics. 2011 Jul-Aug;31(4):1031-46; discussion 1047-50. doi: 10.1148/rg.314105159. PubMed PMID: 21768237.
    b. Hartman R, Kawashima A, Takahashi N, Silva A, Vrtiska T, Leng S, Fletcher J, McCollough C. Applications of dual-energy CT in urologic imaging: an update. Radiol Clin North Am. 2012 Mar;50(2):191-205, v. doi: 10.1016/j.rcl.2012.02.007. Epub 2012 Mar 7. Review. PubMed PMID: 22498438.
    c. Maia RS, Jacob C, Hara AK, Silva AC, Pavlicek W, Ross MJ. An algorithm for noise correction of dual-energy computed tomography material density images. Int J Comput Assist Radiol Surg. 2015 Jan;10(1):87-100. doi: 10.1007/s11548-014-1006-z. Epub 2014 May 11. PubMed PMID: 24817129.
    d. Oldan J, He M, Wu T, Silva AC, Li J, Mitchell JR, Pavlicek WM, Roarke MC, Hara AK. Pilot study: Evaluation of dual-energy computed tomography measurement strategies for positron emission tomography correlation in pancreatic adenocarcinoma. J Digit Imaging. 2014 Dec;27(6):824-32. doi: 10.1007/s10278-014-9707-y. PubMed PMID: 24994547; PubMed Central PMCID: PMC4391069.

4. MR Elastography (MRE), invented in Mayo Rochester by Richard Ehman MD, utilizes mechanical shear waves with a motion-sensitive MR sequence to generate quantitative maps of tissue stiffness. As pathologic tissue is generally stiffer than normal tissue, the first clinical application to emerge for this technique was the evaluation of chronic liver disease. In collaboration with Dr. Ehman, I helped optimize and implement MRE at Mayo Scottsdale. In addition, I worked with colleagues in hepatology and liver transplant to integrate MRE into clinical patient workflows. Also, as matrix stiffness has been shown to regulate tumor cell proliferation and chemotherapeutic response, we are currently exploring MRE's feasibility for evaluating oncologic masses.
    a. Silva AM, Grimm RC, Glaser KJ, Fu Y, Wu T, Ehman RL, Silva AC. Magnetic resonance elastography: evaluation of new inversion algorithm and quantitative analysis method. Abdom Imaging. 2015 Apr;40(4):810-7. doi: 10.1007/s00261-015-0372-5. PubMed PMID: 25742725.
    b. Gallegos-Orozco JF, Silva AC, Batheja MJ, Chang YH, Hansen KL, Lam-Himlin D, De Petris G, Aqel BA, Byrne TJ, Carey EJ, Douglas DD, Mulligan DC, Silva AM, Rakela J, Vargas HE. Magnetic resonance elastography can discriminate normal vs. abnormal liver biopsy in candidates for live liver donation. Abdom Imaging. 2015 Apr;40(4):795-802. doi: 10.1007/s00261-014-0310-y. PubMed PMID: 25445158.

c. Batheja M, Vargas H, Silva AM, Walker F, Chang YH, De Petris G, Silva AC. Magnetic resonance elastography (MRE) in assessing hepatic fibrosis: performance in a cohort of patients with histological data. Abdom Imaging. 2015 Apr;40(4):760-5. doi: 10.1007/s00261-014-0321-8. PubMed PMID: 25542217.
d. Singh S, Venkatesh SK, Keaveny A, Adam S, Miller FH, Asbach P, Godfrey EM, Silva AC, Wang Z, Murad MH, Asrani SK, Lomas DJ, Ehman RL. Diagnostic accuracy of magnetic resonance elastography in liver transplant recipients: A pooled analysis. Ann Hepatol. 2016 May-Jun;15(3):363-76. doi: 10.5604/16652681.1198808. Review.

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/sites/myncbi/alvin.silva.1/bibliography/51987472/public/?sort=date&direction=descending

D. Research Support

Ongoing Research Support

NIH 13-DK-N151 Nelson (PI) 10/2018-present
Determinants of Diabetic Nephropathy in American Indians.
The goal of this study is to utilize advanced MR techniques (MR Elastography, IDEALQuant, ASL,DWI/ IVIM) to identify imaging biomarkers for diabetic nephropathy.
Role: Co-Investigator/Site PI

Mayo Clinic Silva (Co-PI) 10/2016-present
Hybrid C-11 Choline and Multiparametric Pelvic PET/MR: Validation of a Requisite Preoperative Biomarker for Metastatic Lymphadenopathy in Primary Prostate Cancer.
Funded by CIM Imaging Biomarker Discovery Program. The goal of this study is to identify and validate an imaging biomarker for metastatic lymph nodes in prostate cancer.
Role: Co-PI

R01 DK110096-01 Cole (PI) 10/2016-present
Fatty liver disease and its determinants in an American Indian Population: the Strong Heart Study.
The goal of this study is to utilize advanced MR techniques (MR Elastography and IDEALQuant) to assess fatty liver disease.
Role: Co-Investigator/Site PI

Completed Research Support

NCI/ACRIN-ECOG 10-005978 Wald (PI) 04/2011-2016
A Prospective, Multicenter Comparison of Multiphase Contrast Enhanced CT and Multiphase Contrast Enhanced MRI for Diagnosis of Hepatocellular Carcinoma and Liver Transplant Allocation.
The goal of this study is to compare state-of-the-art CT versus MR for HCC diagnosis and staging in a liver transplant population.
Role: Site PI

Mayo Clinic Silva (PI) 10/2016-2016
iCORE – Standardizing Radiology Reports via Quantitative Imaging Tools to Improve Tumor Response Accuracy, Diagnostic Outcomes, and End-User Satisfaction. Funded Center of Science of Healthcare Delivery

Role: PI

Mayo Clinic Ramanathan (PI) 10/2016-2016
AZ Opportunity Fund - Texture analysis of tumor using CT scans to predict KRAS mutations in metastatic colon cancer. Funded by MEGA Program - MCA Internal Funds
Role: Co-PI

Mayo Clinic Silva (PI) 10/2016-2016
AZ Opportunity Fund - Utility of brain magnetic resonance elastography (MRE), a non-invasive research neuroimaging technique, and Texture Analysis (TA), an advanced post-process imaging algorithm. Funded by MEGA Program - MCA Internal Funds
Role: PI

Mayo Clinic Silva (PI) 10/2014-2015
Clinical Outcomes and Response Evaluation (CORE) Imaging Lab: Pilot Funding to establish an Imaging lab
Role: PI