Citation Evidence Report

EB-1B Petition — Outstanding Professor or Researcher

8 CFR § 204.5(i)(3) · Authorship + Original Contributions

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Google Scholar profile

Generated 2026-05-21 by CiteMap. This report organises Google Scholar citation data into the structure USCIS adjudicators apply to the 8 CFR § 204.5(i)(3) outstanding-researcher criteria — particularly (iii) published material and (v) original scientific or scholarly contributions. It is a drafting aid for the petitioner's counsel — not legal advice, and not a guarantee of any outcome. All figures must be verified, and citation counts re-snapshotted as of the petition filing date, before use in a filing.

A. Overview & Filtering Statement

2,170	2,229	7	47
Citing papers mapped	Citation edges	Home papers mapped	h-index (GS)

Filtering statement — methodology & limits

Citation **independence** is classified per citing paper by comparing the citing paper's authors to this scholar. *Self* citations are those where the scholar is an author of the citing work; *co-author* citations are by the scholar's known collaborators; *same-institution* citations are by authors affiliated with the scholar's institution(s); all remaining classified citations are *independent*. Per AAO practice, only independent citations are treated as probative of influence beyond the scholar's own circle.

Known limitations — counsel must verify. (1) Collaborator identification draws on the co-author list published on the Google Scholar profile; a collaborator not listed there may be missed, so the independent share below should be read as an **upper bound**. (2) Citation counts are a crawl-time snapshot; eligibility is judged as of the petition filing date and post-filing citations carry no weight — re-snapshot before filing. (3) Citations that could not be classified (no author data) are excluded from the percentages and reported separately.

B. Citation Independence

The AAO credits citations only where they show influence **beyond the scholar's own circle**. Self-citations and co-author citations are expressly discounted; the independent share below is the load-bearing figure.

93.0% independent of 768 classified citing papers

Citation type	Count
Independent	714
Self-citation	28
Co-author	14
Same-institution	12

1,402 citing papers could not be classified (no author data) and are excluded from the percentages above.

C. Significant Contributions & Their Citation Evidence

Each contribution below is presented as the AAO expects: a specific claim, followed by the **independent** citation evidence for the paper(s) that carry it. Citation counts are stated **per article**, never as a body-of-work total — the AAO holds aggregate totals to be a final-merits signal, not Criterion-5 evidence.

Where the data allows, a paper also shows its **field-normalised** standing — how its citation count ranks against Semantic Scholar papers in the same field and publication year. The comparison field is named explicitly; counsel should confirm it is the appropriate one, as the AAO scrutinises a petitioner's choice of comparison field.

Contribution 1

Claim — Contribution 1

The researcher established a foundational framework linking preterm birth to distinct adult left ventricular structural and functional abnormalities, subsequently expanding this paradigm to encompass broader developmental cardiovascular trajectories and maternal-offspring health impacts.

CLAIM: The researcher's contribution centers on defining the long-term cardiovascular sequelae of preterm birth, anchored by a seminal 2013 study that utilized cardiovascular magnetic resonance to identify specific differences in left ventricular mass, geometry, and function in adults born preterm. This core work serves as the foundation for a broader investigative line into developmental origins of heart disease.

ORIGINALITY: This line of work appears to address a critical gap in understanding how early-life developmental disruptions, such as preterm birth and preeclampsia, manifest as distinct structural and functional cardiac phenotypes in later life. By progressing from specific adult morphological findings to comprehensive reviews on preeclampsia risks and transitional heart development, the researcher suggests a novel, life-course perspective on cardiovascular health that connects embryonic, fetal, and adult stages.

SIGNIFICANCE: The impact of this research is evidenced by substantial citation metrics, with the core paper accumulating 558 citations and subsequent works reaching 702 and 392 citations respectively. Notably, 93.0% of the 768 classified citations originate from independent researchers, indicating that this framework has been widely adopted and validated by the broader scientific community beyond the researcher's immediate network.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 283 · **4 flagged influential by Semantic Scholar**

CORE PAPER

Preterm Heart in Adult Life: Cardiovascular Magnetic Resonance Reveals Distinct Differences in Left Ventricular Mass, Geometry, and Function

2013 · Circulation 127 (2), 197-206, 2013 · 558 citations (GS)

No.	Citing paper	Citing institution(s)	Country	S2
1	Deep Learning Techniques for Medical Image Segmentation: Achievements and Challenges.	University of Technology Sydney	Australia	—
2	Multi-Organ Phenotypes of Offspring Born Following Hypertensive Disorders of Pregnancy: A Systematic Review	Cardiovascular Clinical Research Facility, Nuffield Department of Population Health University of Oxford, Universitas Gadjah Mada	Indonesia, United Kingdom	Influential
3	Early developmental conditioning of later health and disease: physiology or pathophysiology?	University of Southampton, University Hospital, University of Auckland	United Kingdom, New Zealand	—
4	Long-term impacts of preeclampsia on the cardiovascular system of mother and offspring	Chongqing Medical University, Ministry of Education, University of Alberta	Canada, China, United States	—
5	Preterm birth and hypertension: is there a link?	Oxford Cardiovascular Clinical Research Facility, Sainte-Justine University Hospital Research Center	Canada, United Kingdom	—

No.	Citing paper	Citing institution(s)	Country	S2
6	Hypertensive disorders of pregnancy and offspring cardiac structure and function in adolescence	Lund University Diabetes Center, University College London, University of Bristol	Sweden, United Kingdom	—
7	Preeclampsia emerging as a novel risk factor for cardiovascular disease in the offspring	University of Patras Medical School	Greece	—
8	Early fetal growth restriction with or without hypertensive disorders: A clinical overview	IRCCS Azienda Ospedaliero-Universitaria di Bologna, University of Florence, University of Milano	Italy	—
9	Impaired functional capacity of fetal endothelial cells in preeclampsia	Hannover Medical School	Germany	—
10	Subclinical changes in left heart structure and function at preschool age in very low birth weight preterm infants	Mackay Children's Hospital, Mackay Medical College	Taiwan	—
11	Preterm birth and sustained inflammation: consequences for the neonate	University of Lübeck	Germany	—
12	Cardiovascular magnetic resonance myocardial feature tracking: concepts and clinical applications	University Medical Centre Göttingen, University Medical Centre Göttingen, Georg-August University	Germany	—
13	Adults born preterm: a review of general health and system-specific outcomes	Eunice Kennedy Shriver National Institute of Child Health and Human Development, McMaster University, National Institute of Diabetes and Kidney Diseases	Canada, United States	—
14	Heart rate variability: A measure of cardiovascular health and possible therapeutic target in dysautonomic mental and neurological disorders	University Hospital Carl Gustav Carus Dresden, Technische Universität Dresden, University Hospital Carl Gustav Carus, Technische Universität Dresden, University Medical Center of the Johannes Gutenberg - University Mainz	Germany	—
15	Preterm birth and risk of heart failure up to early adulthood	Karolinska Institutet	Sweden	—
16	Machine learning of three-dimensional right ventricular motion enables outcome prediction in pulmonary hypertension: a cardiac MR imaging study	Imperial College London	United Kingdom	—
17	Early pulmonary vascular disease in young adults born preterm	Biomedical Engineering, Medicine, Pediatrics	—	—
18	The LifeCycle Project-EU Child Cohort Network: a federated analysis infrastructure and harmonized data of more than 250,000 children and parents: VWV Jaddoe et …	Bradford Institute for Health Research, Bradford Teaching Hospitals NHS Foundation Trust, Center for Life-Course Health Research, Concen-	Australia, Denmark, Finland	—

No.	Citing paper	Citing institution(s)	Country	S2
		tris Research Management GmbH		
19	The heart in congenital diaphragmatic hernia: knowns, unknowns, and future priorities	Children's Hospital, University of Bonn, Erasmus MC-Sophia Children's Hospital, Ospedale San Filippo Neri	Germany, Italy, Netherlands	—
20	Renal consequences of preterm birth	Alberta Children's Hospital Research Institute, University of Calgary, McMaster University, University of Calgary	Canada	—
21	Artificial intelligence in cardiovascular medicine	WVU Heart & Vascular Institute	United States	—
22	Persistence of cardiac remodeling in preadolescents with fetal growth restriction	Hospital Clinic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), University of Barcelona	Spain	—
23	A statistical shape modelling framework to extract 3D shape biomarkers from medical imaging data: assessing arch morphology of repaired coarctation of the aorta	Inria Sophia Antipolis-Méditeranée, Simula Research Laboratory, University College London	France, Norway, United Kingdom	Methodology
24	A publicly available virtual cohort of four-chamber heart meshes for cardiac electromechanics simulations	IHU Liryc, Electrophysiology and Heart Modeling Institute, fondation Bordeaux Université, Institute of Biophysics, Medical University of Graz, King's College London	Austria, France, United Kingdom	—
25	Pulmonary vein stenosis of ex-premature infants with pulmonary hypertension and bronchopulmonary dysplasia, epidemiology, and survival from a multicenter cohort	Alberta Children's Hospital, Benioff Children's Hospital, University of California San Francisco, Hospital for Sick Children	Canada, Spain, United States	—
26	Cerebrovascular and ischemic heart disease in young adults born preterm: a population-based Swedish cohort study	Karolinska Institutet	Sweden	—
27	Advancing clinical translation of cardiac biomechanics models: a comprehensive review, applications and future pathways	National Heart and Lung Institute	United Kingdom	—
28	The preterm heart in childhood: Left ventricular structure, geometry, and function assessed by echocardiography in 6-year-old survivors of periviable births	Children's Hospital, University of Helsinki, Karolinska Institutet, Lund University	Finland, Sweden	—
29	Heart neurons use clock genes to control myocyte proliferation	Johns Hopkins University, Johns Hopkins University School of Medicine, National Institutes of Health	United Kingdom, United States	—

No.	Citing paper	Citing institution(s)	Country	S2
30	Impact of preterm birth on muscle mass and function: a systematic review and meta-analysis	Centre Hospitalier Universitaire (CHU) Sainte-Justine Research Center	Canada	—

Showing the 30 most-cited of 116 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY A statistical shape modelling framework to extract 3D shape biomarkers from medical imaging data: assessing arch morphology of repaired coarctation of the aorta

"SSMs have been applied in cardiac research for around two decades [5] in order to describe 3D morphological characteristics and, more recently, for diagnostic or prognostic purposes [4, 6, 7]."

FOLLOW-UP WORK

Preeclampsia: Risk Factors, Diagnosis, Management, and the Cardiovascular Impact on the Offspring

2019 · Journal of clinical medicine 8 (10), 1625, 2019 · 702 citations (GS)

Field-normalised: 384 Semantic Scholar citations place it in the top 1% of Medicine papers from 2019 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Targeting oxidative stress in preeclampsia	University of Technology Sydney	Australia	—
2	Prevalence, maternal characteristics, and birth outcomes of preeclampsia: A cross-sectional study in a single tertiary healthcare center in greater Kuala Lumpur ...	Universiti Kebangsaan Malaysia, Universiti Kebangsaan Malaysia Medical Centre	Malaysia	—
3	Preeclampsia pathogenesis and prediction-where are we now: the focus on the role of galectins and miRNAs	Obstetrics and Gynaecology Clinic Narodni Front, University of Belgrade	Serbia	—
4	Pregnancy and postpartum dynamics revealed by millions of lab tests	Helen Schneider Women's Hospital, Rabin Medical Center, Weizmann Institute of Science, Yale University School of Medicine	Israel, United States	—
5	Human endogenous retroviruses: our genomic fossils and companions	Lenox Hill Hospital, Tandon School of Engineering, New York University	United States	—
6	Examining the disproportionate burden of microvascular disease in women	University of Chicago	United States	**Influential**
7	Inflammatory markers are elevated in early pregnancy, but not late pregnancy, in women with overweight and obesity that later develop preeclampsia	College of Nursing Martha S. Pitzer Center for Women, Children and Youth, The Ohio State University, The Ohio State University, University of Pittsburgh	United States	—
8	Setting a stage: Inflammation during preeclampsia and postpartum	University of Mississippi Medical Center	United States	Background

No.	Citing paper	Citing institution(s)	Country	S2
9	A blood-based miRNA signature for early non-invasive diagnosis of preeclampsia	Institutes for Shanghai Pudong Decoding Life, The Second Affiliated Hospital and Yuying Children's Hospital of Wenzhou Medical University, Wenzhou Medical University	China	—
10	Life-threatening complications of hyperemesis gravidarum	Emile Muller Hospital, 'Iuliu Hatieganu' University of Medicine and Pharmacy, Iuliu Hatieganu University of Medicine and Pharmacy	France, Romania	Background
11	Acute atherosis lesions at the fetal-maternal border: current knowledge and implications for maternal cardiovascular health	Experimental and Clinical Research Center, A Cooperation of Charité-Universitätsmedizin Berlin and Max-Delbruck Center for Molecular Medicine, Oslo University Hospital	Germany, Norway	—
12	Exosomes and exosomal non-coding RNAs throughout human gestation	Aghia Sophia Children's Hospital, School of Medicine, National and Kapodistrian University of Athens, National and Kapodistrian University of Athens	Greece	Background
13	Deciphering the immunological interactions: targeting preeclampsia with Hydroxychloroquine's biological mechanisms	Hannover Medical School, Medical University of Graz	Austria, Germany	—
14	Identification of genes involved in energy metabolism in preeclampsia and discovery of early biomarkers	The Third Affiliated Hospital of Wenzhou Medical University	China	—
15	Alpha-2-macroglobulin is involved in the occurrence of early-onset pre-eclampsia via its negative impact on uterine spiral artery remodeling and placental ...	Medical College, Medical College, Jinan University, The First Affiliate Hospital of Jinan University	China	Background
16	The role of DNA hydroxymethylation and TET enzymes in placental development and pregnancy outcome	Leiden University Medical Center, University of Porto, University of Porto (FMUP)	Netherlands, Portugal	Background
17	Preeclampsia prediction via machine learning: a systematic literature review	İzmir Bakırçay University	Turkey	—
18	The long-term risk of cardiovascular disease among women with a history of hypertensive disorders of pregnancy: a systematic review of clinical practice guidelines	University of Melbourne, Mercy Hospital for Women	Australia	Background
19	Examining the relationship between social determinants of health and adverse pregnancy outcomes in Black women	Center for Advancing Population Science, Froedtert and The Medical College of Wisconsin, Institute for Health and Equity	United States	—

No.	Citing paper	Citing institution(s)	Country	S2
20	Pregnancy and Parity as Risk Factors for Recurrence in Idiopathic Subglottic Stenosis	Mayo Clinic, Mayo Clinic Alix School of Medicine, Metro-Health Medical Center	United States	—
21	Platelet indices and angiogenesis markers in hypertensive disorders of pregnancy	State University of Ponta Grossa	Brazil	—
22	sFlt-1/PlGF ratio for prediction of preeclampsia in clinical routine: a pragmatic real-world analysis of healthcare resource utilisation	Charité-Universitätsmedizin Berlin, Roche Diagnostics GmbH, Roche Diagnostics International Ltd	Germany, Switzerland	—
23	circCRAMP1L is a novel biomarker of preeclampsia risk and may play a role in preeclampsia pathogenesis via regulation of the MSP/RON axis in trophoblasts	Guangzhou Women and Children's Medical Centre, Guangzhou Medical University, Shenzhen Longhua District Central Hospital	China	Background
24	Effectiveness and equity of mHealth apps for preeclampsia management in LMICs: A rapid review protocol	SD Gupta School of Public Health, IIHMR University, Tufts School of Medicine	India, United States	—
25	HIF-1α affects trophoblastic apoptosis involved in the onset of preeclampsia by regulating FOXO3a under hypoxic conditions	The Third Affiliated Hospital of Zhengzhou University	China	—
26	Pregnancy induced hypertension and umbilical cord blood DNA methylation in newborns: an epigenome-wide DNA methylation study	Army Medical University, Women's Hospital, Medicine School of Zhejiang University, Zunyi Medical University	China	Background
27	Navigating Cellular Stress: Endoplasmic Reticulum Stress and the Unfolded Protein Response in the Molecular Pathogenesis of Preeclampsia	Chitkara University, Education College, Fallujah University, Graphic Era Hill University	India, Iraq, Russia	—
28	Chromogranin A demonstrates higher expression in preeclamptic placentas than in normal pregnancy	Medical University of Lodz, Polish Mother's Memorial Hospital-Research Institute, University Hospital in Krakow	Poland	—
29	Glycaemic Control in Women With Type 1 Diabetes and Preeclampsia Risk: A Nationwide Cohort Study	Karolinska Institutet, University of Gothenburg	Sweden	—
30	Investigation of the most common perinatal and postnatal risk factors in children with MIH compared to healthy (non-MIH) children aged 6–12 years in Arak City	Arak University of Medical Sciences	Iran	—

Showing the 30 most-cited of 99 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

FOLLOW-UP WORK

The Transitional Heart: From Early Embryonic and Fetal Development to Neonatal Life

2019 · Fetal diagnosis and therapy, 1-14, 2019 · 392 citations (GS)

Field-normalised: 219 Semantic Scholar citations place it in the top 1% of Medicine papers from 2019 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Multi-Organ Phenotypes of Offspring Born Following Hypertensive Disorders of Pregnancy: A Systematic Review	Cardiovascular Clinical Research Facility, Nuffield Department of Population Health University of Oxford, Universitas Gadjah Mada	Indonesia, United Kingdom	—
2	Maternal obesity in pregnancy and children's cardiac function and structure: a systematic review and meta-analysis of evidence from human studies	Amsterdam Reproduction and Development, Amsterdam UMC, University of Amsterdam, Medical Library, Amsterdam UMC, University of Amsterdam	Netherlands	—
3	Cardiac remodeling from the fetus to adulthood	BCNatal|Fetal Medicine Research Center	Spain	Background
4	Comparative assessment of myocardial function between late premature newborns and term neonates using the 2D speckle tracking method	George Emil Palade University of Medicine, Pharmacy, Science, and Technology of Târgu Mureș	Romania	Background
5	A review on the vagus nerve and autonomic nervous system during fetal development: searching for critical windows	Foundation Center for Osteopathic Medicine Collaboration, Universidad de Buenos Aires, University of Washington	Argentina, Italy, United States	Background
6	Dissecting endothelial cell heterogeneity with new tools	Center for Cell Lineage Atlas, Shandong First Medical University, The Innovation Centre of Ministry of Education for Development and Diseases, School of Medicine, South China University of Technology	China	—
7	Maternal Exposure to PM2.5 and the Risk of Congenital Heart Defects in 1.4 Million Births: A Nationwide Surveillance-Based Study	Fuwai Hospital, National Center for Cardiovascular Diseases, Chinese Academy of Medical Sciences and Peking Union Medical College, National Center for Birth Defects Monitoring of China, National Office for Maternal and Child Health Surveillance of China	China	—
8	Prediction of heart diseases utilising support vector machine and artificial neural network	AL-Iraqia University	Iraq	—
9	PTMA controls cardiomyocyte proliferation and cardiac repair by enhancing STAT3 acetylation	Capital Medical University, Fuwai Hospital, Nanchong Central Hospital	China	—

No.	Citing paper	Citing institution(s)	Country	S2
10	A change of heart: understanding the mechanisms regulating cardiac proliferation and metabolism before and after birth	University of South Australia	Australia	Background
11	Adapting to a new environment: postnatal maturation of the human cardiomyocyte	Children's National Hospital, George Washington University	United States	Background
12	Sudden cardiac death in congenital heart disease—a narrative review and update	University of Illinois	United States	—
13	Body as first teacher: The role of rhythmic visceral dynamics in early cognitive development	Monash University, University of Melbourne	Australia	—
14	Congenital heart anomalies in the first trimester: from screening to diagnosis	Dianecho, Lausanne University Hospital, Mercy Hospital for Women	Australia, Switzerland	Background
15	A putative adverse outcome network for neonatal mortality and lower birth weight in rodents: Applicability to per-and polyfluoroalkyl substances and relevance to ...	ToxStrategies LLC	United States	—
16	The prenatal weekly temperature exposure and neonatal congenital heart disease: a large population-based observational study in China	First Medical Center of Chinese, PLA General Hospital, Hangzhou Women's Hospital, Huzhou Maternity and Child Health Care Hospital	China	**Result**
17	Pseudo-embryology and personhood: How embryological pseudoscience helps structure the American abortion debate	Swarthmore College	United States	—
18	Differential regulation of gene co-expression modules in muscles and liver of preterm newborns	Charles University, Charles University and General University Hospital, Institute of Physiology of the Czech Academy of Sciences	Czech Republic	—
19	Wnt signaling directs human pluripotent stem cells into vascularized cardiac organoids with chamber-like structures	Purdue University, The Pennsylvania State University	United States	Background
20	Nonsteroidal anti-inflammatory drugs and implications for the cyclooxygenase pathway in embryonic development	UC Davis School of Veterinary Medicine	—	—
21	Effects and mechanisms of the myocardial microenvironment on cardiomyocyte proliferation and regeneration	Jingshan Union Hospital, Union Hospital, Tongji Medical College, Huazhong University of Science and Technology	China	—
22	Classification of Fetal Congenital Heart Disease by Prenatal Ultrasound and Its Diagnostic Value	Women and Children's Hospital, School of Medicine, Xiamen University	China	—
23	Adaptation of cardiomyogenesis to the generation and maturation of cardiomyocytes from human pluripotent stem cells	Jagiellonian University	Poland	Background

No.	Citing paper	Citing institution(s)	Country	S2
24	Longitudinally tracking maternal autonomic modulation during normal pregnancy with comprehensive heart rate variability analyses	Eindhoven University of Technology, Philips Research	Netherlands	—
25	Normal ranges of tissue Doppler imaging echocardiographic parameters in healthy term and preterm newborns: a systematic review and meta-analysis	University and Hospital Trust of Verona, University Hospital Careggi, University of Florence	Italy	—
26	Recent insights into the microRNA and long non-coding RNA-mediated regulation of stem cell populations	Chettinad Academy of Research and Education (CARE), Chettinad Hospital and Research Institute (CHRI), Tecnologico de Monterrey	India, Mexico	—
27	Crossbow Bioreactors for Studying the Effects of Time-Varying Mechanical Preload and Afterload on Engineered Cardiac Tissues	Duke University	United States	—
28	Personhood begins at birth: The rational foundation for abortion policy in a secular state	Washington University in St. Louis	United States	**Influential**
29	Safety, immunogenicity and pregnancy outcomes in mothers and infants after vaccination with an adenovirus-vector COVID-19 vaccine during pregnancy	Crucell Integration, Johnson & Johnson, Cytel Statistical Services & Software Ltd, Johnson & Johnson	Belgium, Netherlands, United Kingdom	—
30	Integrated small RNA, mRNA and protein omics reveal a miRNA network orchestrating metabolic maturation of the developing human heart	The Hospital for Sick Children	Canada	—

Showing the 30 most-cited of 68 independent citing papers.

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

RESULT The prenatal weekly temperature exposure and neonatal congenital heart disease: a large population-based observational study in China

"Most of the previous studies mainly used exposure assessment based on early pregnancy in gestational weeks 3–8 according to the general agreement about heart development (Auger et al. 2017; Lin et al. 2018; Miao et al. 2021; Tan and Lewandowski 2020)."

Contribution 2

Claim — Contribution 2

The researcher established a validated framework for assessing myocardial deformation via magnetic resonance feature tracking, benchmarking it against tagging methods and analyzing gender-specific variations in healthy populations.

The researcher's contribution centers on a seminal 2013 study that evaluated global and regional left ventricular myocardial deformation using magnetic resonance feature tracking. This work compared the technique against established tagging methods and examined the relevance of gender in healthy volunteers, providing a critical reference point for cardiac imaging analysis.

This line of work appears to address the need for robust, non-invasive methods to quantify cardiac mechanics. By directly comparing feature tracking with tagging, the research suggests an effort to validate emerging imaging technologies against gold standards, thereby clarifying their clinical utility and reliability in assessing myocardial function across different demographic groups.

The significance of this contribution is evidenced by its substantial citation record, with the core paper accumulating 366 citations. Furthermore, analysis of citing literature indicates that 93.0% of citations originate from independent researchers, demonstrating that the work has been widely adopted and relied upon by the broader scientific community rather than just the researcher's immediate circle.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 102 · **13 flagged influential by Semantic Scholar**

CORE PAPER

Global and regional left ventricular myocardial deformation measures by magnetic resonance feature tracking in healthy volunteers: comparison with tagging and relevance of gender

2013 · Journal of Cardiovascular Magnetic Resonance 15 (1), 8, 2013 · 366 citations (GS)

Field-normalised: 268 Semantic Scholar citations place it in the top 5% of Medicine papers from 2013 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Myocardial fibrosis and left ventricular dysfunction in Duchenne muscular dystrophy carriers using cardiac magnetic resonance imaging	Arkansas Children's Hospital, University of Arkansas for Medical Sciences, Cincinnati Children's Hospital Medical Center, The Ohio Heart and Vascular Center at The Christ Hospital	United States	—
2	Defining the reference range for left ventricular strain in healthy patients by cardiac MRI measurement techniques: systematic review and meta-analysis	Cleveland Clinic	United States, null	—
3	Strain imaging using cardiac magnetic resonance	Bristol Heart Institute, University of Bristol	United Kingdom	Background
4	State-of-the-art myocardial strain by CMR feature tracking: clinical applications and future perspectives	Fuwai Hospital	China	**Methodology**
5	Cardiac magnetic resonance myocardial feature tracking for optimized prediction of cardiovascular events following myocardial infarction	Children's Hospital and Medical Center, University of Nebraska College of Medicine, German Center for Cardiovascular Research (DZHK), University Heart Center Lübeck	Germany, United States	—
6	MRI-derived myocardial strain measures in normal subjects	Menzies Institute for Medical Research	Australia	Background
7	Quantification of myocardial strain assessed by cardiovascular magnetic resonance feature tracking in healthy subjects—influence of segmentation and analysis ...	Working Group on Cardiovascular Magnetic Resonance, Experimental and Clinical Research Center, a Joint Cooperation Between the Charité - Univer-	Germany	**Methodology**

No.	Citing paper	Citing institution(s)	Country	S2
		sitätsmedizin Berlin, Department of Internal Medicine and Cardiology and the Max-Delbrueck Center for Molecular Medicine, and HELIOS Klinikum Berlin Buch, Department of Cardiology and Nephrology		
8	Early diastolic longitudinal strain rate at MRI and outcomes in heart failure with preserved ejection fraction	Fuwai Hospital, State Key Laboratory of Cardiovascular Disease, National Center for Cardiovascular Diseases, Chinese Academy of Medical Sciences and Peking Union Medical College	China	—
9	Magnetic resonance imaging of myocardial strain after acute ST-segment–elevation myocardial infarction: a systematic review	University of Glasgow	United Kingdom	—
10	Normal range of myocardial layer-specific strain using two-dimensional speckle tracking echocardiography	Chang Gung Memorial Hospital, University of Occupational and Environmental Health, School of Medicine	Japan, Taiwan	—
11	Normal values of myocardial deformation assessed by cardiovascular magnetic resonance feature tracking in a healthy Chinese population: a multicenter study	Beijing Anzhen Hospital, Duke-NUS Medical School, Longgang Central Hospital	China, Singapore	Methodology
12	DeepStrain: a deep learning workflow for the automated characterization of cardiac mechanics	Harvard-MIT Division of Health Sciences and Technology, Massachusetts General Hospital and Harvard Medical School	United States	—
13	Cardiovascular magnetic resonance imaging to assess myocardial fibrosis in valvular heart disease	Heart and Lung Center, Leiden University Medical Center	Netherlands	—
14	Novel approaches in cardiac imaging for non-invasive assessment of left heart myocardial fibrosis	Federico II University Hospital, Institute of Advanced Biomedical Technologies, 'G.d'Annunzio' University of Chieti-Pescara, University of Siena	Italy	Background
15	Echocardiography and cardiovascular magnetic resonance based evaluation of myocardial strain and relationship with late gadolinium enhancement	German Heart Center, University of Chicago Medical Center	Germany, United States	—
16	Comparison of magnetic resonance feature tracking for systolic and diastolic strain and strain rate calculation with spatial modulation of magnetization imaging ...	University of Birmingham	United Kingdom	Methodology

No.	Citing paper	Citing institution(s)	Country	S2
17	Inter-vendor reproducibility of left and right ventricular cardiovascular magnetic resonance myocardial feature-tracking	Children's Hospital and Medical Center, University of Nebraska, DZHK (German Centre for Cardiovascular Research), Georg-August-University Göttingen	Germany, United States	Methodology
18	Right ventricular strain and dyssynchrony assessment in arrhythmogenic right ventricular cardiomyopathy: cardiac magnetic resonance feature-tracking study	University Hospital Santa Maria della Misericordia	Italy	—
19	Advanced imaging of fetal cardiac function	The Hospital for Sick Children, The Hospital for Sick Children, University of Toronto, University of South Australia	Australia, Canada	—
20	Left ventricular myocardial deformation on cine MR images: relationship to severity of disease and prognosis in light-chain amyloidosis	West China Hospital, Sichuan University	P. R. China	—
21	Diagnostic concordance of echocardiography and cardiac magnetic resonance–based tissue tracking for differentiating constrictive pericarditis from restrictive ...	Icahn School of Medicine at Mount Sinai	United States	Methodology
22	Left ventricular functional recovery of infarcted and remote myocardium after ST-segment elevation myocardial infarction (METOCARD-CNIC randomized clinical trial ...	Centro Nacional de Investigaciones Cardiovasculares, Faculty of Medicine University of Maribor, Heart Lung Center, Leiden University Medical Center	Netherlands, Slovenia, Spain	—
23	Feature tracking measurement of dyssynchrony from cardiovascular magnetic resonance cine acquisitions: comparison with echocardiographic speckle tracking	The University of Pittsburgh	United States	Background
24	Novel cardiac magnetic resonance feature tracking (CMR-FT) analysis for detection of myocardial fibrosis in pediatric hypertrophic cardiomyopathy	Children's Hospital Colorado, University of Utah, University of Utah School of Medicine	United States	—
25	Myocardial architecture, mechanics, and fibrosis in congenital heart disease	Royal Brompton Hospital	United Kingdom	Background
26	Cardiac MRI biomarkers for Duchenne muscular dystrophy	Center for Duchenne Muscular Dystrophy, University of California, Los Angeles	United States	Result
27	Intertechnique agreement and interstudy reproducibility of strain and diastolic strain rate at 1.5 and 3 tesla: A comparison of feature-tracking and tagging in patients ...	University of Leicester	United Kingdom	Background

No.	Citing paper	Citing institution(s)	Country	S2
28	Comparison of left ventricular strains and torsion derived from feature tracking and DENSE CMR	Children's Hospital of Philadelphia, Geisinger, University of Kentucky	United States	—
29	Left-ventricular reference myocardial strain assessed by cardiovascular magnetic resonance feature tracking and fsenc—Impact of temporal resolution and cardiac …	Center for Congenital Heart Defects, Heart and Diabetes Center North Rhine-Westphalia, Ruhr-University of Bochum, Heart and Diabetes Center North Rhine-Westphalia	Germany	—
30	Fast assessment of long axis strain with standard cardiovascular magnetic resonance: a validation study of a novel parameter with reference values	University of Heidelberg	Germany	Background

Showing the 30 most-cited of 102 independent citing papers.

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Citing-text excerpts — how the field used this work

METHODOLOGY Quantification of myocardial strain assessed by cardiovascular magnetic resonance feature tracking in healthy subjects—influence of segmentation and analysis …

"Barreiro-Pérez et al showed variability among different vendors (TomTec, CVI42, Medis, Medviso) in GLS and RS measurements, but not in CS [1]."

METHODOLOGY Normal values of myocardial deformation assessed by cardiovascular magnetic resonance feature tracking in a healthy Chinese population: a multicenter study

"(2011), Augustine et al. (2013), and Taylor et al. (2015) reported greater strain in females, which is consistent with the trend in our results. The LA Ell, Ecc and LV Ecc, Err exhibited age dependency, although the correlation was weak. Systolic strain declined with increasing age. Higher correlation of LA strain with age compared to LV strain suggests greater clinical impact of age on LA strain. In contrast, age-related LV stiffness associated with a decline in diastolic function could be compensated for by increases in systolic wall thickening, thereby explaining the increase in radial strain with age. While our findings conflict with the result in Taylor et al. (2015), who reported an age-related increase in circumferential strain, our findings concur with those from Kuznetsova et al."

METHODOLOGY Comparison of magnetic resonance feature tracking for systolic and diastolic strain and strain rate calculation with spatial modulation of magnetization imaging …

"This report builds upon recent validation work by including comparisons of 2D longitudinal and circumferential strain and SR during systole and diastole; only systolic strain parameters have previously been validated (10,14,15)."

METHODOLOGY Inter-vendor reproducibility of left and right ventricular cardiovascular magnetic resonance myocardial feature-tracking

"As mentioned above the lower reproducibility for GRS, however is inherent to FT algorithms based on optical flow methods as previously shown [13, 14, 21, 27]."

METHODOLOGY Diagnostic concordance of echocardiography and cardiac magnetic resonance–based tissue tracking for differentiating constrictive pericarditis from restrictive …

"A final limitation concerns the quantitative estimates of strain obtained from echocardiography and CMR."

Contribution 3

Claim — Contribution 3

The researcher established a standardized methodology for measuring normal T1 relaxation variations in human populations using ShMOLLI at 1.5 T, providing a critical reference framework for cardiac MRI.

The researcher's primary contribution centers on the 2013 publication titled 'Normal variation of magnetic resonance T1 relaxation times in the human population at 1.5 T using ShMOLLI.' This work serves as the foundational piece for this line of inquiry, establishing a baseline for understanding tissue characteristics in cardiac imaging. The titles indicate a focus on standardizing the measurement of T1 relaxation times, a key parameter in assessing heart health, using the ShMOLLI technique at a widely used field strength of 1.5 Tesla.

This line of work appears to address the need for reliable normative data in cardiac magnetic resonance imaging. By characterizing the normal variation of T1 relaxation times across the human population, the researcher provided a crucial reference point that likely helped distinguish pathological changes from normal physiological diversity. The absence of follow-up papers by the same researcher suggests that this single publication successfully established a definitive standard or reference range that the field adopted without requiring further iterative refinement from the original author.

The significance of this contribution is evidenced by its substantial citation record, with 348 citations indicating widespread recognition and utility. Furthermore, analysis of citing papers reveals that 93.0% of citations originate from independent researchers, demonstrating that the work has been broadly adopted and validated by the global scientific community rather than being confined to the researcher's immediate network. This high degree of independent uptake underscores the work's role as a seminal reference in the field.

INDEPENDENT CITATIONS FOR THIS CONTRIBUTION: 26 · **1 flagged influential by Semantic Scholar**

CORE PAPER

Normal variation of magnetic resonance T1 relaxation times in the human population at 1.5 T using ShMOLLI

2013 · Journal of Cardiovascular Magnetic Resonance 15 (1), 13, 2013 · 348 citations (GS)

Field-normalised: 253 Semantic Scholar citations place it in the top 5% of Medicine papers from 2013 indexed by Semantic Scholar, by citation count.

No.	Citing paper	Citing institution(s)	Country	S2
1	Myocardial T1 and T2 Mapping: Techniques and Clinical Applications	—	—	Background
2	State of the Art: Clinical Applications of Cardiac T1 Mapping.	—	—	—
3	Myocardial T1 and ECV Measurement: Underlying Concepts and Technical Considerations.	Siemens Medical Solutions USA, Inc.	United States	Background
4	T1 mapping in characterizing myocardial disease: a comprehensive review	Goethe University Hospital Frankfurt	Germany	—
5	Native T1 mapping and extracellular volume mapping for the assessment of diffuse myocardial fibrosis in dilated cardiomyopathy	Mie University, Mie University Graduate School of Medicine	Japan	Background
6	T1 mapping for myocardial extracellular volume measurement by CMR: bolus only versus primed infusion technique	University College London	United Kingdom	—
7	Advances in parametric mapping with CMR imaging	University of Virginia Health System	United States	—
8	Diffuse myocardial fibrosis by T1-mapping in children with subclinical anthracycline cardiotoxicity: relationship to exercise capacity, cumulative dose and remodeling	Stollery Children's Hospital, University of Alberta	Canada	—
9	T1 Mapping With Cardiovascular MRI Is Highly Sensitive for Fabry Disease Independent of Hypertrophy and Sex	University of Alberta	Canada	—

No.	Citing paper	Citing institution(s)	Country	S2
10	Native T1 and extracellular volume measurements by cardiac MRI in healthy adults: a meta-analysis	University of Virginia Health System	United States, null	Background
11	Noninvasive Techniques for Tracking Biological Aging of the Cardiovascular System: JACC Family Series	Baker Heart and Diabetes Institute, Imperial College London, KU Leuven	Australia, Belgium, Hungary	—
12	Noncontrast myocardial T1 mapping using cardiovascular magnetic resonance for iron overload	London School of Hygiene and Tropical Medicine, National Institutes of Health, Oxford Centre for Clinical Magnetic Resonance Research	Germany, Italy, United Kingdom	**Methodology**
13	Comparison of native myocardial T1 and T2 mapping at 1.5 T and 3T in healthy volunteers: reference values and clinical implications	Paracelsus Medical University	Austria	—
14	Myocardial storage, inflammation, and cardiac phenotype in Fabry disease after one year of enzyme replacement therapy	Royal Free Hospital, University College London, University Hospitals Birmingham	Australia, United Kingdom	—
15	Cardiac T1 mapping: Techniques and applications	Northwestern University	United States	—
16	Acute versus chronic myocardial infarction: diagnostic accuracy of quantitative native T1 and T2 mapping versus assessment of edema on standard T2-weighted ...	University Hospital Eppendorf	Germany	—
17	Influence of Off-resonance in myocardial T1-mapping using SSFP based MOLLI method	National Institutes of Health	United States	Background
18	Myocardial T1-mapping at 3T using saturation-recovery: reference values, precision and comparison with MOLLI	DZHK (German Centre for Cardiovascular Research) partner site Heidelberg/ Mannheim, Institute of Clinical Radiology and Nuclear Medicine, University Medical Center Mannheim, Medical Faculty Mannheim, Heidelberg University, University Medical Center Mannheim	Germany	Background
19	Mapping the future of cardiac MR imaging: case-based review of T1 and T2 mapping techniques	Emory University School of Medicine	null	—
20	Myocardial T1 values at 1.5 T: normal values for general electric scanners and sex-related differences	Fondazione G. Monasterio CNR-Regione Toscana, Institute of Clinical Physiology, National Research Council	Italy	Background
21	Native myocardial longitudinal (T1) relaxation time: Regional, age, and sex associations in the healthy adult heart	BHF Glasgow Cardiovascular Research Centre, University of Glasgow, Queen Elizabeth University Hospital	United Kingdom	—

No.	Citing paper	Citing institution(s)	Country	S2
22	T1 mapping: characterisation of myocardial interstitial space	Hospital Clinic, University of Barcelona	Spain	—
23	Aortic 4D flow: Quantification of signal-to-noise ratio as a function of field strength and contrast enhancement for 1.5 T, 3T, and 7T	University of Oxford Centre for Clinical Magnetic Resonance Research	United Kingdom	—
24	Social determinants of cardiovascular aging	Beth Israel Deaconess Medical Center, Johns Hopkins School of Medicine, Oregon Health and Science University	United States	—
25	Arterial spin labeling characterization of cerebral perfusion during normal maturation from late childhood into adulthood: normal 'reference range'values and their use ...	Great Ormond Street Hospital, University College London	United Kingdom	—
26	Imaging of inflammation in unexplained cardiomyopathy	Mayo Clinic, Ohio State University	United States	—

Independent citing papers only; self- and co-author citations excluded. The **S2** column carries Semantic Scholar's read of each citation — *Methodology / Result* (the citing work used the method or built on the finding — the "built on / relied upon" pattern the AAO credits), *Influential* (S2's isInfluential signal, Valenzuela et al. 2015), or *Background* (a passing mention).

Citing-text excerpts — how the field used this work

METHODOLOGY Noncontrast myocardial T1 mapping using cardiovascular magnetic resonance for iron overload

"5T in which only three were found to have a T1 of <904 msec, with none having a value <901 msec (19); and 6) there is a narrower normal range for T1 compared to T2, with normal T1 being 968 6 32 msec and T2* 31 6 4 msec in this study."*

D. Citing-Institution Prestige & Geography

Top citing institutions

Institution	Country	World ranking	Citing papers
University of Oxford	United Kingdom	SCImago #26 · THE 1 · QS 4	43
University of Mississippi Medical Center	United States	SCImago #2804	17
King's College London	United Kingdom	THE 38 · QS 31	14
Karolinska Institutet	Sweden	—	14
University College London	United Kingdom	SCImago #30	12
University of Bristol	United Kingdom	SCImago #478 · THE =80 · QS 51	10
Hannover Medical School	Germany	SCImago #964	9
Oxford Cardiovascular Clinical Research Facility	United Kingdom	—	8
University of Alberta	Canada	SCImago #262 · THE 119 · QS =94	7
Imperial College London	United Kingdom	SCImago #69 · THE 8 · QS 2	7
Siemens Healthcare	United States	—	7
Mayo Clinic	United States	SCImago #88	7

Institution	Country	World ranking	Citing papers
University of Utah	United States	SCImago #320 · THE 201–250 · QS =540	6
Oxford Centre for Clinical Magnetic Resonance Research	United Kingdom	—	6
West China Hospital, Sichuan University	P. R. China	—	6

Geographic distribution of citing authors

Country	Citing papers
United States	206
United Kingdom	143
China	95
Germany	75
Canada	52
Australia	46
Italy	42
Netherlands	35
Spain	31
Sweden	25
Brazil	20
Switzerland	20

Citing-institution prestige and the spread of citing countries speak to recognition **beyond the scholar's own institution and circle** — the dispersion the AAO looks for. World rankings (SCImago / THE / QS) are context, not a stand-alone criterion: the AAO does not treat a citing institution's rank as probative on its own.

F. AAO Precedent Considerations

Pre-filing self-check (AAO denial patterns)

The AAO non-precedent decisions reject citation evidence on a small set of recurring grounds. Confirm the petition addresses each before filing:

- ☐ Self-citations are disclosed and netted out — a Google Scholar total alone is faulted (§1.1).
- ☐ Evidence is per individual article, not a body-of-work aggregate total (§1.2).
- ☐ The petition articulates why the citations show major significance — numbers never stand alone (§1.5).
- ☐ For the strongest papers, citation content shows the work was built on / relied upon, not just listed (§1.6, §2.2).
- ☐ Co-author / collaborator citations are identified and not counted as independent (§1.7).
- ☐ Recognition is shown beyond the scholar's own institution and circle (§1.8).
- ☐ Every citation figure is snapshotted as of the filing date; post-filing citations are excluded (§1.9).
- ☐ Journal impact factor / downloads are not relied on as proxies for article significance (§1.10, §1.12).
- ☐ For large-collaboration papers, the scholar's specific role is documented (§1.13).
- ☐ Aggregate totals / h-index / field-relative rates are placed in a clearly-labelled final-merits section, per Kazarian (§3, §6.1.7).

Disclaimer

The AAO decisions referenced here are **non-precedent** — persuasive illustrations of how USCIS reasons, not binding law. This report is a drafting aid produced from public citation data; it is not legal advice and does not assess the petition's merits. All analysis must be reviewed by qualified immigration counsel.

G. Citation Evidence Index

Cross-reference of each contribution to the regulatory criterion it supports. Counsel should map these to the petition's exhibit numbers.

Contribution	Core paper	Indep. cites	Supports
Contribution 1	Preterm Heart in Adult Life: Cardiovascular Magnetic Resonance Reveals Distinct Differences in Left Ventricular Mass, Geometry, and Function	283	8 CFR 204.5(i)(3) — Outstanding Researcher
Contribution 2	Global and regional left ventricular myocardial deformation measures by magnetic resonance feature tracking in healthy volunteers: comparison with tagging and relevance of gender	102	8 CFR 204.5(i)(3) — Outstanding Researcher
Contribution 3	Normal variation of magnetic resonance T1 relaxation times in the human population at 1.5 T using ShMOLLI	26	8 CFR 204.5(i)(3) — Outstanding Researcher