OMB No. 0925-0001 and 0925-0002 (Rev. 09/17 Approved Through 03/31/2020

BIOGRAPHICAL SKETCH

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NAME: Vaccarino, Viola

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

POSITION TITLE: Professor, Department of Epidemiology and Medicine; Wilton Looney Chair of Cardiovascular Research

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

| INSTITUTION AND LOCATION | DEGREE  (if applicable) | Completion Date  MM/YYYY | FIELD OF STUDY |
| --- | --- | --- | --- |
| Milan University Medical School, Italy | M.D. | 10/1984 | Medicine |
| Yale University School of Medicine | Ph.D. | 10/1994 | Epidemiology |

# A. Personal Statement

I have training in medicine, epidemiology and nutrition, and I am a leading cardiovascular epidemiologist nationally and internationally recognized for my work on cardiovascular disease epidemiology and prevention, social, behavioral and psychological determinants of cardiovascular disease, cardiovascular health disparities and women’s health. I have contributed seminal work on the role of psychological stress, including acute mental stress, and mental health conditions, such as depression and posttraumatic stress disorder (PTSD), on cardiovascular physiology, autonomic function, myocardial perfusion, vascular function and cardiometabolic risk. My research has taken advantage of several cardiac imaging modalities, including single-photon emission tomography (SPECT) and positron emission tomography (PET), as well as brain imaging with PET. I have published over 360 research publications, and my work has been highly cited. I have been continuously funded by the NIH as a PI for almost 20 years and was also a recipient of the Established Investigator Award from the American Heart Association (AHA). My research on twins has uncovered a shared genetic vulnerability of mental health factors (depression, PTSD) with cardiovascular disease, as well as with cardiac autonomic function and inflammation, suggesting common biological substrates linking mental health conditions and cardiometabolic disorders. I have done important work in the area of women’s health. I have pioneered the discovery that women with early-onset heart disease have unique risk characteristics and my work has had a pivotal role in bringing attention to this understudied group. I have lead the concept of the importance of mind-body pathways for cardiovascular risk in women, and discovered a vulnerability of young women to the adverse cardiovascular effects of emotional stress and mental health.

I also have outstanding qualifications as a mentor and educator. Throughout my career I have been the primary mentor of 15 PhD students and 21 postdocs in addition to several junior faculty, and I was awarded a NHLBI K24 for 10 years to help support my mentoring activities. As primary mentor, I have sponsored 22 successful career development awards or fellowships, including five NIH K awards, five K12/KL2 ACTSI fellowships, five AHA scientist development grants, five NRSA F31/F32 fellowships, and five AHA predoc/postdoc fellowships. I am also the program director of a T32 training program from NHLBI for the training of predocs and postdocs in cardiovascular research aimed at addressing health inequalities. I served as the Epidemiology Department Chair at Emory for 8 years, and in addition to the Epidemiology doctoral program, I am a faculty member in the Training Program in Academic Cardiology, the Nutrition Sciences and Health Training program, the Morehouse-Emory Cardiovascular (MECA) Center for Health Equity, and the Emory University KL2-Mentored Clinical Research Scholars Program. I also serve as internal advisory board member for the Specialized Center of Research Excellence (SCORE) at Emory University. Much of my work has involved students, postdocs and junior faculty working with me, and my work has also taken advantage of strong inter-departmental and national collaborations.

# B. Positions and Honors

**Positions and Employment**

1986-1988 Fellow, Nutrition Sciences, Inst. of Pharmacological Sciences, University of Milan, Italy

1988-1993 Dottorato di Ricerca, Public Education Ministry, Rome, Italy

1994-1995 Postdoctoral fellow, Yale Univ. School of Medicine, Dept. of Epidemiology & Public Health, New Haven, CT

1995-2000 Assistant Professor, Yale Univ. School of Medicine, Dept. of Epidemiology & Public Health, New Haven, CT

2000-2006 Associate Professor with Tenure, Emory Univ. School of Medicine, Dept. of Medicine (Cardiology), Atlanta, GA

2000-2003 Research Health Scientist, Atlanta VA Medical Center, Atlanta, GA

2001-2010 Associate Prof. (joint), Rollins School of Public Health, Emory Univ., Dept. of Epidemiology, Atlanta, GA

2003-2010 Medical Director, Emory Heart Center Information Services, Atlanta, GA

2005-2010 Director, Emory Program in Cardiovascular Outcomes Research and Epidemiology, Atlanta, GA

2006-2010 Professor with Tenure, Emory School of Medicine, Dept. of Medicine (Cardiology), Atlanta, GA

2006-2010 Professor (joint), Rollins School of Public Health, Emory Univ., Dept. of Epidemiology, Atlanta, GA

2008-2009 Senior Scientist, CDC, Division of Heart Disease and Stroke Prevention

2010- Professor, Dept. of Epidemiology, Emory Univ. Rollins School of Public Health, Atlanta, GA

2010- Professor of Medicine (joint), Emory University School of Medicine, Atlanta, GA

2010-2018 Chair, Dept. of Epidemiology, Emory Univ. Rollins School of Public Health, Atlanta, GA

2013- Wilton Looney Professor and Endowed Chair in Cardiovascular Research, Emory Univ. Rollins School of Public Health, Atlanta, GA

**Other Experience and Professional Memberships**

2007 Elected member, American Epidemiological Society

2007 Fellow, American Heart Association

2008-2009 Vice Chair, National Forum for Heart Disease and Stroke Prevention, Policy Research Implementation Group

2008-2010 Associate Editor, Psychosomatic Medicine

2008-2010 Associate Editor, Circulation Cardiovascular Quality & Outcomes

2009-2010 NIH Center for Scientific Review ZHL1 CSR-R (O1), Patient Oriented Research Career Enhancement Awards study section

2009, 2012 NIH Center for Scientific Review, NIH Director’s Pioneer Award

2010 Workshop Co-Chair, NIH-ORWH “Moving Into the Future: New Dimensions and Strategies for Women’s Health Research for the National Institutes of Health”

2011-2015 Council member, American Psychosomatic Society

2011- Editorial board and guest editor, Journal of the American Heart Association

2012 Elected member, Academy of Behavioral Medicine Research

2013-2017 NIH Center for Scientific Review, Biobehavioral Mechanisms of Emotion, Stress and Health (MESH) study section member

2018- NHLBI Institutional Training Mechanism (NITM) T32 Review Panel member

**Honors**

1984 Summa Cum Laude, Milan University Medical School, Milan, Italy

1986 Nutrition Foundation of Italy fellowship award, Milan, Italy

1988 Dottorato di Ricerca fellowship award, Public Education Ministry, Rome, Italy

2002 American Heart Association Established Investigator Award

2008 Silver Pear Mentoring Award, Emory Dept. of Medicine, Atlanta, GA

2010 Woodruff Leadership Academy, Woodruff Health Sciences Center, Atlanta, GA

2013 Tracy Faber Award for Women in Imaging Science and Engineering (inaugural)

2013 Wilton Looney Endowed Chair in Cardiovascular Research (inaugural)

2016 Wenger Award for Medical Leadership, WomenHeart, The National Coalition of Women with Heart Disease

2017 Thomas F. Sellers Jr. Award (for Faculty Role Model and Mentor), Rollins SPH, Emory University, Atlanta, GA

2019 R. Wayne Alexander Mentoring Award from the Emory School of Medicine, Atlanta, GA

# C. Contribution to Science

1. **Health inequalities for cardiovascular disease (CVD) in different sociodemographic groups.** My initial work focused on sex and race-related inequities in CVD treatments and outcomes, and showed remarkable sex and race differences in important health outcomes and treatment modalities among patients with CVD. We discovered that younger women with acute myocardial infarction (MI) represent the group at highest risk of adverse outcomes compared with men. Furthermore, we have shown that young women show much slower reductions in coronary heart disease mortality than other groups since 1990, likely reflecting inadequate primary prevention.
   1. **Vaccarino V**, Parsons L, Every NR, Barron HV, Krumholz HM. (1999). Sex-based differences in early mortality after myocardial infarction. N. Engl. J. Med. 1999;341:217-225.
   2. **Vaccarino V**, Abramson JL, Veledar E, Weintraub WS. (2002). Sex differences in hospital mortality after coronary artery bypass surgery. Evidence for a higher mortality in younger women. Circulation. 2002;105:1176-1181.
   3. **Vaccarino V**, Rathore SS, Wenger NK, Frederick PD, Abramson JL, Barron HV, Manhapra A, Mallik S, Krumholz HM. (2005). Sex and racial differences in the management of acute myocardial infarction, 1994 through 2002. N. Engl. J. Med. 2005;353:671-682.
   4. Wilmot KA, O’Flaherty M, Capewell S, Ford ES, **Vaccarino V**. (2015). Coronary heart disease mortality declines in the United States from 1979 through 2011. Evidence for stagnation in young adults, especially women. Circulation, 2015 Sep 15;132(11):997-1002. PMID: PMID: 26302759
2. **Psychosocial risk factors for CVD.** In my subsequent work I came to increasingly appreciate the contribution of psychosocial and behavioral factors in the development and outcome of CVD, metabolic disorders and gender differences. My investigations in this domain included landmark contributions on the links between depression and posttraumatic stress disorder (PTSD) with CVD risk. Much of this work was based on samples drawn from the Vietnam Era Twin Registry.
   1. **Vaccarino V**, Votaw J, Faber T, Veledar E, Murrah NV, Jones LR, Zhao J, Su S, Goldberg J, Raggi JP, Quyyumi AA, Sheps DS, Bremner JD. (2009). Major depression and coronary flow reserve detected by positron emission tomography. Arch. Intern. Med. 2009;169:1668-1676.
   2. Shah AJ, Veledar E, Hong Y, Bremner JD, **Vaccarino V**. (2011). Depression and history of attempted suicide as risk factors for heart disease mortality in young individuals. Arch Gen Psychiatry. 2011;68:1135-42.
   3. Shah AJ, Lampert R, Goldberg J, Veledar E, Bremner JD, **Vaccarino V**. Posttraumatic stress disorder and impaired autonomic modulation in male twins. Biol Psychiatry. 2013 Jun 1;73(11):1103-10. PubMed PMID: 23434412; PubMed Central PMCID: PMC3648627.
   4. **Vaccarino V**, Goldberg J, Rooks C, Shah AJ, Veledar E, Faber TL, Votaw JR, Forsberg CW, Bremner JD. (2013). Post-traumatic stress disorder and incidence of coronary heart disease: a twin study. J. Am. Coll. Cardiol. 2013;62:970-978.
3. **Role of autonomic function and inflammation as pathways of CVD risk.** My work has elucidated the role of autonomic function and inflammation in the link between psychosocial factors and CVD.
   1. **Vaccarino V**, Johnson BD, Sheps DS, Reis SE, Kelsey SF, Bittner V, Rutledge T, Shaw LJ, Sopko G, Bairey Merz CN (2007). National Heart, Lung, and Blood Institute. Depression, inflammation, and incident cardiovascular disease in women with suspected coronary ischemia: the National Heart, Lung, and Blood Institute-sponsored WISE study. J Am Coll Cardiol. 2007 Nov 20;50(21):2044-50.
   2. **Vaccarino V**, Brennan ML, Miller AH, Bremner JD, Ritchie JC, Lindau F, Veledar E, Su S, Murrah NV, Jones L, Jawed F, Dai J, Goldberg J, Hazen SL. Association of major depressive disorder with serum myeloperoxidase and other markers of inflammation: A Twin Study. Biol Psychiatry. 2008;64:478-483.
   3. **Vaccarino V**, Lampert R, Bremner JD, Lee F, Su S, Maisano C, Murrah NV, Jones L, Jawed F, Afzal N, Ashraf A, Goldberg J. (2008). Depressive symptoms and heart rate variability: evidence for a shared genetic substrate in a study of twins. Psychosom Med. 2008;70(6):628-36. PubMed PMID: 18606724.
   4. Huang M, Shah A, Su S, Goldberg J, Lampert RJ, Levantsevych OM, Shallenberger L, Pimple P, Bremner JD, **Vaccarino V**. Association of depressive symptoms and heart rate variability in Vietnam War-era twins: a longitudinal twin difference study. JAMA Psychiatry. 2018 Jul 1;75(7):705-712. PubMed PMID: 29799951.
4. **Role of genetic and epigenetic factors in the interconnections among autonomic function, inflammation and CVD.** In a series of studies, we have pioneered the concept of a central role played by genetics and epigenetics in the relationship between psychosocial factors and CVD or CVD risk factors.
   1. Su S, Zhao J, Bremner JD, Miller AH, Tang W, Bouzyk M, Snieder H, Novik O, Afzal N, Goldberg J, **Vaccarino V.** (2009). Serotonin transporter gene, depressive symptoms, and interleukin-6. Circ Cardiovasc Genet. 2009 Dec;2(6):614-20. MID: 20031642; PubMed Central PMCID: PMC2802220.
   2. Su S, Lampert R, Zhao J, Bremner JD, Miller A, Snieder H, Lee F, Khan D, Goldberg J, **Vaccarino V**. (2009). Pleiotropy of C-reactive protein gene polymorphisms with C-reactive protein levels and heart rate variability in healthy male twins. Am J Cardiol. 2009 Dec 15;104(12):1748-54. PMCID: PMC2818743.
   3. Su S, Lampert R, Lee F, Bremner JD, Snieder H, Jones L, Murrah NV, Goldberg J, **Vaccarino V**. (2010). Common genes contribute to depressive symptoms and heart rate variability: the twins heart study. Twin Res Hum Genet. 2010 Feb;13(1):1-9.
   4. Zhao J, Forsberg CW, Goldberg J, Smith NL, **Vaccarino V.** (2010). MAOA promoter methylation and susceptibility to carotid atherosclerosis: role of familial factors in a monozygotic twin sample. BMC Med Genet. 2012 Nov 2;13:100. PubMed PMID: 23116433; PMCID: PMC3532355.
5. **Acute mental stress and myocardial ischemia and vascular and autonomic responses to stress.** My most recent work has used a standardized experimental manipulation with mental stress testing to examine mechanisms and prognostic importance of psychological stress. Of particular interest is the study of mental stress-induced myocardial ischemia (MSIMI), detected with myocardial perfusion imaging. We have discovered a remarkable disparity in MSIMI between women and men with coronary artery disease. We have also described the effects of acute mental stress on vascular, inflammatory and autonomic responses.
   1. **Vaccarino V,** Wilmot K, Al Mheid I, Ramadan R, Pimple P, Shah AJ, Garcia EV, Nye J, Ward L, Hammadah M, Kutner M, Long Q, Bremner JD, Esteves F, Raggi P, Quyyumi AA. (2016). Sex differences in mental stress-induced myocardial ischemia in patients with coronary heart disease. J Am Heart Assoc. 2016 Aug 24;5(9). PubMed PMID: 27559072. PMC5079026.
   2. Sullivan S, Hammadah M, Al Mheid I, Wilmot K, Ramadan R, Alkhoder A, Isakadze N, Shah A, Levantsevych O, Pimple PM, Kutner M, Ward L, Garcia EV, Nye J, Mehta PK, Lewis TT, Bremner JD, Raggi P, Quyyumi AA, **Vaccarino V.** (2018). Sex differences in hemodynamic and microvascular mechanisms of myocardial ischemia induced by mental stress. Arterioscler Thromb Vasc Biol. 2018 Feb;38(2):473-480. PMCID: PMC5785428.
   3. **Vaccarino V**, Sullivan S, Hammadah M, Wilmot K, Al Mheid I, Ramadan R, Elon L, Pimple PM, Garcia EV, Nye J, Shah AJ, Alkhoder A, Levantsevych O, Gay H, Obideen M, Huang M, Lewis TT, Bremner JD, Quyyumi AA, Raggi P. Mental Stress-Induced-Myocardial Ischemia in Young Patients With Recent Myocardial Infarction: Sex Differences and Mechanisms. Circulation. 2018 Feb 20;137(8):794-805. PMCID: PMC5822741.
   4. Lima BB, Hammadah M, Kim JH, Uphoff I, Shah A, Levantsevych O, Almuwaqqat Z, Moazzami K, Sullivan S, Ward L, Kutner M, Ko YA, Sheps DS, Bremner JD, Quyyumi AA, **Vaccarino V**. Association of transient endothelial dysfunction induced by mental stress with major adverse cardiovascular events in men and women with coronary artery disease. JAMA Cardiol. 2019 Sep 11. doi: 10.1001/jamacardio.2019.3252. PubMed PMID: 31509180; PubMed Central PMCID: PMC6739728.

**Complete List of Published Work in My Bibliography:**

[**https://www.ncbi.nlm.nih.gov/sites/myncbi/1pA3C4MiT2e5E/bibliography/42858679/public/?sort=date&direction=descending**](https://www.ncbi.nlm.nih.gov/sites/myncbi/1pA3C4MiT2e5E/bibliography/42858679/public/?sort=date&direction=descending)

**D. Research Support**

**Ongoing Research Support**

R01 HL125246 Vaccarino (PI) 07/15/15 – 04/30/20 (NCE)

NIH/NHLBI PTSD and Ischemic Heart Disease Progression: A Longitudinal Twin Study

The purpose of this project is to examine the longitudinal association between PTSD and ischemic heart disease by doing a follow up study of twins in the Vietnam Era Twin Registry 10 years after a baseline visit that involved assessments of ischemic heart disease with positron emission tomography (PET) myocardial perfusion imaging.

R01HL136205 Vaccarino (PI) 03/17/17 – 02/28/21

NIH/NHLBI Sleep Disturbance as a Mechanism for Ischemic Heart Disease in PTSD

The purpose of this project is to assess whether abnormal sleep and nighttime altered autonomic function represent interrelated biobehavioral pathways linking PTSD to ischemic heart disease using a twin design.

2R01 HL109413 Vaccarino (PI) 05/01/12 - 07/31/24

NIH/NHLBI Mental Stress and Myocardial Ischemia after MI: Sex Differences, Mechanisms and Prognosis

The purpose of the R01 renewal is to continue work on sex differences in myocardial ischemia provoked by psychological stress and identify pathways of risk linking emotional stress to myocardial ischemia and clinical outcomes in young patients with a myocardial infarction.

15SFDRN23910003 Taylor H (PI) 07/01/15 – 04/30/20 (NCE)

American Heart Association Strategically Focused Disparities Research Network Center

Cardiovascular Health Among Blacks: Risk and Resilience

The primary purpose of this project is to examine predictors of cardiovascular “resilience” among African-Americans in the metropolitan Atlanta area at the geographic, community and individual level.

R01 HL130471 Lewis (PI) 01/15/15 – 12/31/19

NIH/NHLBI Expectations of Discrimination and CVD Risk in African-American Women

The purpose of this project is to examine whether expectations of racism are linked to early CVD risk and changes in CVD risk over a 2-year follow up in a community sample of 250 healthy African-American women and 250 White controls aged 30-45.

T32 HL130025 Vaccarino (PI) 07/01/16 – 06/30/21

NIH/NHLBI Multidisciplinary Research Training to Reduce Inequities in Cardiovascular Health (METRIC) T32

This T32 training grant is designed to train the next generation of leading researchers to pioneer innovative research using a multidisciplinary approach in order to reduce cardiovascular health disparities.

R01AR070898 Lewis (PI) 09/20/16 – 08/31/21

NIH/ARMS Social stressors and atherosclerosis in African-American women with lupus.

This project will examine the impact of social stressors on the atherosclerotic process and on molecular markers of immunity and inflammation in a cohort of African American women with systemic lupus erythematosus, over a 2-year follow up.

R21DK112108 Arriola (PI) 06/19/17 – 04/30/2020

NIH/NIDDK Social stress, inflammation, and chronic kidney disease among African Americans

This proof of concept study will determine whether discriminatory stressors are an important risk factor for CKD-related physiological processes and kidney functioning among African American patients.

U01 HL146382-01 (Vaccarino Subcontract PI) 04/01/19 – 03/31/2025

Boston University/NIH

RURAL: Risk Underlying Rural Areas Longitudinal Cohort Study

The overall goal of the RURAL study is to evaluate contextual, social and environmental factors, and their interconnections with biological factors, as determinants of the high rural burden of HLBS disorders and premature mortality.

**Completed Research Grants (selected, in past 5 years)**

P01 HL 101398 Quyyumi (PI) Vaccarino )Project Leader) 09/01/10 - 11/31/16

NIH/NHLBI Mental Stress Ischemia-Prognosis and Genetic Influences

The overall objective of this PPG is to generate novel data on the causal mechanisms of mental stress ischemia (MSI), to identify new endophenotypes susceptible to MSI, to determine the clinical importance of MSI in a diverse and contemporary patient population with stable coronary artery disease.

2K24 HL077506 Vaccarino (PI) 09/01/04 - 05/31/15

NIH/NHLBI Mind-Body Interactions in Cardiovascular Disease

The objective of this grant is to foster Dr. Vaccarino’s academic career and that of beginning investigators working with her in patient-oriented research on mind-body relationships in cardiovascular disease.

R01 HL088726 Bremner (PI) 09/01/08 - 08/31/15

NIH/NHLBI Mechanisms of Depression in CVD  
The purpose of this grant is to use PET imaging of the brain and SPECT imaging of the heart to assess neural and cardiac correlates of stress and depression in patients with heart disease.