

PROMOTION RECOMMENDATION  
THE UNIVERSITY OF MICHIGAN  
MEDICAL SCHOOL  
DEPARTMENT OF INTERNAL MEDICINE  
DEPARTMENT OF HUMAN GENETICS

Santhi K. Ganesh, M.D., associate professor of internal medicine, with tenure, Department of Internal Medicine, and associate professor of human genetics, without tenure, Department of Human Genetics, Medical School, is recommended for promotion to professor of medicine, with tenure, Department of Internal Medicine, and professor of human genetics, without tenure, Department of Human Genetics, Medical School.

Academic Degrees:

M.D.	1997	Northwestern University Feinberg School of Medicine
B.A.	1993	Northwestern University

Professional Record:

2016-Present	Associate Professor, with tenure, Department of Internal Medicine, Division of Cardiovascular Medicine, University of Michigan
2016-Present	Associate Professor, without tenure, Department of Human Genetics, University of Michigan
2012-2016	Assistant Professor, Department of Human Genetics, University of Michigan
2012-2016	Adjunct Assistant Professor, Department of Medicine, Johns Hopkins School of Medicine
2010-2016	Assistant Professor, Department of Internal Medicine, Division of Cardiovascular Medicine, University of Michigan

Summary of Evaluation:

Teaching: As a physician educator, Dr. Ganesh is a dedicated mentor to a wide range of learners, from undergraduate students to junior faculty, as well as the general community of clinicians and scientists in a number of settings. In the clinical setting, she teaches medical students, residents, and fellows in the areas of general cardiology, vascular medicine, and medical genetics, and also provides didactic sessions for these groups on a variety of topics. In her research laboratory, she provides one-on-one mentoring for graduate students and post-doctoral fellows on their research projects, as well as to undergraduate students and medical students, who share similar research interests. Within the Department of Human Genetics, she serves as a mentor for the HG821/822 course in critical review of published data and seminar presentation skills and has taught the complex genetics section of the Molecular Basis of Human Genetic Disease (HG452) course. Outside of the University of Michigan, Dr. Ganesh has been actively involved in talks to patient communities through her involvement in numerous patient societies, most often associated with fibromuscular dysplasia, spontaneous coronary artery dissection, and pediatric renovascular hypertension. Dr. Ganesh is also extremely active in peer education, leading writing groups for scientific statements on the application of genetics to clinical practice, and providing lectures at many national cardiology conferences on this topic.

Research: Dr. Ganesh's research portfolio is focused on human genetics and genomics, blood pressure and hypertension, and vascular biology, focused primarily on molecular drivers of disease in arterial smooth muscle. Dr. Ganesh is actively involved in highly collaborative national and international studies investigating the genetic susceptibility to both common traits and diseases (blood pressure,

hypertension, and hematologic traits influencing cardiovascular traits) and rare vascular diseases (fibromuscular dysplasia (FMD), spontaneous coronary artery dissection (SCAD), and pediatric renovascular hypertension). For many of these consortium efforts, Dr. Ganesh has assumed international leadership positions. Under her leadership, these consortiums have grown to now include over 20 cohorts representing over 50 independent sites and over 100,000 research subjects. These collaborations have been highly productive, resulting in numerous novel discoveries of disease mechanisms and novel genetic determinants of cardiovascular traits, and resulted in several flagship publications. Dr. Ganesh's lab is also making tremendous strides in better understanding Fibromuscular dysplasia (FMD), an under-recognized and under-investigated vascular disease responsible for renovascular hypertension, stroke, and myocardial infarction that disproportionately burdens women. Her lab has generated several novel mouse lines in which they are the first to describe relevant arterial phenotypes, which represents a major advancement for the field. Dr. Ganesh has a phenomenal track record of funding with funding from the National Institutes of Health, the National Heart, Lung, and Blood Institute, the Department of Defense, a Patient-Centered Outcomes Research Institute (PCORI), and a Taubman Institute Innovation in Phenotyping Award. Dr. Ganesh has authored 93 peer-reviewed publications in top-tier journals such as *JAMA Cardiology*, the *Journal of Vascular Surgery*, and *Human Molecular Genetics*, provided over 30 published abstracts, and three book chapters. Her research expertise has been recognized by invitations to write review articles for high-profile journals in her field, including *Circulation*, *Circulation Research*, and *Vascular Medicine*. Furthermore, recognition of her expertise in the field is evident in her journal review service for industry-leading journals, including *PLoS One*, *Nature Genetics*, *Human Molecular Genetics*, *American Journal of Human Genetics*, and *Lancet*.

#### Recent and Significant Publications:

- Sun P, Kumar N, Tin A, Zhao J, Brown MR, Lin Z, Yang ML, Zheng Q, Jia J, Bielak LF, Yu B, Boerwinkle E, Hunker KL, Coresh J, Chen YE, Huo Y, Kardina SLR, Khoriaty R, Zhou X, Morrison AC, Zhang Y\*, Ganesh SK\*, (\*Co-corresponding authors) "Epidemiologic and Genetic Associations of Erythropoietin With Blood Pressure, Hypertension, and Coronary Artery Disease," *Hypertension* 78(5): 1555-1566, 2021. PM34488438/PMC8516734
- Richer J, Hill HL, Wang Y, Yang ML, Hunker KL, Lane J, Blackburn S, Coleman DM, Eliason J, Sillon G, D'Agostino MD, Jetty P, Mongeon FP, Laberge AM, Ryan SE, Fendrikova-Mahlay N, Coutinho T, Mathis MR, Zawistowski M, Hazen SL, Katz AE, Gornik HL, Brummett CM, Abecasis G, Bergin IL, Stanley JC, Li JZ, Ganesh SK\*, (\*Correspondence Author), "A Novel Recurrent *COL5A1* Genetic Variant Is Associated With a Dysplasia-Associated Arterial Disease Exhibiting Dissections and Fibromuscular Dysplasia," *Arterioscler Thromb Vasc Biol* 40(11): 2686-2699, 2020. PM32938213
- Saw J\*, Yang ML, Trinder M, Tcheandjieu C, Xu C, Starovoytov A, Birt I, Mathis MR, Hunker KL, Schmidt EM, Jackson L, Fendrikova-Mahlay N, Zawistowski M, Brummett CM, Zoellner S, Katz A, Coleman DM, Swan K, O'Donnell CJ, Million Veteran Program, Zhou X, Li JZ, Gornik HL, Assimes TL, Stanley JC, Brunham LR, Ganesh SK\*, (\*Correspondence Author), "Chromosome 1q21.2 and additional loci influence risk of spontaneous coronary artery dissection and myocardial infarction," *Nat Commun* 11(1): 4432, 2020. PM32887874/PMC7474092
- van Rooij FJ, Qayyum R, Smith AV, Zhou Y, Trompet S, Tanaka T, Keller MF, Chang LC, Schmidt H, Yang ML, Chen MH, Hayes J, Johnson AD, Yanek LR, Mueller C, Lange L, Floyd JS, Ghanbari M, Zonderman AB, Jukema JW, Hofman A, van Duijn CM, Desch KC, Saba Y, Ozel AB, Snively BM, Wu JY, Schmidt R, Fornage M, Klein RJ, Fox CS, Matsuda K, Kamatani N, Wild PS, Stott DJ, Ford I, Slagboom PE, Yang J, Chu AY, Lambert AJ, Uitterlinden AG, Franco OH, Hofer E, Ginsburg D, Hu B, Keating B, Schick UM, Brody JA, Li JZ, Chen Z, Zeller T, Guralnik JM, Chasman DI, Peters LL, Kubo M, Becker DM, Li J, Eiriksdottir G, Rotter JI, Levy D, Grossmann

V, Patel KV, Chen CH, BioBank Japan Project., Ridker PM, Tang H, Launer LJ, Rice KM, Li-Gao R, Ferrucci L, Evans MK, Choudhuri A, Trompouki E, Abraham BJ, Yang S, Takahashi A, Kamatani Y, Kooperberg C, Harris TB, Jee SH, Coresh J, Tsai FJ, Longo DL, Chen YT, Felix JF, Yang Q, Psaty BM, Boerwinkle E, Becker LC, Mook-Kanamori DO, Wilson JG, Gudnason V, O'Donnell CJ, Dehghan A, Cupples LA, Nalls MA, Morris AP, Okada Y, Reiner AP, Zon LI, Ganesh SK\*, (\*Correspondence Author), "Genome-wide Trans-ethnic Meta-analysis Identifies Seven Genetic Loci Influencing Erythrocyte Traits and a Role for RBPMS in Erythropoiesis," *Am J Hum Genet* 100 (1): 51-63, 2017. PM28017375/PMC5223059

Pankratz N, Schick UM, Zhou Y, Zhou W, Ahluwalia TS, Allende ML, Auer PL, Bork-Jensen J, Brody JA, Chen MH, Clavo V, Eicher JD, Grarup N, Hagedorn EJ, Hu B, Hunker K, Johnson AD, Leusink M, Lu Y, Lyytikäinen LP, Manichaikul A, Marioni RE, Nalls MA, Pazoki R, Smith AV, van Rooij FJ, Yang ML, Zhang X, Zhang Y, Asselbergs FW, Boerwinkle E, Borecki IB, Bottinger EP, Cushman M, de Bakker PI, Deary IJ, Dong L, Feitosa MF, Floyd JS, Franceschini N, Franco OH, Garcia ME, Grove ML, Gudnason V, Hansen T, Harris TB, Hofman A, Jackson RD, Jia J, Kähönen M, Launer LJ, Lehtimäki T, Liewald DC, Linneberg A, Liu Y, Loos RJ, Nguyen VM, Numans ME, Pedersen O, Psaty BM, Raitakari OT, Rich SS, Rivadeneira F, Di Sant AM, Rotter JI, Starr JM, Taylor KD, Thuesen BH, Tracy RP, Uitterlinden AG, Wang J, Wang J, Dehghan A, Huo Y, Cupples LA, Wilson JG, Proia RL, Zon LI, O'Donnell CJ, Reiner AP, Ganesh SK, "Meta-analysis of rare and common exome chip variants identifies S1PR4 and other loci influencing blood cell traits," *Nat Genet* 48(8): 867-76, 2016. PM27399967/PMC5145000

Service: Dr. Ganesh is an excellent clinician who provides patient care as an attending physician and in the clinic, with a focus on caring for patients with vascular and genetic diseases. In addition to her clinical schedule and robust research endeavors, Dr. Ganesh is extremely active in service at the University of Michigan and beyond. Institutionally, Dr. Ganesh is the director of the Michigan Biological Research Initiative for Sex-Differences in Cardiovascular disease (M-BRISC), a newly formed initiative at the UM Frankel Cardiovascular Center. M-BRISC aims to foster research in the area of sex-differences research as it pertains to the mechanistic understanding of cardiovascular diseases. Under Dr. Ganesh's leadership, the program has successfully increased recruitment, hypothesis-driven research in several laboratories through a grant program funded by M-BRISC, and interdisciplinary interactions through regularly occurring seminar series and symposia. Dr. Ganesh also serves numerous internal committees, most include the review of internal grants and the interviewing of trainees, particularly those pursuing a physician-scientist track, as well as the Department of Internal Medicine's Space Committee for laboratory space allocations. Nationally, Dr. Ganesh is a standing member of the NHBI Mentored Transition to Independence (MTI) study section and has served on grant review committees for the American Heart Association and Doris Duke Charitable Foundation (ad hoc). She has also served on the American Heart Association (AHA) Functional Genomics and Translational Biology Council's leadership committee.

External Reviewers:

Reviewer A: "Other outstanding aspects of her CV are ample NIH grant funding, election to membership in the ASCI, and service as Associate Editor for JCI Insight. It would be important for me to point out that it might seem odd to a promotions committee that many of the publications include her as a middle author. However, this is quite accepted for genomics work, and there are many other publications for which she is first, co-senior or senior author. She also has ample first author and senior author papers in the form of review articles, editorials, and book chapters.."

Reviewer B: "Without a doubt Dr Ganesh's contribution to cardiovascular and genomic science are outstanding...Her scholarship is outstanding, as is evident from her curriculum vitae, and it is of high

impact at a national level. Dr Ganesh is recognized as an experienced and valuable contributor multiple capacities.”

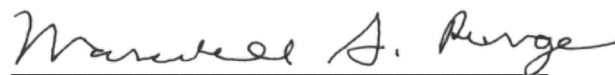
Reviewer C: “Dr. Ganesh’s teaching skills have been robust...she began mentoring Undergraduate Students, Post-Doctoral Fellows, Medical Students Graduate Students, Faculty Members and Clinical Fellows. In total she has mentored 44 candidates and currently mentors 17 of them. She began her Teaching Activities in 2006 and has taught over 35 sessions at the National and Intuitional level.”

Reviewer D: “...she is one of the world’s experts on the genetics of fibromuscular dysplasia and has published several landmark studies on this disorder. For example, her publication in Nature Communications in 2021 was the product of a major international effort on the genetics of fibromuscular dysplasia which and led to novel insights in the biology of this disorder. I am especially struck by her productivity since her promotion to Associate Professor in 2016, which if anything has accelerated over the last few years. The overall impact of her body of work is quite high, and she is clearly recognized as an international leader in the field.”

Reviewer E: “Dr. Ganesh plays important service roles locally and nationally. She has mentored students and trainees at every level, from undergraduates to junior faculty. She has served on study sections for the NIH and Doris Duke Foundation. Dr. Ganesh has lectured locally, nationally and has mulitple visiting professorships at leading academic centers.”

Summary of Recommendation:

Dr. Ganesh is nationally and internationally recognized for her contributions to the field of the genetics of vascular disease. She is also a dedicated educator and clinician who provides substantial service at the institutional and national levels. Therefore, I most enthusiastically recommend Santhi K. Ganesh, M.D. for promotion to professor of internal medicine, with tenure, Department of Internal Medicine, and professor of human genetics, without tenure, Department of Human Genetics, Medical School.



Marschall S. Runge, M.D., Ph.D.  
Executive Vice President for Medical Affairs  
Dean, Medical School

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