BIOGRAPHICAL SKETCH

Provide the following information for the Senior/key personnel and other significant contributors.

NAME: Khalique, Omar K.

eRA COMMONS USER NAME: OKHALIQUE

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE	MM/YY	FIELD OF STUDY
Pennsylvania State University	BS	1999-2001	Life Sciences
Jefferson Medical College	MD	2001-2005	Medicine

A. Personal Statement

I am an Assistant Professor of Medicine (in Radiology) at Columbia University, where I serve as Director of Multimodality Cardiac Imaging within the Structural Heart and Valve Center. I have completed advanced training (level III) in cardiac MRI, and am well versed in application and analysis of all imaging components in the research protocol. I have an established investigative track record concerning use of novel imaging tools for study of heart disease, as evidenced by prior publications (cited below). I am well versed in the skills needed to successfully implement imaging research protocols, having done so in the context of ongoing NIH and independently sponsored studies, as well as industry protocols. The goals of this study are:1) To examine whether there are differences in cardiac mechanics, interstitial fibrosis, and the myocardial microcirculation in women with a history of severe preeclampsia compared to postpartum women with normotension, and 2) To provide preliminary data for an R01 application examining the coronary microvasculature in women with and without a history of hypertensive disorders of pregnancy..

I will direct the CMR Analysis Center for this project and will be primarily responsible for the CMR stress protocol and will supervise one technical personnel to ensure timely and high quality quantitative analysis of CMR scans. As the director of the CMR Analysis Center, I will also oversee the acquisition of CMR images, perform quantitative analyses of CMR data, and be fully engaged with the multidisciplinary research team led by Dr. Bello and including Dr. Leb. I will actively contribute to data analysis, interpretation, and publications/dissemination. I look forward to my active engagement in this important study, and am fully committed to its success.

a) **Khalique OK,** Bello NA. Are we getting closer to the HEART of Hypertensive Heart Disease? Hypertens. 2019. *In Press.*

B. Positions and Honors

Positions

2005-2008 Residency in Internal Medicine at New York Medical College/Westchester Medical Center, Valhalla, NY
2008-2011 Fellowship in Cardiovascular Disease at New York Medical College/Westchester Medical Center, Valhalla, NY
2011-2012 Advanced Imaging Fellowship at Columbia University Medical Center
2012-2013 Instructor of Medicine and trainee in Structural Heart Imaging at Columbia Medical Center
2013- Assistant Professor of Medicine at the Columbia University Medical Center
2014- Assistant Director, Multimodality Imaging, Structural Heart and Valve Center at the Columbia University Medical Center

Honors and Awards

2007	Richard E. Lebore Award for Excellence in Teaching 3rd Year Medical Students
2011	American Federation of Medical Research – Eastern Regional Scholar
2012	American Federation of Medical Research – Eastern Regional Scholar
2012	American College of Cardiology – Fellows-in-Training Rising Star Achievement
2014	Young Author Achievement Award, JACC:Interventions, for "Quantity and Location of Aortic Valve Complex Calcification Predicts Severity and Location of Paravalvular Regurgitation and Frequency of Post-dilatation After Balloon-expandable Transcatheter Aortic Valve Replacement"

Certifications:

Cardiac Magnetic Resonance level III certification, Society of Cardiac Magnetic Resonance 2017

Cardiac Computed Tomography: board certified 12/2012

Cardiovascular Disease: board certified 11/4/2011

Nuclear Cardiology: board certified 12/19/10

Echocardiography: board certified 4/8/2011

Internal Medicine: board certified 8/15/2008

Other Experiences and Professional Memberships:
Memberships:
Fellow of the Society of Cardiovasvular Magnetic Resonance

Fellow of the American College of Cardiology

Fellow of the American Society of Echocardiography

Fellow of the Society of Cardiovascular Computed Tomography

Fellow of the Society of Cardiovasvular Magnetic Resonance

Reviewer:
Catherization and Cardiovascular Interventions
Circulation: Cardiovascular Imaging
European Heart Journal
European Journal of Cardiothoracic Surgery
Eurointervention
Journal of the American College of Cardiology: Imaging
Journal of the American College of Cardiology: Interventions
Journal of the American Society of Echocardiography
Journal of Cardiovascular Computed Tomography

C. Contributions to Science

1. I have engaged in cardiac MRI research, which has provided me with in depth experience in quantitative methods for assessment of geometric and tissue based manifestations of adverse cardiac chamber remodeling in patients with ischemic heart disease (A). More broadly, my research has examined predictors of atherosclerotic disease burden as well as prognostic outcomes in patients with CAD (B-C).

A. Srinivasan A, Kim J, **Khalique O**, Geevarghese A, Rusli M, Shah T, Di Franco A, Alakbarli J, Goldburg S, Rozenstrauch M, Devereux RB, Weinsaft JW. Echocardiographic linear fractional shortening for quantification of right ventricular systolic function – A cardiac magnetic resonance validation study. *Echocardiography*. 2017 Mar;34(3):348-358. PMID: 28247463. PMCID: PMC5352481.
B. Paradis JM, White JM, Généreux P, Urena M, Doshi D, Nazif T, Hahn R, George I, **Khalique O**, Harjai K, Lasalle L, Labbé BM, DeLarochellière R, Doyle D, Dumont É, Mohammadi S, Leon MB, Rodés-Cabau J, Kodali S. Impact of Coronary Artery Disease Severity Assessed with the SYNTAX Score on Outcomes Following Transcatheter Aortic Valve Replacement. *J Am Heart Assoc.* 2017 Feb 20;6(2). pii: e005070. PMID: 28219920.
C. **Khalique O**, Aronow WS, Ahn C, et al. Relation of moderate or severe reduction in glomerular filtration rate to number of coronary arteries narrowed >50% in patients undergoing coronary angiography for suspected coronary artery disease. *Am J Cardiol*. 2007;100(3):415-6. PMID: 17659920.

2. I have employed novel quantitative imaging methods to assess valvular regurgitation as well as heart failure associated chamber remodeling. Among patients undergoing transcatheter aortic valve replacement, my group's research has validated novel echo formulae for measurement of aortic valve orifice size (A, B). We have also shown 3D approaches to improve prediction of para-valvular aortic regurgitation (C). In addition, I have contributed to studies focused on contractile dysfunction patterns in patients with heart failure, including work that has identified distinct basal-mid ventricular hypokinesis among patients with amyloid-associated non-ischemic cardiomyopathy (D).

A. **Khalique OK**, Hamid NB, Kodali SK et al. Improving the Accuracy of Effective Orifice Area Assessment after Transcatheter Aortic Valve Replacement: Validation of Left Ventricular Outflow Tract Diameter and Pulsed-Wave Doppler Location and Impact of Three-Dimensional Measurements. *J Am Soc Echocardiogr*. 2015 Nov;28(11):1283-93. PMID: 26323890.
B. **Khalique OK**, Kodali SK, Paradis JM, Nazif TM, Williams MR, Einstein AJ, Pearson GD, Harjai K, Grubb K, George I, Leon MB, Hahn RT. Aortic annular sizing using a novel 3-dimensional echocardiographic method: use and comparison with cardiac computed tomography. *Circ Cardiovasc Imaging*. 2014 Jan 1;7(1):155-63. PMID: 24221192.
C. Hahn RT, **Khalique O**, Williams MR, Koss E, Paradis JM, Daneault B, Kirtane AJ, George I, Leon MB, Kodali S. Predicting paravalvular regurgitation following transcatheter valve replacement: utility of a novel method for three-dimensional echocardiographic measurements of the aortic annulus. *J Am Soc Echocardiogr*. 2013 Sep;26 (9):1043-52. PMID: 23998695.
D. Belkin RN, Kupersmith AC, Khalique O, Aronow WS, Chilappa K, Palaniswamy C, Rosenblum WD, Gass A, Ahmed A, and Katta US. A Novel Two-Dimensional Echocardiographic Finding in Cardiac Amyloidosis. *Echocardiography*. 2010 Nov;27 (10):1171-6. PMID: 20584062.

3. I have conducted multimodality research to test impact of methodological variability on measurement of aortic annular size, for which my research has shown conventional 3D echo approaches to undersize annular size in relation to the reference of cardiac CT (A). My CT research has also elucidated the role of aortic valve calcification as a causal substrate for paravalvular regurgitation (B). More broadly, I have engaged in outcomes based research examining prognosis in relation to aortic stenosis severity, in which data has shown aortic valve replacement to improve survival independent of pre-procedure valve gradient (C).

A. **Khalique OK,** Hamid NB, White JM, Bae DJ, Kodali SK, Nazif TM, Vahl TP, Paradis JM, George I, Leon MB, Hahn RT. Impact of Methodologic Differences in Three-Dimensional Echocardiographic Measurements of the Aortic Annulus Compared with Computed Tomographic Angiography Before Transcatheter Aortic Valve Replacement. *J Am Soc Echocardiogr*. 2017 Apr;30(4):414-421. PMID: 27939049.
B. **Khalique OK**, Hahn RT, Gada H et al. Quantity and Location of Aortic Valve Complex Calcification Predicts Severity and Location of Paravalvular Regurgitation and Frequency of Post-dilatation After Balloon expandable Transcatheter Aortic Valve Replacement. *JACC Cardiovasc Interv.* 2014 Aug; 7(8):885-94. PMID: 25147034.
C. Belkin RN, **Khalique O**, Aronow WS, Ahn C, and Sharma M. Outcomes and Survival with Aortic Valve Replacement Compared with Medical Therapy in Patients with Low-, Moderate-, and Severe-Gradient Severe Aortic Stenosis and Normal Left Ventricular Ejection Fraction. *Echocardiography*. 2011 Apr;28 (4):378-87. PMID: 21323995.

Complete List of Published Work in My Bibliography: https://www.ncbi.nlm.nih.gov/pubmed/?term=khalique+O

D. Research Support

Current Research Support

R01HL128278 (Weinsaft PI) **7/20/15 – 6/30/20**
CMR Myocardial Tissue Based Prediction of Ischemic MR Revascularization Response
The goals of this project are to use cardiac MRI and echocardiography to determine predictors of mitral regurgitation response to coronary revascularization via statistical and finite element computational modeling.
Role: Co-Investigator

UL1TR000040 Imaging Pilot
(Dr. Natalie Bello PI**)** **1/01/2020-12/31/202**0
MANIFESTATIONS OF PREECLAMPSIA IN THE HEART AND VASCULATURE
This pilot study will examine the use of stress cardiac magnetic resonance imaging (CMR) to quantify coronary microvascular dysfunction and extracellular fibrosis in women with a history of preeclampsia.
Role: Co-investigator

Completed Research Support

UL1TR001873 (Khalique PI) **7/1/2016-6/30/2017**
MYOCARDIAL TISSUE AND FUNCTIONAL CHARACTERIZATION FOR PREDICTION OF REVASCULARIZATION RESPONSE AMONG PATIENTS WITH CORONARY ARTERIAL CHRONIC TOTAL OCCLUSIONS

The major goals of this project were to determine functional response of patient undergoing revascularization of coronary arterial chronic total occlusions using cardiac magnetic resonance imaging