

Curriculum Vitae

Vivek Garg, PhD

Assistant Professor, Department of Pharmacology and Physiology
University of Maryland Baltimore

CONTACT

Department of Pharmacology & Physiology
University of Maryland Baltimore
655 W Baltimore Street, BRB 5-039
Baltimore, MD 21201
Phone: 410-706-7407

EDUCATION

- 2004 – 2009 **The Ohio State University**, Columbus, OH
Ph.D. Pharmacology
- 2000 – 2002 **Panjab University**, Chandigarh, India
M. Pharmacy (Pharmacology)
- 1995 – 1999 **Panjab University**, Chandigarh, India
B. Pharmacy

ACADEMIC POSITIONS & RESEARCH

- 2020 – present **Assistant Professor, Dept. of Pharmacology and Physiology, School of Medicine, University of Maryland Baltimore, MD**
Molecular physiology of mitochondrial ion channels and transporters, Barth syndrome, mitochondrial biology, Ca²⁺ signaling, muscle biology, cardiovascular physiology and pharmacology.
- 2017 – 2020 **Instructor**
2014 – 2017 **Associate Specialist**
Department of Physiology, University of California, San Francisco, CA
Physiology and biophysics of mitochondrial ion channels and transporters.
- 2009 – 2014 **Research Associate, University of Utah, Salt Lake City, UT**
Pathological mechanisms that lead to electrical failure during sudden cardiac death (long duration ventricular fibrillation/ischemia). Biophysics and pharmacology of cardiac voltage-gated K⁺ channels.
- 2004 – 2009 **Graduate Student, Pharmacology, The Ohio State University, Columbus, OH**
Regulation of cardiac and vascular ATP-sensitive K⁺ channels.

2001 – 2002 **Graduate Research Fellow, Pharmacology, Panjab University, India**
Inflammation and Chronic fatigue syndrome.

GRANTS & FELLOWSHIPS

- 2025 – current *Biophysics of Mitochondrial Membranes in Cardiolipin-Deficient iPSCs: Pathophysiology and Treatment of Barth Syndrome (BTHS)*
(PI: Vivek Garg) **Maryland Stem Cell Research Fund**,
This project investigates how cardiolipin deficiency, a hallmark of the inherited metabolic disorder Barth Syndrome, impacts mitochondrial ion channels and transporters, specifically the Mitochondrial Calcium Uniporter (MCU) and Adenine Nucleotide Translocase (ANT).
- 2023 – current *Molecular Physiology of Mitochondrial Calcium Uniporter (MCU)*
(PI: Vivek Garg) **National Institute of General Medical Sciences – R01**,
1R01GM145806
This project examines the gating of MCU, the principal pathway for mitochondrial Ca²⁺ entry, utilizing cutting-edge direct electrophysiological methods on the native mitochondrial membranes.
- 2017 – 2020 *Molecular Mechanisms of Mitochondrial Calcium Uptake (MCU)*
(PI: Vivek Garg) **American Heart Association – Scientist Development Grant**
Elucidated the role of regulatory subunits of mitochondrial calcium uniporter specifically MICU1-3 in channel physiology.
- 2010 – 2012 *Molecular Basis of Action of hERG Channel Activators*
(PI: Vivek Garg) **American Heart Association – Postdoctoral Fellowship**
Characterized the molecular mechanism of action and the structural basis of the binding site for ICA105574, a novel hERG1 potassium channel activator. Identified that the same hERG-activator is an inhibitor and binds to a similar site in a related channel hEAG present in the central nervous system.
- 2008 – 2009 *Popat N. Patil Fellowship for Excellence in Pharmacology*
College of Pharmacy, The Ohio State University.

SERVICE & OUTREACH

- Ad hoc journal peer reviewer:
The Journal of General Physiology, eLife, American Journal of Physiology: Heart and Circulatory Physiology, Molecular Pharmacology, Biochimica et Biophysica Acta: Molecular Basis of Disease, Journal of Physiology, PLOS One, Frontiers of Physiology.

TEACHING

Current GPLS 601, Mechanisms in Biomedical Sciences Core Course
GPLS 625, Ion Channels

GPLS 750, Topics in Molecular Medicine (Director)
GPLS-715, Muscle Cell Biology and Development
GPLS 632, Experimental Design and Quantitative Analysis for Neuroscience

2009-2012 Lab Instructor (University of Utah, Salt Lake City, Utah)
2004-2009 Teaching Assistant & Lab Instructor (The Ohio State University, Columbus, Ohio)
2002-2003 Lecturer (Physiology and Pharmacology), College of Pharmacy, India

ADMINISTRATIVE SERVICE (INSTITUTIONAL)

2023 – present Thesis Committee, Taylor Crawford, Program in Molecular Medicine
2024 – present Thesis Committee, Schuyler Brown, Program in Molecular Medicine
2023 Qualifying Exam Committee, Schuyler Brown, Program in Molecular Medicine
2023 Qualifying Exam Committee, Alexander Wiltse, Program in Neuroscience
2023 – 2024 Faculty Advisory Committee, Ria Parikh, Program in Neuroscience
2022 – 2023 Faculty Advisory Committee, Sonia Malaiya, Program in Neuroscience
2022 Qualifying Exam Committee, Daniela Fuller, Program in Molecular Medicine

HONORS & AWARDS

- Oral Presentation Award for outstanding scientific research. *NHLBI Mitochondrial Biology Symposium 2019*.
- National Biomedical Computation Resource (NBCR) Summer Institute Scholarship, University of California, San Diego, 2012.
- “Chauncey D. Leake Award for Excellence in Pharmacology” for the outstanding research manuscript written by a doctoral student in Pharmacology (College of Pharmacy at The Ohio State University) 2009.
- Outstanding Presenter Award, Dorothy M. Davis Heart & Lung Research Institute’s III Annual Research Retreat at The Ohio State University, Columbus, Ohio, 2008.
- Travel Award, Council of Basic Cardiovascular Sciences, AHA Scientific Sessions 2006, Chicago, Illinois.
- Graduate Research Fellowship, University Grants Commission 2001, Pharmacology, Panjab University, Chandigarh, India.

CONFERENCE PRESENTATIONS/ABSTRACTS (Selected)

<i>Biophysical Society Annual Meeting</i>	2020
<i>AHA Scientific Sessions</i>	2019
<i>AHA Basic Cardiovascular Sciences</i>	2019
<i>Gordon Research Conference: Mitochondria in Health and Disease</i>	2019
<i>Biophysical Society Annual Meeting</i>	2014
<i>Resuscitation Science Symposium</i>	2013
<i>Biophysical Society Annual Meeting</i>	2012
<i>Heart Rhythm Society Annual Meeting</i>	2011

<i>Biophysical Society Annual Meeting</i>	2011
<i>AHA Scientific Sessions</i>	2008
<i>Experimental Biology</i>	2008
<i>AHA Scientific Sessions</i>	2006

INVITED PRESENTATIONS

John Hopkins University, Baltimore	2021
University of Maryland, Baltimore, MD	2019
NHLBI Mitochondrial Biology Symposium, Bethesda, MD	2019
University of Missouri, Columbia, MO	2019
Novartis Institute of Biomedical Research, Boston, MA	2013
Gilead Sciences Inc., Fremont, CA	2013

SOCIETY MEMBERSHIPS

Member of American Heart Association (since 2006)
 Member of The Rho Chi Society (A Pharmaceutical Honor Society) (since 2006)
 Member of The Biophysical Society (since 2010)
 Member of Society of General Physiologists (since 2019)

PUBLICATIONS (<https://www.ncbi.nlm.nih.gov/myncbi/11MyomIM3aC/bibliography/public/>)

1. Kumari A, Nguyen DM, **Garg V**. (2023) Patch-clamp technique to study mitochondrial membrane biophysics. *J Gen Physiol*. 155 (8). doi: 10.1085/jgp.202313347. [PMID: 37347216].
2. Fefelova N, Wongjaikam S, Pamarthi SH, Siri-Angkul N, Comollo T, Kumari A, **Garg V**, Ivessa A, Chattipakorn SC, Chattipakorn N, Gwathmey JK, Xie LH. (2023) Deficiency of mitochondrial calcium uniporter abrogates iron overload-induced cardiac dysfunction by reducing ferroptosis. *Basic Res Cardiol*. 118 (1): 21. doi: 10.1007/s00395-023-00990-7. [PMID: 37227592].
3. **Garg V***, Suzuki J, Paranjpe I, Unsulangi T, Boyman L, Milescu LS, Lederer WJ, Kirichok Y*. (2021) The mechanism of MICU-dependent gating of the mitochondrial Ca²⁺ uniporter. *Elife*. 10:e69312. doi: 10.7554/eLife.69312. [PMID: 34463251]. *Corresponding authors.
4. **Garg V**, Kirichok YY. (2019) Patch-clamp analysis of the mitochondrial calcium uniporter. *Methods Mol Biol*. 1925: 75-86. (**Book Chapter**)
5. Garg P, **Garg V**, Shrestha R, Sanguinetti MC, Kamp TJ, Wu JC. (2018) Human induced pluripotent stem cell-derived cardiomyocytes as models for cardiac channelopathies: A primer for non-electrophysiologists. *Circ Res*. 123: 224-243.
6. Warren M, Sciuto KJ, Taylor TG, **Garg V**, Torres NS, Shibayama J, Spitzer KW, Zaitsev AV. (2017) Blockade of CaMKII depresses conduction preferentially in the right ventricular

outflow tract and promotes ischemic ventricular fibrillation in the rabbit heart. *Am J Physiol Heart Circ Physiol.* 312: H752-H767.

7. **Garg V**, Kirichok YY. (2016) Keeping a lid on calcium uptake. *Elife.* 5. (commentary)
8. **Garg V***, Taylor T*, Warren M, Venable P, Sciuto K, Shibayama J, Zaitsev A. (2015) β -Adrenergic stimulation and rapid pacing mutually promote heterogeneous electrical failure and ventricular fibrillation in the globally ischemic heart. *Am J Physiol Heart Circ Physiol.* 308: H1155-70. *(equal contribution).
9. Venable PW, Sciuto KJ, Warren M, Taylor TG, **Garg V**, Shibayama J, Zaitsev AV. (2015) Mitochondrial depolarization and asystole in the globally ischemic rabbit heart: coordinated response to interventions affecting energy balance. *Am J Physiol Heart Circ Physiol.* 308: H485-99.
10. Garg P, Gardner A, **Garg V**, Sanguinetti MC. (2013) Structural basis of ion permeation gating in Slo2.1 K⁺ channels. *J Gen Physiol.* 142: 523-42.
11. Taylor TG, Venable PW, Booth A, **Garg V**, Shibayama J, Zaitsev AV. (2013) Does the combination of hyperkalemia and K_{ATP} activation determine excitation rate gradient and electrical failure in the globally ischemic fibrillating heart? *Am J Physiol Heart Circ Physiol.* 305: H903-12.
12. Saegusa N, **Garg V**, Spitzer KW. (2013) Modulation of ventricular transient outward K⁺ current by acidosis and its effects on excitation-contraction coupling. *Am J Physiol Heart Circ Physiol.* 304: H1680-96.
13. **Garg V**, Stary-Weinzinger A, Sanguinetti MC. (2013) ICA-105574 interacts with a common binding site to elicit opposite effects on inactivation gating of EAG and ERG potassium channels. *Mol Pharmacol.* 83: 805-13.
14. **Garg V**, Sachse FB, Sanguinetti MC. (2012) Tuning of EAG K⁺ channel inactivation: molecular determinants of amplification by mutations and a small molecule. *J Gen Physiol.* 140: 307-24.
15. **Garg V**, Stary-Weinzinger A, Sachse F, Sanguinetti MC. (2011) Molecular determinants for activation of human ether- α -go-go-related gene 1 potassium channels by 3-nitro-n-(4-phenoxyphenyl) benzamide. *Mol Pharmacol.* 80: 630-7.
16. Dai L, **Garg V**, Sanguinetti MC. (2010) Activation of Slo2.1 channels by niflumic acid. *J Gen Physiol* 135: 275-95.
17. Zhang L, Chen CL, Kang PT, **Garg V**, Hu K, Green-Church KB, Chen YR. (2010) Peroxynitrite-mediated oxidative modifications of complex II: relevance in myocardial infarction. *Biochemistry.* 49: 2529-39.
18. **Garg V**, Sun W, Hu K. (2009) Caveolin-3 negatively regulates recombinant cardiac K_{ATP} channels. *Biochem Biophys Res Commun.* 385: 472-7.
19. **Garg V**, Jiao J, Hu K. (2009) Regulation of ATP-sensitive K⁺ channels by caveolin-enriched

microdomains in cardiac myocytes. *Cardiovasc Res.* 82: 51-8.

20. Jiao J, **Garg V**, Yang B, Elton TS, Hu K. (2008) Protein kinase C- ϵ induces caveolin-dependent internalization of vascular adenosine 5'-triphosphate-sensitive K⁺ channels. *Hypertension.* 52: 499-506.
21. Jiao JD*, **Garg V***, Yang B, Hu K. (2008) Novel functional role of heat shock protein 90 in ATP-sensitive K⁺ channel-mediated hypoxic preconditioning. *Cardiovasc Res.* 77: 126-33.
*(equal contribution).
22. **Garg V**, Hu K. (2007) Protein kinase C isoform-dependent modulation of ATP-sensitive K⁺ channels in mitochondrial inner membrane. *Am J Physiol Heart Circ Physiol.* 293: H322-32.
23. Singh A, **Garg V**, Gupta S, Kulkarni SK (2002) Role of antioxidants in chronic fatigue syndrome in mice. *Indian J Exp Biol* 40: 1240-44.