

CURRICULUM VITAE

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PLACE OF BIRTH: Columbus, OH

PERSONAL STATEMENT

I am a research associate professor and physical therapist Level IV in the Department of Physical Medicine and Rehabilitation at Vanderbilt University Medical Center (VUMC) with clinical and research roles. My clinical care and research focus on lymphedema, lipedema and cancer rehabilitation while also aiding related neurology studies focused on stroke, Parkinson's disease and lymphatic functioning. Since having joined VUMC in 2011, I assisted with opening the Vanderbilt Lymphedema Clinic as the primary specialist providing clinical care in lymphedema as well as initiated research collaboration with the Vanderbilt University Institute of Imaging Science on lymphatic studies. To date, my multicenter collaborations across Vanderbilt have expanded to include Neurology, Oncology, Radiology and Vascular Medicine. My long-term career goal is help establish centers of excellence for both lymphedema and lipedema care at VUMC through supporting our clinical and research collaborations and grant funding.

EDUCATION

1994-1998	Duke University , Durham, North Carolina Biological Anthropology and Anatomy (BS), confirmed May 1998
1998-2002	Northwestern University School of Medicine , Department of Physical Therapy and Human Movement Sciences, Chicago, Illinois Doctor of Physical Therapy (DPT) transitional, confirmed July 2002 Masters of Physical Therapy (MPT), confirmed November 2000
2003- 2007	The Johns Hopkins University Carey Business School , Baltimore, Maryland Master of Business Administration (MBA) with a medical concentration, confirmed May 2007

Professional Licensure and Certification

2010-	Tennessee Physical Therapy License (8776)
2008- 2010	Health Professions Council Physiotherapy License, United Kingdom (PH84806)
2000- 2012	Maryland Physical Therapy License (20133)
2011-	The Academy of Lymphatic Studies, Chattanooga, TN Certified Lymphatic Therapist (CLT), confirmed April 2011
2015-	Lymphology Association of North America (LANA), Louisville, KY Lymphedema Therapist LANA Certification, confirmed March 2015

Academic Appointments

10/2012 – 12/2022	Research Assistant Professor in Department of Physical Medicine and Rehabilitation Vanderbilt University Medical Center, Nashville, TN
01/2023 -	Research Associate Professor in Department of Physical Medicine and Rehabilitation Vanderbilt University Medical Center, Nashville, TN

Employment (other than academic appointments)

08/2001 – 04/2002	University of Maryland-Baltimore, Department of Physical Therapy, Baltimore, Maryland Assistant Instructor for Neurology 1 Lab Course; Fall 2001 Assistant Clinical Instructor for Neurology 2 Course; April 2002
11/2000 – 01/ 2003	The Johns Hopkins Bayview Medical Center, Baltimore, Maryland
01/2003 – 01/2008	Anne Arundel Medical Center, Annapolis, Maryland Staff Physical Therapist 01/2003 – 07/2003 Lead Physical Therapist 07/2003- 01/2008 Interim Rehabilitation Services Supervisor 12/2005—5/2006
06/2008 – 12/2009	Oxford Radcliffe Hospitals NHS Trust, Oxford, England
01/2010 – 09/2010	Bayada Nurses, Anne Arundel County, Maryland
11/2010 – 01/2011	Select Specialty Hospitals, Nashville, TN
01/2011 –	Vanderbilt Dayani Center for Health and Wellness Physical Therapist Level II 01/2011 – 07/2012 Physical Therapist Level III 07/2012 – 07/2015 Physical Therapist Level IV (highest rank) 07/2015 - Current

Professional Organizations

1998-	American Physical Therapy Association (APTA)	Member
2000-2010	APTA of Maryland	Member
2008-2010	Association of Chartered Physiotherapists, United Kingdom	Member
2010-	APTA of Tennessee member	Member
2013-2019	Association of Academic Physiatrists (AAP)	Member
2013-	National Lymphedema Network	Member
2018-	American Vein and Lymphatic Society (AVLS) Congress Committee Lymphedema Chair 2020, 2021 and 2022	Member
2022-	Fat Disorders Resource Society (FDRS)	Medical Advisory Board Member
2022-	Lymphatic Education and Research Network (LE&RN) Tennessee Chapter established 2022	Member
2022-	World Lipedema Alliance (WLA) established 2021	Committee Member

Professional Activities

Intramural

2011	Clinical lead for initiating Dayani lymphedema clinical care
2012-2014	Dayani Journal Club Co-Chair
2013-2015	Dayani Leadership Team member
2013-2016	VICC Cancer Wellness Committee member
2013-2015	Dayani Research Team Committee Chair
2015-2017	PM&R Research Club member
2020-	Rehab CAP Advancement Committee member

Extramural

2017	Ad hoc reviewing for SAGE Journals
2018-2019	Association of Academic Physiatrists abstract reviewer for Physiatry 2018
2019-	United States Standard of Care Lipedema Committee member
2019-2021	Ad hoc reviewing for MDPI Journals, including JCM and IJERPH

- 2019- American Vein and Lymphatic Society Congress Lymphedema Committee Chair
- 2020- Ad hoc reviewing for Lymphatic Research & Biology Journal
- 2022- International Union of Phlebology (UIP) World Congress XX Lymphedema Program Chair for the 2023 Congress

Other Professional Activities

- 2019- PureTech Health consultant for study trial design and implementation (consultant status held during March 2021-Jan 2022 due to Principal Investigator status at VUMC site)
- 2019- Professional consultation for non VUMC lawsuits (MD, DC, VA)
- 2021- Tactile Medical consultant for lymphedema and lipedema
- 2022- Juzo consultant for lipedema
- 2023- LymphaPress consultant for lipedema and lymphedema

Professional Awards and Recognition

- 2005 Employee of the Month, Anne Arundel Medical Center, Annapolis, MD
- 2010 Employee of the Month, Bayada Nurses, Anne Arundel County, MD
- 2011 Employee of the Month, Vanderbilt Dayani Center, Nashville, TN
- 2013 Employee of the Month, Vanderbilt Dayani Center, Nashville, TN
- 2016 Best Research Award sponsored by the Lymphology Association of North America at the 2016 National lymphedema Network Conference, Dallas, TN

TEACHING ACTIVITIES

- Jan 2000- Jun 2000 Physical Therapy Care Lab Assistant for Skill Checks and Practicals for First Year PT students, Northwestern University School of Medicine, Department of Physical Therapy and Human Movement Sciences, Chicago, IL
- Fall 2001 Assistant Instructor, Neurology 1 Lab Course, University of Maryland-Baltimore, Department of Physical Therapy, Baltimore, MD
- Spring 2002 Assistant Instructor, Neurology 2 Lab Course, University of Maryland-Baltimore, Department of Physical Therapy, Baltimore, MD
- 2013-2015 Research Educational training activities facilitating Dayani in-services from VU speakers on topics related to VICTR services, Redcap, poster presentation skills, scientific public speaking presentations for staff members
- 2014-2015 In-service and hands on training to Dayani Physical Therapists on use and interpretation of U400 Impedimed Bioimpedance device for early lymphedema detection
- 2015-2016 Training Dayani PTs in the use of Microcurrent Point stimulation device for chronic pain management (includes department protocol creation).

2014-2015	In-service and hands on training to Dayani Physical Therapists on use of the Perometer for limb volume measurements (includes department protocol creation).
2017-Current	Breast Surgical Oncology Fellowship Lymphedema Education (Observation and one-on-one discussion), annual ½ day observation for the current Fellow
2017-2018	Graded Negative Pressure in-service and hands on training to Dayani and OSHER Physical therapists and massage therapists for clinical use (includes department protocol creation).
2018- Mar 2020	VUMC PM&R Residents Lymphedema Education (Observation and one-on-one discussion), ½ day with each PM&R resident during their residency, halted during COVID onset and not yet restarted
2019-Current	VUMC Vascular Medicine Fellowship Lymphedema Education (Observation and one-on-one discussion), ½ day per month with some months involving 2-3 residents and fellows (temporarily halted during COVID resuming Nov 2021)
May 2020- Jun 2020	Didactics to VUMC PM&R Residents Topic: Lymphatic System, Lymphedema and Lipedema (total 6 hours; Virtual)
Mar 1, 2021	Guest Instructor on Lymphedema for South College© Nashville PTA program, (3hrs; in person)
Jan 5, 2022	Breast Surgical Oncology Fellowship In-service on Breast Cancer Related Lymphedema, (1.5hrs; Virtual)
Apr 28-29, 2023	Motivational Interviewing Workshop provided 4 times (90-minutes workshop) at Power Lymphatics, Denver, Co, (6hrs; in person)

MENTORSHIP

Dates	Mentee	Role	VUMC Rehab CAP Advancement Level
FY2012-2013	Jeremy McNatt, ES	CAP Mentor	Level III
FY2015-2016	Cynthia Allen, PT	CAP Mentor	Level III
FY2015-2016	Katie Mingledorff, ES	CAP Mentor	Level III
FY2017-FY2018	April Williams, CES	CAP Mentor	Level III
FY2017-FY2018	Jeff Cobble, PT	CAP Mentor	Level III
FY2019-FY2020	Jadranko Franjic, PT	CAP Mentor	Level III
FY2020-FY2021	Josh Greensweig, PT	CAP Mentor	Level III
FY2021-FY2022	Kelsey McCallops, PT	CAP Mentor	Level III
FY2022-FY2023	Amy Larkin, PT	CAP Mentor	Level IV
FY2022-FY2023	Julia Russell, PT	CAP Mentor	Level III

INTERNATIONAL CONFERENCE EDUCATION DEVELOPED

- Oct 15-18, 2020 **AVLS Congress 2020** (Virtual due to pandemic). As Lymphedema Program Chair, developed **8hrs 15minutes CEU content** with 5 Lymphedema and Lipedema Therapy sessions; 28 speakers; Moderated 2 sessions
Session Topics:
-Lymphatic Imaging: Cutting Edge Concepts
-Complex Lymphedema Therapy: Vascular and Compression Considerations
-Enhancing Lymphedema Therapy through Manual Techniques
-Lipedema Treatment: Imaging and Post-Surgical Therapy Application
-Advancing Lymphedema Care in the Clinic and Community
- Oct 7-10, 2021 **AVLS Congress 2021**, Denver, CO. Brought in Co-Chair for training. As Lymphedema Program Co-Chair, developed **6hrs 30minutes CEU content** with 4 Lymphedema Therapy sessions; 9 speakers (kept numbers low for in-person attendance); Moderated 2 sessions
Session Topics:
-Outcome Measures in Lymphedema and Bioimpedance Updates
-Mindfulness Approach and Empowering Patients to Optimize Outcomes
-Genital and Pelvic Floor Considerations in Lymphedema Therapy
-Lymphatic Surgical Approaches and Therapy Application
- Oct 13-16, 2022 **AVLS Congress 2022**, New Orleans, LA. As Lymphedema Program Co-Chair, developed **7hrs 45minutes CEU content** with 4 Lymphedema and Lipedema Therapy sessions; 9 speakers; Moderating 3 sessions
Session Topics:
-Lipedema Awareness and Nutritional Guidance Updates
-Lymphedema: Empowering Patients in their Journey and Moving Lymphedema Care Forward
-Advances in Lymphatic Imaging
-Putting Evidence into Practice
-Surgical Innovations for Lymphedema and Lipedema
- Sept 17-21, 2023 *(planned)* **2023 UIP World Congress/ AVLS 37th Annual Congress 2023**, Miami, FL. As Lymphedema Program Co-Chair for the largest international vein and lymphatic medical conference bringing together 80 countries, developed **4hrs pre-conference** hands on workshop and **9hrs didactic content** with 3 Lymphedema and 2 Lipedema Therapy sessions; 22 speakers; Moderating 4 sessions
Conference Session Topics:
-Thriving with chronic disease: Addressing concepts of health and wellbeing, obesity, nutrition and active patient engagement in lymphedema and lipedema
-Key Topics in Lipedema
-Lipedema in Practice: Case Reports
-Lymphedema Surgery Updates
-Conservative Lymphedema Therapy Under Review: Tailoring therapy to best advance our patients forward

RESEARCH PROGRAM

Active Support

All dollar amounts reflect annual award direct costs only in USD, unless otherwise stated. Abbreviations: Principal Investigator (PI); Co-investigator (Co-I); National Institutes of Health (NIH); National Heart, Lung, and Blood Institute (NHLBI); National Institute of Nursing Research (NINR); National Institute of Neurological Disorders and Stroke (NINDS); American Heart Association (AHA); Vanderbilt University Institute of Imaging Science (VUIIS).

5R01 NR015079-07 (Donahue MJ)	08/01/2018 – 05/31/2024
NIH/NINR	\$2,239,226.00
<i>Imaging of Biomarkers of Lymphatic Dysfunction</i>	Role: Co-I
This work developed novel, noninvasive structural and functional MRI methods in patients with mild and moderate breast cancer-related lymphedema to test fundamental hypotheses about relationships between lymphatic compromise and imaging biomarkers that may portend disease progression and individualized therapy response.	50% effort

1R01HL155523-01 (Donahue MJ)	09/01/2020 – 08/31/2025
NIH/NIA	\$3,026,883.00
<i>Quantitative Imaging of Brain Glymphatic Functioning in Humans</i>	Role: Co-I
The goal of this work is to apply novel MRI approaches, optimized already for evaluating lymphatic circulation in patients with peripheral lymphatic dysfunction, to quantify relationships between physiological hallmarks of Alzheimer's disease and related dementias (ADRD) and CNS lymphatic function in humans.	5% effort

1R01HL155523-01 (Crescenzi RL)	09/01/2020 – 08/31/2025
NIH/NHLBI	\$2,235,516.00
<i>Imaging sodium and lymphatics in lymphedema</i>	Role: Co-I
The major goals of this project are to apply novel, noninvasive imaging tools to measure relationships between lymphatic function and tissue sodium in patients with well-characterized lymphedema. Imaging will be used to assess risk, treatment, and progression of lymphedema.	10% effort

1R01HL157378-01 (Crescenzi RL)	07/01/2021 – 06/30/2026
NIH/NHLBI	\$2,597,020.00
<i>Visualizing vascular mechanisms of lipedema</i>	

Major Goals: The overall goal of this work is to address clinical unmet needs for patients with lipedema using advanced magnetic resonance imaging (MRI) methods of vascular and molecular dysfunction, in sequence with portable clinical measures of adiposity and edema. The study will assess screening tools for lipedema, as well as evaluate therapy and possible vascular mechanisms of disease.

Role: Co-I
10% effort

Awarded Support – not issued

LYT-100-2020-01-US-02
PureTech LYT100, Inc

1/01/2022– 1/01/2023

\$158,188.00 total

Role: PI

A Phase 2a Double-Blind, Placebo-Controlled Study to Determine the Safety, Tolerability, Pharmacokinetics and Efficacy of Deupirfenidone (LYT-100) in patients with Breast Cancer-Related Upper Limb Secondary Lymphedema.

This work is a multi-center international pharmaceutical trial in Australia and the United States with overall goal to investigate the safety and tolerability of LYT-100 in the breast cancer related lymphedema patient population.

Completed Support

Undergraduate Support Grant (Cattaneo P)

Duke University

Developmental Trends of Gait Patterns Focusing on Foot Clearance in the Pediatric Population

The primary purpose of this work was to investigate gait patterns of children ages 2-8 and provide developmental information regarding foot clearance in children

Preceptor: Daniel Schmitt, PhD

Role: PI (no effort support)

09/01/1997 – 05/01/1998

\$600.00

Role: PI

Polluck Award (Cattaneo P)

Buehler Center on Aging, McGaw Medical Center, Northwestern University

Age Related Changes in Mobility and the Perception of Physical Performance Among High Functioning Older Adult Cohorts.

The primary focus of this work is to assess age-related changes in physical performance among high functioning older adults and determine whether a simple test or battery of tests can be readily used to assess physical performance among high functioning older adults.

Preceptors - Clive Yi-Chung Pai, PhD, MPT; Nora Francis, MS, PT, OTR

Role: Co-PI (no effort support)

08/01/1999 – 11/15/2000

\$1,400.00 total

Role: PI

VR8745 (Donahue P)

The Vanderbilt Institute for Clinical and Translational Research
Imaging lymphatic function in patients with breast cancer lymphedema following manual lymphatic drainage.

01/01/2014 – 07/01/2014

\$4,000.00 total

Role: PI

This work was the start of funding of non-invasive imaging in the lymphedema population and fundamental to the MRI protocol development of lymphatic imaging.

Role: PI (no effort support)

14GRNT20150004 (Strother, M)

American Heart Association
 Characterization of Regional Chemical and Vascular Uncoupling in Following Ischemic Stroke

07/01/2014 – 06/30/2016

\$550,000.00

Role: Co-I

5% effort

The focus of this work is to use novel noninvasive MRI methods to quantify tissue changes in stroke. My role as clinical investigator was to administer Fugl-Meyer sensorimotor assessment on subjects.

1R01 NS097763-01 (Donahue MJ)

NIH- NINDS
Imaging collaterals and tissue metabolism in patients with Moyamoya syndrome

09/01/2017 – 08/31/2019

\$1,200,000.00

Role: Co-I

5% effort

This work applies novel, noninvasive imaging to obtain a more comprehensive measure of tissue viability

In this at-risk stroke population and uses this information to triage patients for surgical or medical management.

1R01NR015079-01, NIH-NINR (Donahue, MJ)

NIH- NINR

20% effort

Imaging lymphatic function in patients with breast cancer related lymphedema

07/01/2016 – 06/30/2020

\$1,580,000.00

Role: Co-I

Non-invasive objective measurements quantifying lymphatic flow pre and post lymph node surgeries on routine basis for early lymphedema detection/ prevention and patient education

Multi-Center Collaborative Research Award #12 (Donahue MJ)

Lipedema Foundation
Utilizing Molecular Tissue Profiles to Improve Clinical Discriminatory Capacity in Patients with Lipedema

09/01/2017 – 08/31/2019

\$250,000total

Role: Co-I

The primary goal of this study is to understand whether excessive sodium and adipose are present systemically in patients with lipedema, or whether these molecular markers of disease affect primarily the lower extremities.

LymphaTouch Imaging Grant (Donahue, P)

07/01/2019– 12/31/2021

LymphaTouch, Inc

\$11,152.00

Imaging Biomarkers of Lymphatic Function with use of LymphaTouch

Role: PI

The primary purpose of this work is to image a patient with breast cancer related lymphedema before and after three commonly used treatments for lymphedema (manual lymphatic drainage, pneumatic compression pump and use of graded negative pressure) for a proof-of-concept case report comparison using imaging to visualize changes in noninvasive MRI lymphangiography.

2% effort

LymphaTouch Clinical Grant (Donahue, P)

07/01/2019 – 12/31/2021

LymphaTouch, Inc

\$17,331.72

Tissue Mobilization with LymphaTouch: Graded Negative Pressure

Role: PI

The primary goal of this grant was to introduce clinical care providers in the use of the tool as a component of manual treatment for pain management and tissue mobilization.

2% effort

W81XWH-19-1-0812 (Claassen D)

09/15/2019 – 09/14/2022

Department of Defense

\$1,500,000.00

Effects of Exercise of Glymphatic Functioning and Neurobehavioral Correlates in Parkinson's Disease.

Role: Co-I

5% effort

This work applies novel MRI methods for the first time in the CNS in subjects with Parkinson's disease, with and without associated mild cognitive impairment and varying levels of beta-amyloid burden. Study findings are intended to provide imaging biomarkers of CNS small blood at lymphatic vessels which can be recorded noninvasively in vivo and evaluate the relevance of these markers in beta-amyloid clearance.

PUBLICATIONS AND PRESENTATIONS

Peer-Reviewed Publications

1. Rane S, **Donahue PM**, Jordi J, Gore J, Donahue MJ.. (2012) "Noninvasive Characterization of Lymphatic Flow Velocity Using Principles of Spin Labeling". Proc of the International Society for Magnetic Resonance in Medicine, Melbourne, Australia.
2. Rane S, **Donahue PM**, Towse T, Ridner S, Chappell M, Gore J, Donahue MJ. (2013) "Measurement of Reduced Lymphatic Flow Velocity Under Conditions of Obstructed Lymphatic Flow Using Spin Labeling Approach". Proc of International Society for Magnetic Resonance in Medicine, Salt Lake City, Utah.
3. Rane S, **Donahue PM**, Towse T, Ridner S, Chappell M, Jordi J, Gore J, Donahue MJ. Clinical feasibility of noninvasive visualization of lymphatic flow with principles of spin labeling MR imaging: implications for lymphedema assessment. *Radiology*. 2013 Dec;269(3):893-902. doi: 10.1148/radiol.13120145. Epub 2013 Oct 28. PMID: 23864103; PMCID: PMC4485559.
4. Donahue MJ*, **Donahue PC***, Rane S, Thompson CR, Strother MK, Scott AO, Smith SA. Assessment of lymphatic impairment and interstitial protein accumulation in patients with breast cancer treatment-related lymphedema using CEST MRI. *Magn Reson Med*. 2016 Jan;75(1):345-55. doi: 10.1002/mrm.25649. Epub 2015 Mar 7. PMID: 25752499; PMCID: PMC4561605.
5. **Donahue PM**, Crescenzi R, Scott AO, Braxton V, Desai A, Smith SA, Jordi J, Meszoely IM, Grau AM, Kauffmann RM, Sweeting RS, Spotanski K, Ridner SH, Donahue MJ. Bilateral Changes in Deep Tissue Environment After Manual Lymphatic Drainage in Patients with Breast Cancer Treatment-Related Lymphedema. *Lymphat Res Biol*. 2017 Mar;15(1):45-56. doi: 10.1089/lrb.2016.0020. PMID: 28323572; PMCID: PMC5369395.
6. Crescenzi R*, **Donahue PMC***, Hartley KG, Desai AA, Scott AO, Braxton V, Mahany H, Lants SK, Donahue MJ. Lymphedema evaluation using noninvasive 3T MR lymphangiography. *J Magn Reson Imaging*. 2017 Nov;46(5):1349-1360. doi: 10.1002/jmri.25670. Epub 2017 Feb 28. PMID: 28245075; PMCID: PMC5573666.
7. Crescenzi R, Marton A, **Donahue PMC**, Mahany HB, Lants SK, Wang P, Beckman JA, Donahue MJ, Titze J. Tissue Sodium Content is Elevated in the Skin and Subcutaneous Adipose Tissue in Women with Lipedema. *Obesity (Silver Spring)*. 2018 Feb;26(2):310-317. doi: 10.1002/oby.22090. Epub 2017 Dec 27. PMID: 29280322; PMCID: PMC5783748.
8. Crescenzi R, **Donahue PM**, Braxton VG, Scott AO, Mahany HB, Lants SK, Donahue MJ. 3.0 T relaxation time measurements of human lymph nodes in adults with and without lymphatic insufficiency: Implications for magnetic resonance lymphatic imaging. *NMR Biomed*. 2018 Dec;31(12):e4009. doi: 10.1002/nbm.4009. Epub 2018 Oct 12. PMID: 30311705; PMCID: PMC6263822.
9. Crescenzi R, **Donahue PMC**, Weakley S, Garza M, Donahue MJ, Herbst KL. Lipedema and Dercum's Disease: A New Application of Bioimpedance. *Lymphat Res Biol*. 2019 Dec;17(6):671-679. doi: 10.1089/lrb.2019.0011. Epub 2019 Aug 13. PMID: 31408408; PMCID: PMC6919257.
10. Johnson SE, McKnight CD, Lants SK, Juttukonda MR, Fusco M, Chitale R, **Donahue PC**, Claassen DO, Donahue MJ. Choroid plexus perfusion and intracranial cerebrospinal fluid changes after

- angiogenesis. *J Cereb Blood Flow Metab.* 2020 Aug;40(8):1658-1671. doi: 10.1177/0271678X19872563. Epub 2019 Sep 9. PMID: 31500523; PMCID: PMC7370367.
11. **Donahue PMC**, Crescenzi R, Du L, Donahue MJ. Implementation of Single-Tab Electrodes for Bioimpedance Spectroscopy Measures. *Lymphat Res Biol.* 2020 Jun;18(3):277-283. doi: 10.1089/lrb.2019.0035. Epub 2019 Sep 19. PMID: 31536441; PMCID: PMC7310215.
 12. Crescenzi R, **Donahue P**, Petersen K, Garza M, Guerreso K, Luo Y, Beckman J and Donahue M. Lymphatic insufficiency observed by noninvasive MR lymphangiography and multi-nuclear ²³Na-MRI in patients with lymphedema and lipedema. *28th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), April 18-23. 2020.*
 13. Crescenzi R, **Donahue PMC**, Mahany H, Lants SK, Donahue MJ. CEST MRI quantification procedures for breast cancer treatment-related lymphedema therapy evaluation. *Magn Reson Med.* 2020 May;83(5):1760-1773. doi: 10.1002/mrm.28031. Epub 2019 Oct 21. PMID: 31631410; PMCID: PMC6982565.
 14. Crescenzi R, **Donahue PMC**, Petersen KJ, Garza M, Patel N, Lee C, Beckman JA, Donahue MJ. Upper and Lower Extremity Measurement of Tissue Sodium and Fat Content in Patients with Lipedema. *Obesity (Silver Spring).* 2020 May;28(5):907-915. doi: 10.1002/oby.22778. Epub 2020 Apr 9. PMID: 32270924; PMCID: PMC7180116.
 15. **Donahue PMC**, Crescenzi R, Lee C, Garza M, Patel NJ, Petersen KJ, Donahue MJ. Magnetic resonance imaging and bioimpedance evaluation of lymphatic abnormalities in patients with breast cancer treatment-related lymphedema. *Breast Cancer Res Treat.* 2020 Aug;183(1):83-94. doi: 10.1007/s10549-020-05765-5. Epub 2020 Jun 29. PMID: 32601969; PMCID: PMC8086787.
 16. Petersen KJ, Garza M, **Donahue PMC**, Harkins KD, Marton A, Titze J, Donahue MJ, Crescenzi R. Neuroimaging of Cerebral Blood Flow and Sodium in Women with Lipedema. *Obesity (Silver Spring).* 2020 Jul;28(7):1292-1300. doi: 10.1002/oby.22837. PMID: 32568462; PMCID: PMC7360333.
 17. Herbst KL, Kahn LA, Iker E, Ehrlich C, Wright T, McHutchison L, Schwartz J, Sleigh M, **Donahue PM**, Lissou KH, Faris T, Miller J, Lontok E, Schwartz MS, Dean SM, Bartholomew JR, Armour P, Correa-Perez M, Pennings N, Wallace EL, Larson E. Standard of care for lipedema in the United States. *Phlebology*, Published online 28May2021. doi: 10.1177/02683555211015887. PubMed PMID: 34049453.
 18. Crescenzi R, **Donahue PMC**, Garza M, Lee CA, Patel NJ, Gonzalez V, Jones RS, Donahue MJ. Elevated magnetic resonance imaging measures of adipose tissue deposition in women with breast cancer treatment-related lymphedema. *Breast Cancer Res Treat.* 2022 Jan;191(1):115-124. doi: 10.1007/s10549-021-06419-w. Epub 2021 Oct 23. PMID: 34687412; PMCID: PMC8853636.
 19. **Donahue PMC**, Crescenzi R, Petersen KJ, Garza M, Patel N, Lee C, Chen SC, Donahue MJ. Physical Therapy in Women with Early Stage Lipedema: Potential Impact of Multimodal Manual Therapy, Compression, Exercise, and Education Interventions. *Lymphat Res Biol.* 2022 Aug;20(4):382-390. doi: 10.1089/lrb.2021.0039. Epub 2021 Nov 8. PMID: 34748408; PMCID: PMC9422785.

20. Crescenzi R, **Donahue PMC**, Garza M, Patel NJ, Lee C, Guerreso K, Hall G, Luo Y, Chen SC, Herbst KL, Pridmore M, Aday AW, Beckman JA, Donahue MJ. Subcutaneous Adipose Tissue Edema in Lipedema Revealed by Noninvasive 3T MR Lymphangiography. *J Magn Reson Imaging*. 2022 Jun 3. doi: 10.1002/jmri.28281. Epub ahead of print. PMID: 35657120.
21. Chakraborty, A, Crescenzi, R, Usman, TA, Reyna, AJ, Garza, ME, Al-Ghadban, S, Herbst, KL, **Donahue, PMC**, Rutkowski, JM. Indications of Peripheral Pain, Dermal Hypersensitivity, and Neurogenic Inflammation in Patients with Lipedema. *Int. J. Mol. Sci.* 2022, 23, 10313. <https://doi.org/10.3390/ijms231810313>.
22. Crescenzi R, **Donahue PMC**, Garza M, Patel NJ, Lee C, Guerreso K, Hall G, Luo Y, Chen SC, Herbst KL, Pridmore M, Aday AW, Beckman JA, Donahue MJ. Subcutaneous Adipose Tissue Edema in Lipedema Revealed by Noninvasive 3T MR Lymphangiography. *J Magn Reson Imaging*. 2023 Feb;57(2):598-608. doi: 10.1002/jmri.28281. Epub 2022 Jun 3. PMID: 35657120; PMCID: PMC9718889.
23. **Donahue PMC**, MacKenzie A, Filipovic A, Koelmeyer L. Advances in the prevention and treatment of breast cancer-related lymphedema. *Breast Cancer Res Treat*. 2023 Apr 27. doi: 10.1007/s10549-023-06947-7. Epub ahead of print. PMID: 37103598.
24. Crescenzi R, **Donahue PC**, Aday AW, Luo Y, Donahue MJ. Response to "Comments on 'Subcutaneous Adipose Tissue Edema in Lipedema Revealed by Noninvasive 3T MR Lymphangiography'". *J Magn Reson Imaging*. 2023 Apr 6. doi: 10.1002/jmri.28720. Epub ahead of print. PMID: 37025019.
25. Taylor SL, **Donahue PMC**, Pridmore MD, Garza ME, Patel NJ, Custer CA, Luo Y, Aday AW, Beckman JA, Donahue MJ, Crescenzi RL. Semiautomated segmentation of lower extremity MRI reveals distinctive subcutaneous adipose tissue in lipedema: a pilot study. *J Med Imaging (Bellingham)*. 2023 May;10(3):036001. doi: 10.1117/1.JMI.10.3.036001. Epub 2023 May 15. PMID: 37197375; PMCID: PMC10185105.

* *Co-first authors*

Book Chapters

1. MJ Donahue, P.D., R Crescenzi, CD McKnight, *Anatomical and Functional Features of the Central Nervous System Lymphatic System in Functional Neuroradiology: Principles and Clinical Applications*. 2023: Springer International Publishing.

Conference Proceedings Publications

1. Taylor SL, **Donahue PMC**, Pridmore M, Garza ME, Patel MJ, Lee CA, Aday AW, Beckman JA, Donahue MJ, Crescenzi R. "Whole-leg chemical-shift encoded MRI analysis reveals differential subcutaneous adipose tissue accumulation in lipedema." *Proceedings of SPIE--the International Society for Optical*

Engineering. Proceedings Volume 12036, Medical Imaging 2022: Biomedical Applications in Molecular, Structural, and Functional Imaging; 120361S (2022) <https://doi.org/10.1117/12.2611240>

Peer-Reviewed Abstracts

1. **Donahue P**, Scott A, Crescenzi R, Desai A, Braxton V, Donahue M. "Quantitative Magnetic Resonance Imaging of Lymphatic Function Before and After Manual Lymphatic Drainage in Patients with Breast Cancer Treatment-Related Lymphedema." Proc. Intl. Soc. Mag. Reson. Med. 24 (2016), 2736. E-Poster.
2. Crescenzi R, **Donahue PMC**, Scott AO, Braxton AG, Mahany HB, Lants SK, Donahue MJ. "Non-invasive 3T lymphangiography using 3D velocity-suppressed T2-weighted MRI." Proc. Intl. Soc. Mag. Reson. Med. 25 (2017), 261. E-Poster.
3. Crescenzi R, **Donahue PMC**, Braxton VG, Scott AO, Donahue MJ. "Quantitative relaxation time mapping of axillary lymph nodes and recommended parameters for 3T lymphatic node substructure imaging." Proc. Intl. Soc. Mag. Reson. Med. 25 (2017), 259. Poster.
4. Crescenzi R, Marton A, **Donahue PMC**, Mahany HB, Wang P, Beckman JA, Donahue MJ, Titze J. "A novel application of quantitative sodium MRI for distinguishing lipedema from obesity." X-Nuclei Imaging Study Group ISMRM. 25 (2017), 262. E-Poster.
5. Crescenzi R, Marton A, **Donahue PMC**, Mahany HB, Wang P, Beckman JA, Donahue MJ, Titze J. "A novel application of quantitative sodium MRI for distinguishing lipedema from obesity." Proc. Intl. Soc. Mag. Reson. Med. 25 (2017), 262. E-Poster.
6. Crescenzi R, **Donahue PMD**, Mahany HB, Lants SK, Wang P, Donahue MJ. "Elevated tissue sodium and lymphatic dysfunction in patients with lipedema." Obesity Week, The Obesity Society (2018), Poster.
7. **Donahue P**, Crescenzi R, Donahue MJ. "Axillary MRI relaxometry as a tool for assessing risk of lymphedema development." 27th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), E-Poster. 2019.
8. Crescenzi R, **Donahue P**, Donahue MJ. "Axillary Chemical Exchange Saturation Transfer (CEST) MRI Possesses Contrast Consistent with Secondary Lymphedema in Breast Cancer Patients Following Lymph Node Removal." 27th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), E-Poster. 2019.
9. Petersen K, Garza M, **Donahue P**, Harkins K, Donahue MJ, Crescenzi R. "Reduced brain sodium and elevated cerebral blood flow in women with lipedema." 28th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), E-Poster. 2020.
10. Crescenzi R, **Donahue P**, Petersen K, et al. "Lymphatic insufficiency observed by noninvasive MR lymphangiography and multi-nuclear ^{23}Na -MRI in patients with lymphedema and lipedema." 28th Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Oral Presentation. 2020.
11. Taylor SL, **Donahue PMC**, Pridmore M, Garza M, Patel NJ, Lee CA, Aday AW, Beckman JA, Donahue MJ, and Crescenzi R. Whole-leg chemical shift encoded MRI analysis reveals differential subcutaneous adipose tissue accumulation in lipedema. International Society for Optics and Photonics (SPIE) Medical Imaging 2022. Poster Presentation. 2022.
12. Crescenzi R, **Donahue PMC**, Garza M, Lee CA, Patel NJ, Gonzalez V, Jones S, and Donahue MJ. Elevated magnetic resonance imaging measures of adipose tissue deposition in women with breast cancer

treatment-related lymphedema. 31st Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Poster Presentation. 2022.

13. **Donahue PMC**, Crescenzi R, Petersen K, Garza M, Patel NJ, Lee CA, Chen S-C, and Donahue MJ. Multi-nuclear MRI of tissue sodium provides novel measure of treatment response to physical therapy in women with lipedema. 31st Annual Meeting of the International Society for Magnetic Resonance in Medicine (ISMRM), Poster Presentation. 2022.

Other Non-Peer Reviewed Publications

Manual Strategies: Optimizing Patient Outcomes in the Clinic. Donahue P. Performance Health Academy, March 25, 2019. <https://www.performancehealthacademy.com/manual-strategies-optimizing-patient-outcomes-in-the-clinic.html>

Lipedema and Exercise. Donahue P. Juzo's Steps to Better Health blog, posted June 2022 for Lipedema Awareness Month. <https://www.juzousa.com/Juzo-Blog/Article/Trending-Lipedema-Exercise>

Marketing Publications

Paula Donahue has been featured in Vanderbilt news. A complete list can be found at:
<https://news.vanderbilt.edu/tag/paula-donahue/>

MRI Used as new tool in predicting lymphedema risk. Vanderbilt Reporter, Sept 12, 2013.
<https://news.vumc.org/2013/09/12/mri-used-as-new-tool-in-predicting-lymphedema-risk/>

National Lymphedema Network honors VUMC research efforts. Vanderbilt Reporter, Sept 22, 2016.
<https://news.vumc.org/2016/09/22/national-lymphedema-network-honors-vumc-research-efforts/>

Another way to detect lymphedema. Vanderbilt Reporter Oct 22, 2019.
<https://news.vumc.org/2019/10/22/another-way-detect-lymphedema/>

Advanced Tech and Teamwork Support Early Detection of Lymphedema. VUMC Discover article April, 7, 2021. <https://discover.vumc.org/2021/04/advanced-tech-and-teamwork-support-early-detection-of-lymphedema/>

Team's imaging strategy enhances lipedema treatment. VUMC Reporter Feb 9, 2023.
<https://news.vumc.org/2023/02/09/teams-imaging-strategy-enhances-lipedema-treatment/>

Invited Lectures: International

The VEINS: Lymphedema and Vein Pump Application. **Donahue P**. Las Vegas, NV at VIVA-VEINS Conference on Nov 2, 2019.

The VEINS: Lymphedema- Compression Therapy is Not Enough. **Donahue P.** Las Vegas, NV at VIVA-VEINS Conference on Nov 2, 2019.

Lymphedema and Lipedema Symposium: Practical Case Reports Panel. Dean S, Herbst K, **Donahue P**, Wright T. Las Vegas, NV at the American Vascular and Lymphatic Society Congress 2019 on Nov 9, 2019.

Lymphedema: Biophysical Agents and Cooling. **Donahue P.** Las Vegas, NV at the American Vascular and Lymphatic Society Congress 2019 on Nov 9, 2019.

Combined Use of Graded Negative Pressure with Manual Therapy. **Donahue P.** American Vein and Lymphatic Society Annual Congress (Virtual) on Oct 16, 2020.

Manual Techniques for Patient Management: Case Examples. **Donahue P.** led panel discussion. American Vein and Lymphatic Society Annual Congress (Virtual) on Oct 16, 2020.

Lipo-lymphedema Therapy. **Donahue P.** National Lymphedema Network Virtual Conference on Oct 23, 2020.

Quality of Life in Lipedema Population. **Donahue P.** along with international panel. Lipedema Italia Onlus Virtual conference on Dec 6, 2020.

Lipedema Therapy. **Donahue P.** POWER Lymphatic Virtual Symposium on Mar 5, 2021.

Lipedema Treatment Updates. **Donahue P.** Tactile Medical Platform Presentation, Virtual International Webinar on June 2, 2021.

Clinical Practices to Empower Patients and Optimize Adherence. **Donahue P.** Denver, CO at the American Vascular and Lymphatic Society Congress 2021 on Oct 7, 2021.

Updates in Lipedema Therapy. **Donahue P.** Denver, CO at the American Vascular and Lymphatic Society Congress 2021 on Oct 7, 2021.

United States Standard of Care for Lipedema Therapy. **Donahue P.** POWER Lymphatics Conference on Mar 16, 2022.

Lipedema: The International Consensus panel discussion. Panelists: Dean S, **Donahue P**, Bertsch T, and Albrecht E. POWER Lymphatics Conference on Mar 16, 2022.

Lipedema Therapy: US Standard of Care Perspective. **Donahue P.** POWER Lymphatics Symposium in Las Vegas, NV on Mar 5, 2021.

Lipedema Treatment Updates with Magnetic Resonance Imaging. **Donahue P.** New Orleans, LA at the American Vascular and Lymphatic Society Congress 2022 on Oct 15, 2022.

Motivational Interview Workshop. **Donahue P.** and Larkin A. POWER Lymphatics Symposium in Denver, CO on Apr 28 and 29, 2023. (repeated workshop training 4 times over 2 days)

Invited Lectures: National

National Lymphedema Network: Does it Measure Up? Assessing Functional Outcomes. **Donahue P**, Davies C, Franjic J. Dallas, TN on Sept 2, 2016.

News You Can Use: Physical therapy treatment interventions for Fat Disorders. **Donahue PM**. Fat Disorders Resource Society (FDRS) Conference in Baltimore, MD on Apr 13, 2019.

Clinical Skills We Can Use: Lymphatic Decongestion Treatment Interventions. **Donahue PM**. Fat Disorders Resource Society (FDRS) Conference in Baltimore, MD on Apr 14, 2019.

Physical Therapy for Persons with Lipedema. **Donahue P**. Compression Guru Webinar (presented virtual live 3 times) on May 6 and 7, 2020

Updates in Lipedema Therapy. **Donahue PM**. Fat Disorders Resource Society (FDRS) Conference in Cleveland, OH on Apr 22, 2022.

Compression garment treatment options and how to choose? A Lymphedema Therapists' Perspective. **Donahue, P**. Virtual Symposium on Management of Phlebolymphe­dema in a Venous Practice, Jun 10, 2022.

Putting it all together: Tips for Driving Patient Compliance. **Donahue, P**. Virtual Symposium on Management of Phlebolymphe­dema in a Venous Practice, Jun 10, 2022.

Effective Swelling management: Collaborating with the medical community to optimize patients' recovery following trauma or surgery. **Donahue, P**. Virtual national presentation with Q&A sponsored by LymphaPress ®, March 2, 2023.

Donahue, P (panelist) presenting at the LymphaPress ® Lipedema Round Table to discuss and answer questions live regarding lipedema symptoms and treatment. National virtual lipedema support group, June 21, 2023.

Invited Lectures: Local and Regional

Vanderbilt Physical Medicine & Rehabilitation Grand Rounds: Lymphedema Imaging Research Findings. **Donahue PM**. Nashville, TN on January 9, 2013.

Breast Cancer Rehabilitation Wellness. **Donahue PM**. Given at Kirkland Cancer Center, Jackson, TN on March 11, 2014.

Physical Therapy Following Breast Cancer Surgeries. **Donahue PM**. Vanderbilt University Medical Center Webinar given for physical therapists at Kirkland Cancer Center, Jackson, TN on March 12, 2015.

Vanderbilt Physical Medicine & Rehabilitation Grand Rounds: Potential Impact of Edema in the Patient Recovery. **Donahue PM**. Nashville, TN on July 7, 2016.

Publishing Scientific Manuscripts. **Donahue P**, Vanderbilt University Medical Center Rehabilitation Services Research Group, Nashville, TN on Sept 20, 2017.

Vanderbilt Physical Medicine & Rehabilitation Grand Rounds: Lipedema. **Donahue P**. Nashville, TN on May 8, 2019.

Vanderbilt Breast Fellows Conference. **Donahue P**. Lymphedema Management. Nashville, TN on Jan 5, 2022.

Vanderbilt Breast Fellows Conference. **Donahue P**. Breast Cancer Related Lymphedema Updates. Nashville, TN on Jan 11, 2023.

Oral Presentations at International, National and Regional Meetings

Visualization of Health and Compromised Lymphatic Systems Using Non-Invasive Magnetic Resonance Imaging (MRI), **Donahue P**. National Lymphedema Network Conference, in Washington DC, September 4, 2014.

Noninvasive Magnetic Resonance Imaging Demonstrates Changes in Tissue Composition and Interstitial Protein Accumulation in Patients with Breast Cancer-Treatment Related Lymphedema Immediately Following Manual Lymphatic Drainage, **Donahue P**. National Lymphedema Network Conference, *Shaping the Future through Commitment, Evidence and New Frontiers*, in Dallas, TX, September 3, 2016.

Poster Presentations at International, National and Regional Meetings

Donahue PM, MacKenzie A, Tomlinson C. Aquatic Exercises following Cancer Therapies. National Women's Survivorship Convention, Nashville, TN, April 2012.

Donahue PM, Coon K, Tomlinson C. Scar Adhesion Exercises. National Women's Survivorship Convention, Nashville, TN, April 2012.

Donahue PM, Smith S, Rane S, Jordi J, Towse T, Donahue MJ, Visualization of lymphatic system response to impairment using noninvasive magnetic resonance imaging. Poster Presentation at the Association of Academic Physiatrists (AAP) Conference, Nashville, TN, February 2014.

Donahue PM, Rane S, Smith S, Jordi J, Donahue MJ. Visualization of healthy and compromised lymphatic systems using noninvasive magnetic resonance imaging (MRI). Oral Poster at Spring Tennessee Physical Therapy Association (TPTA) meeting in Nashville, TN, March 2014.

Donahue PM, Rane S, Smith S, Ridner S, Jordi J, Donahue MJ. Using MRI to characterize lymphatic structure and function without exogenous contrast agents. Poster presentation at the annual International Society for Magnetic Resonance in Medicine (ISMRM) in Milan, Italy, May 2014.

Donahue PMC, Scott AO, Crescenzi R, Smith S, Ridner S, Donahue MJ. Application of Noninvasive Magnetic Resonance Imaging Methods to Evaluate Compromised Lymphatics and Personalized Lymphedema Risk. Poster presentation at NINR/NIH Symposium in Washington DC, October 13, 2015.

Donahue P, Crescenzi R, Scott AO, Ridner S, Donahue MJ. Noninvasive Magnetic Resonance Imaging Allows for Visualization of Immediate Tissue Composition Changes Following Manual Lymphatic Drainage. Poster Presentation at the Association of Academic Physiatrists (AAP) Conference, San Francisco, CA, February 2016.

Donahue PMC, Scott AO, Crescenzi R, Braxton V, Desai A, Donahue MJ. Quantitative magnetic resonance imaging of lymphatic function before and after manual lymphatic drainage in patients with breast cancer treatment-related lymphedema. E-poster at International Society for Magnetic Resonance in Medicine (ISMRM) in Singapore, May 2016.

Donahue P, Crescenzi R, Scott AO, Mahany H, Lants K, Braxton V, Donahue MJ. Noninvasive Magnetic Resonance Imaging Quantifying Internal Biomarkers of Lymphatic Function Pre and Post Manual Lymphatic Drainage. Poster Presentation at the Association of Academic Physiatrists (AAP) Conference, Las Vegas, NV, February 9, 2017.

MacKenzie A, **Donahue P**. Significant Improvement in Quality of Life after Treatment of Lower Extremity Lymphedema with Negative Pressure Application. Poster Presentation presented at the International Society of Lymphology (ISL) World Congress, Barcelona, Spain September 25, 2017.

Donahue P, Crescenzi R, Mahany H, Lants K, Hartley K, Donahue MJ. Lymphatic Vessels Visualization Using a Novel, Non-invasive Magnetic Resonance Lymphangiography Technique. Poster Presentation at the Association of Academic Physiatrists (AAP) Conference, Atlanta, GA, February 11, 2018.

Donahue PM, Crescenzi R, Donahue MJ. Axillary MRI relaxometry as a tool for assessing risk of lymphedema development. E-poster at International Society for Magnetic Resonance in Medicine (ISMRM) in Montreal, May 2019.

Donahue PM, Donahue MJ. Graded Negative Pressure: Does it have a place in the CDT treatment model?" Poster Presentation at International Lymphoedema Framework (IFL) in Chicago, IL, June 14, 2019.