Guizhen Zhao, Ph.D.

Assistant Professor
Department of Pharmacological and Pharmaceutical Sciences
Collage of Pharmacy, University of Houston
Health and Biomedical Sciences Building 2, Room 5021
4349 Martin Luther King Boulevard
Houston, TX 77204-5037
Email: gzhao3@central.uh.edu ; gzhao4@uh.edu
Phone: 734-353-3409

I. EDUCATION AND TRAINING

04/2018-01/2023	Postdoctoral Fellow Mentor: Dr. Y. Eugene Chen University of Michigan Medical School, Ann Arbor, Michigan, USA
09/2014-01/2018	Ph.D. in Human Physiology Mentor: Dr. Wei Kong Peking University Health Science Center, Beijing, China
09/2009-07/2014	Bachelor in Basic Medicine Peking University Health Science Center, Beijing, China

II. ACADEMIC APPOINTMENTS

07/2024-	Assistant Professor Department of Pharmacological and Pharmaceutical Sciences, University of Houston, Houston, Texas, USA
02/2023-06/24	Research Investigator Division of Cardiovascular Medicine, Department of Cardiology University of Michigan Medical School, Ann Arbor, Michigan, USA

III. GRANT SUPPORT

Active Research Support

NIH R01HL172832-01 (NHBLI, G. Zhao, PI) 04/01/2024-02/28/2029
Metaboloepigenetics and Atherosclerosis

AHA Career Development Award
AHA-936135 (G. Zhao, PI) 01/01/2023-12/31/2025
The Role of BAF60c in Atherosclerosis

Pending

NIH R01HL174488 (NHBLI, G. Zhao, PI)
Epigenetic Regulation of Endothelial Function and Abdominal Aortic Aneurysm

Previous Research Support

NIH K99/R00 (NHBLI, G. Zhao, PI) 04/01/2023-03/31/2028

K99HL163415 (G. Zhao, PI)
Epigenetic Mechanisms of Atherosclerosis (resigned to avoid overlap)

AHA Postdoctoral Fellowship
AHA-20POST35110064 (G. Zhao, PI/Y.E. Chen, Mentor) 01/01/2020-12/31/2021
The Role of Krüppel Like Factor 11 in Abdominal Aortic Aneurysm

IV. TEACHING & MENTORING

Mentoring

Graduate Students

Yang Zhao 08/2019-12/2022 Department of Pharmacology, University of Michigan

Hongyu Liu 01/2022-current Department of Pharmacology, University of Michigan

Benjamin Li 10/2022-03/2023 Department of Molecular & Integrative Physiology, University of Michigan

Visiting Graduate Students

Yaozhong Liu 01/2022-Current

Yongjie Deng 07/2022-curent

Summer Students

Jiaang Li 07/2022-08/2022

V. HONORS AND AWARDS

2023-2025 American Heart Association Career Development Award
2021-2022 American Heart Association Postdoctoral Fellowship
2019 Young Investigator Award, The Metabolic Cardiovascular Disease Symposium, American Heart Association's ATVB-CAAC Scientific Sessions
2018 Excellent Graduates in Beijing Municipality
2018 Perking University Excellent Doctoral Dissertation Award
2018 Peking University Excellent Graduate Award
2016-2017 Peking University Postgraduate Student First-Class Scholarship
2016-2017 Peking University Merit Student Award
2015-2016 Peking University First Class Scholarship
2015-2016 Perking University Postgraduate Student Second-Class Scholarship
2014-2015 Perking University Postgraduate Student Second-Class Scholarship

VI. PROFESSIONAL SERVICE & AFFILIATIONS

Editorial Board

2022-present *Frontiers in Immunology*, Review Editor

2022-present *Frontiers in Cardiovascular Medicine*, Review Editor

Journal Paper Reviewer

2024-present *International Journal of Molecular Sciences*

2023-present *Journal of Cellular and Molecular Medicine*
2022-present *JCI Insight*
2022-present *Frontiers in Immunology*
2022-present *Frontiers in Cardiovascular Medicine*
2022-present *The Journal of Cardiovascular Pharmacology*
2022-present *International Immunopharmacology*
2022-present *Frontiers in Pharmacology*
2022-present *Mammalian Genome*
2021-present *Cardiovascular Drugs Ther*
2021 *JoVE*, Guest Editor

Professional Membership

2022-present Early Career Member, American Heart Association
2018-2022 Trainee Member, American Heart Association
2015-2017 Member, Chinese Association for Physiological Sciences

VII. PERSONAL STATEMENT

My research focuses on elucidating the metabolic and epigenetic ('metaboloepigenetic') properties of vascular cells in cardiovascular diseases (CVD) and exploring potential drug targets. I have made noteworthy contributions to the field, including using single cell RNA-sequencing technology to, for the first time, reveal the vascular cell heterogeneity in abdominal aortic aneurysm (AAA), which was highlighted with a commentary in the *Cardiovasc Res*. In my recent studies published in JCI and ATVB, I have provided a deeper understanding of the epigenetic mechanisms underlying CVD, specifically AAA. These findings suggest the potential of using epigenetic therapeutics for vascular diseases. Additionally, I have generated a novel inducible Myh11-CreER$^{T2\text{-}P2A}$ knock-in mouse model [publication (2) below], enabling precise gene knockout in vascular smooth muscle cells in both male and female mice. I have also pioneered the use of advanced spatial transcriptomic technologies, namely Seq-Scope and MERFISH, in vascular research. My work has not only established robust methodologies but also demonstrated the feasibility of these techniques in unraveling the spatial cell ontology associated with vascular diseases, both in human and mouse model. My laboratory has made extensive use of animal models, genetic and epigenetic approaches, including bulk RNA-seq, single cell RNA-seq, chromatin accessibility profiling by ChIP-seq and ATAC-seq, spatial transcriptomics and metabolomics. With these interdisciplinary approaches, I am confident in unraveling the complex interactions of cells within local environment, shedding light on the metaboloepigenetic intricacies that drive CVD progression, and establishing cross-disciplinary collaborations in the cardiometabolic field at large.

VIII. PUBLICATIONS

1. Liu H, Zhao Y, **Zhao G**, Deng Y, Chen YE, Zhang J.SWI/SNF Complex in Vascular Smooth Muscle Cells and Its Implications in Cardiovascular Pathologies. **Cells**. 2024 Jan 16;13(1):168.
2. Zhao Y$^{\#}$, **Zhao G**$^{\#}$(**co-first**), Chang Z$^{\#}$, Zhu T, Lu H, Xue C, Garcia-Barrio MT, Chang L, Guo Y, Saunders TL., Zhang J, Chen YE. Generating endogenous Myh11-deriven Cre

Mice for Sex-independent and Controllable Gene Deletion in Smooth Muscle Cells. ***JCI Insight***. 2023 Jul 24;8(14):e171661. PMID:37289544

3. Mizrak D, Zhao Y, Feng H, Macaulay J, Tang Y, Sultan Z, **Zhao G**, Guo Y, Zhang J, Yang B, Chen YE. Single-Molecule Spatial Transcriptomics of Human Thoracic Aortic Aneurysms Uncovers Calcification-Related CARTPT-Expressing Smooth Muscle Cells. ***Arterioscler Thromb Vasc Biol.*** 2023 Oct 12.

4. Zhao Y, Liu YH, **Zhao G**, Lu H, Liu Y, Xue C, Chang Z, Liu H, Deng Y, Liang W, Wang H, Rom O, Garcia-Barrio MT, Zhu T, Guo Y, Chang L, Lin J, Chen YE, Zhang J**.** Myeloid BAF60a deficiency alters metabolic homeostasis and exacerbates atherosclerosis. ***Cell Rep***. 2023 Sep 26;42(10):113171. PMID: 37768825.

5. Wang Z, Zhao X, **Zhao G**, Guo Y, Lu H, Mu W, Zhong J, Garcia-Barrio MT, Zhang J, Chen YE, Chang L. PRDM16 Deficiency in Vascular Smooth muscle Cells Aggravates Abdominal Aortic Aneurysm. ***JCI Insight***. 2023 Apr 20;e167041. PMID: 37079380.

6. **Zhao G**, Zhao Y, Lu H, Chang Z, Wang H, Liang W, Liu Y, Zhu T, Guo Y, Chang L, Yang B, Garcia-Barrio MT, Lin JD, Zhang J, Chen YE. BAF60c prevents abdominal aortic aneurysm through epigenetic control of vascular smooth muscle cell homeostasis. ***J Clin Invest***. 2022 Nov 1;132(21):e158309. PMID:26066968

7. Xue C, **Zhao G**, Zhao Y, Chen YE, Zhang J. Mouse Abdominal Aortic Aneurysm Model Induced by Perivascular Application of Elastase. ***J Vis Exp.*** 2022 Feb 11;(180). PMID: 35225256.

8. **Zhao G**, Lu H, Chang Z, Zhao Y, Zhu T, Chang L, Guo Y, Garcia-Barrio MT, Chen YE, Zhang J. Single-cell RNA sequencing reveals the cellular heterogeneity of aneurysmal infrarenal abdominal aorta. ***Cardiovasc Res.*** 2021 Apr 23;117(5):1402-1416. PMID: 32678909.

9. **Zhao G**, Chang Z, Zhao Y, Guo Y, Lu H, Liang W, Rom O, Wang H, Sun J, Zhu T, Fan Y, Chang L, Yang B, Garcia-Barrio MT, Chen YE, Zhang J. KLF11 protects against abdominal aortic aneurysm through inhibition of endothelial cell dysfunction. ***JCI Insight.*** 2021 Mar 8;6(5). PMID: 33507881.

10. **Zhao G**, Lu H, Liu Y, Zhao Y, Zhu T, Garcia-Barrio MT, Chen YE, Zhang J. Single-Cell Transcriptomics Reveals Endothelial Plasticity During Diabetic Atherogenesis. ***Front Cell Dev Biol.*** 2021;9:689469. PMID: 34095155.

11. Mao C, Ma Z, Jia Y, Li W, Xie N, **Zhao G**, Ma B, Yu F, Sun J, Zhou Y, Cui Q, Fu Y, Kong W. Nidogen-2 Maintains the Contractile Phenotype of Vascular Smooth Muscle Cells and Prevents Neointima Formation via Bridging Jagged1-Notch3 Signaling. ***Circulation***. 2021 Oct 12;144(15):1244-1261. PMID: 34315224.

12. Zhao Y, Chang Z, **Zhao G**, Lu H, Xiong W, Liang W, Wang H, Villacorta L, Garcia-Barrio MT, Zhu T, Guo Y, Fan Y, Chang L, Schopfer FJ, Freeman BA, Zhang J, Chen YE. Suppression of Vascular Macrophage Activation by Nitro-Oleic Acid and its Implication for Abdominal Aortic Aneurysm Therapy. ***Cardiovasc Drugs Ther.*** 2021 Oct;35(5):939-951. PMID: 32671602

13. Liang W, Lu H, Sun J, **Zhao G**, Wang H, Guo Y, Eitzman D, Chen YE, Fan Y, Zhang J. KLF11 Protects against Venous Thrombosis via Suppressing Tissue Factor Expression. ***Thromb Haemost.*** 2021 Aug 24. PMID: 34428834.

14. Liu Y, Zhao Y, Shukha Y, Lu H, Wang L, Liu Z, Liu C, Zhao Y, Wang H, **Zhao G**, Liang W, Fan Y, Chang L, Yurdagul A Jr, Pattillo CB, Orr AW, Aviram M, Wen B, Garcia-Barrio MT, Zhang J, Liu W, Sun D, Hayek T, Chen YE, Rom O. Dysregulated oxalate metabolism is a driver and therapeutic target in atherosclerosis. ***Cell Rep.*** 2021 Jul 27;36(4):109420. PMID: 34320345.

15. Fu Y, Huang Y, Yang Z, Chen Y, Zheng J, Mao C, Li Z, Liu Z, Yu B, Li T, Wang M, Xu C, Zhou Y, **Zhao G**, Jia Y, Guo W, Jia X, Zhang T, Li L, Liu Z, Guo S, Ma M, Zhang H, Liu B, Du J, Wang W, Tang C, Gao P, Xu Q, Wang X, Liu J, Sun J, Kong W. Cartilage oligomeric matrix protein is an endogenous β-arrestin-2-selective allosteric modulator of AT1 receptor counteracting vascular injury. ***Cell Res.*** 2021 Jul;31(7):773-790. PMID: 33510386.

16. Sun J, Lu H, Liang W, **Zhao G**, Ren L, Hu D, Chang Z, Liu Y, Garcia-Barrio MT, Zhang J, Chen YE, Fan Y. Endothelial TFEB (Transcription Factor EB) Improves Glucose Tolerance via Upregulation of IRS (Insulin Receptor Substrate) 1 and IRS2. ***Arterioscler Thromb Vasc Biol.*** 2021 Feb;41(2):783-795. PMID: 33297755.

17. Rom O, Liu Y, Liu Z, Zhao Y, Wu J, Ghrayeb A, Villacorta L, Fan Y, Chang L, Wang L, Liu C, Yang D, Song J, Rech JC, Guo Y, Wang H, **Zhao G**, Liang W, Koike Y, Lu H, Koike T, Hayek T, Pennathur S, Xi C, Wen B, Sun D, Garcia-Barrio MT, Aviram M, Gottlieb E, Mor I, Liu W, Zhang J, Chen YE. Glycine-based treatment ameliorates NAFLD by modulating fatty acid oxidation, glutathione synthesis, and the gut microbiome. ***Sci Transl Med.*** 2020 Dec 2;12(572). PMID: 33268508.

18. Chang Z, **Zhao G** (**co-first**), Zhao Y, Lu H, Xiong W, Liang W, Sun J, Wang H, Zhu T, Rom O, Guo Y, Fan Y, Chang L, Yang B, Garcia-Barrio MT, Lin JD, Chen YE, Zhang J. BAF60a Deficiency in Vascular Smooth Muscle Cells Prevents Abdominal Aortic Aneurysm by Reducing Inflammation and Extracellular Matrix Degradation. ***Arterioscler Thromb Vasc Biol.*** 2020 Oct;40(10):2494-2507. PMID: 32787523.

19. Lu H, Sun J, Liang W, Chang Z, Rom O, Zhao Y, **Zhao G**, Xiong W, Wang H, Zhu T, Guo Y, Chang L, Garcia-Barrio MT, Zhang J, Chen YE, Fan Y. Cyclodextrin Prevents Abdominal Aortic Aneurysm via Activation of Vascular Smooth Muscle Cell Transcription Factor EB. ***Circulation***. 2020 Aug 4;142(5):483-498. PMID: 32354235.

20. Zhou B, Li W, **Zhao G**, Yu B, Ma B, Liu Z, Xie N, Fu Y, Gong Z, Dai R, Zhang X, Kong W. Rapamycin prevents thoracic aortic aneurysm and dissection in mice. **J *Vasc Surg.*** 2019 Mar;69(3):921-932.e3. PMID: 30253896.

21. Wang S, Liu Y, **Zhao G**, He L, Fu Y, Yu C, Wang Z, Zhao T, Cao F, Gao Y, Kong W, Zheng J. Postnatal deficiency of ADAMTS1 ameliorates thoracic aortic aneurysm and dissection in mice. ***Exp Physiol.*** 2018 Dec;103(12):1717-1731. PMID: 30191627.

22. Ma B, Yao F, Xie N, Mao C, Liu F, Gong Z, **Zhao G**, Liu Z, Cai Z, Yu F, Dai R, Chen Z, Wang L, Xu Q, Kong W, Fu Y. Cartilage oligomeric matrix protein is a novel notch ligand driving embryonic stem cell differentiation towards the smooth muscle lineage. ***J Mol Cell Cardiol.*** 2018 Aug;121:69-80. PMID: 29981303.

23. Wang Y, Chen D, Zhang Y, Wang P, Zheng C, Zhang S, Yu B, Zhang L, **Zhao G**, Ma B, Cai Z, Xie N, Huang S, Liu Z, Mo X, Guan Y, Wang X, Fu Y, Ma D, Wang Y, Kong W. Novel Adipokine, FAM19A5, Inhibits Neointima Formation After Injury Through Sphingosine-1-Phosphate Receptor 2. ***Circulation.*** 2018 Jul 3;138(1):48-63. PMID: 29453251.

24. **Zhao G**, Fu Y, Cai Z, Yu F, Gong Z, Dai R, Hu Y, Zeng L, Xu Q, Kong W. Unspliced XBP1 Confers VSMC Homeostasis and Prevents Aortic Aneurysm Formation via FoxO4 Interaction. ***Circ Res.*** 2017 Dec 8;121(12):1331-1345. PMID: 29089350.

Manuscripts in preparation

1. **Zhao G**, Zhao Y, Lu H, Chang Z, Liang W, Zhu T, Garcia-Barrio MT, Chang L, Guo Y, Zhang J, Chen YE. Endothelial KLF11 is novel endogenous protectant against diabetic atherosclerosis. ***Cardiovascular Diabetology***. Reference CVR-2023-1561. (In revision)

2. **Zhao G**[#], Cho CS[#], Liu H, Deng Y, Zhao Y, Xue C, Guo Y, Chang L, Mizrak D, Yang B, Kang H, Zhang J, Lee JH, Chen YE. Unraveling the Cellular Landscape of Abdominal Aortic Aneurysm Using High-Resolution Spatial Transcriptomics: Role of GPNMB-Expressing Macrophages. ***ATVB***. Reference: ATVB/2023/319437. (In revision).

3. Lu H, Fan Y, Liu Y, Zhang C, Wang H, Sun J, **Zhao G**, Zhu W, Zhao Y, Guo Y, Chang L, Xue C, Liang W, Zhu T, Zhang J, Chen YE. Macrophage Tfeb knockout promotes white adipose tissue dysfunction and Insulin resistance in obese mice. ***JCI Insight***. Reference 164467-INS-RG-1. (In revision)

IX. Abstracts/Poster Presentations

1. **Zhao G**, Zhao Y, Zhu T, Zhang J and Chen YE. Endothelial KLF11 is a novel endogenous protectant against diabetic atherosclerosis. American Heart Association's annual Scientific Sessions 2023, Abstract 16881. **Moderated Poster**, Philadelphia, PA, Nov 13, 2023.

2. **Zhao G**, Zhao, Y, Lu H, Chang Z, Zhu T, Zhang J and Chen YE. BAF60c Prevents Abdominal Aortic Aneurysm Formation through Maintaining Vascular Smooth Muscle Cell Homeostasis. American Heart Association Annual Meeting, Vascular Discovery: From Genes to Medicine 2021, Abstract 129. **Pre-recorded podium presentation**, Online, September 22-24, 2021.

3. Zhao Y, Liu Y, **Zhao G**, Lu H, Chang Z, Xue C, Chen YE and Zhang J. Macrophage Chromatin Remodeling Complex Subunit Baf60a in Atherosclerosis. American Heart Association Annual Meeting, Vascular Discovery: From Genes to Medicine 2021. Abstract MP42, September 22-24, 2021.

4. **Zhao G**, Chang Z, Zhao Y, Lu H, Liang W, Zhu T, Zhang J and Chen E. Endothelial Kruppel Like Factor 11 Inhibits Abdominal Aortic Aneurysm. American Heart Association Annual Meeting, Vascular Discovery: From Genes to Medicine 2021. **Poster**, Boston, MA, May 14-16, 2019.

5. **Zhao G**. Endothelial KLF11 Inhibits Abdominal Aortic Aneurysm. The 6th Metabolic Cardiovascular Diseases Symposium (MCDS), a satellite meeting of the American Heart Association's Vascular Discovery Scientific Sessions. **Podium presentation**, Boston, MA, May 13, 2019. **2th place Young Investigator Award**

6. **Zhao G**, Fu Y, Xu Q and Kong W. Unspliced XBP1 prevents abdominal aortic aneurysm via regulating VSMC phenotypic swiching. 2016 International Conference of Physiological Sciences. **Podium presentation**, Beijing, China, September 26-28, 2016. **Excellent Report Award**

7. **Zhao G**, Xu Q and Kong W. Unspliced XBP1 confers VSMC homeostasis and prevents aortic aneurysm formation via FoxO4 interaction. The 1th National Matrix Biology Academic Conference. **Poster**, Beijing, China, March 18-20, 2016. **2th place Poster Award**

X. INVITED TALKS/SEMINARS

1. **SWI/SNF Chromatin Remodeling Complex in Cardiovascular Diseases**
   CVRTI/NUIP Joint Seminar Series, Nutrition & Integrative Physiology (NUIP) Department and Nora Eccles Harrison Cardiovascular Research and training Institute (CVRTI), University of Utah, Salt Lake City, Utah, March 14, 2024.

2. **SWI/SNF Chromatin Remodeling Complex in Cardiovascular Diseases**
   Scientific Seminar, USF Health Heart Institute, University of South Florida, Tampa, Florida, February 28, 2024

3. **SWI/SNF Chromatin Remodeling Complex in Cardiovascular Diseases**
   Scientific Seminar, online, Department of Physiology, University of Arizona, February 12, 2024

4. **SWI/SNF Chromatin Remodeling Complex in Cardiovascular Diseases**
   Scientific Seminar, Department of Biological Sciences, The University of Texas at Dallas, Richardson, Texas, January 29, 2024

5. **BAF60c in Cardiovascular Development and Diseases**
   Integrative Aspects of Diabetes, Obesity and Metabolism Research Club
   Michigan Diabetes Research Center, The Michigan Nutrition Obesity Research Center, The Department of Molecular and Integrative Physiology, University of Michigan, Ann Arbor, Michigan, March 16, 2023

6. **BAF60s in vascular smooth muscle cell biology and abdominal aortic aneurysm**
   110th Anniversary of Peking University Health Science Center Academic Summit: The World Young Scientist Forum of Peking University Medicine, Peking University Health Science Center, Beijing, China, December 3, 2022

7. **BAF60c regulates smooth muscle cell function and abdominal aortic aneurysm**
   Tsingtao Vascular Challenge Summit, The Department of Vascular Surgery, The Affiliated Hospital of Qingdao University, Qingdao, Shandong, China, June 25, 2022

8. **Endothelial Cell Heterogeneity in Diabetic Atherosclerosis**
   Single Cell Genomics in Obesity and Diabetes (scGOD) Research Club, Michigan Diabetes Research Center, Life Sciences Institute, University of Michigan, Ann Arbor, Michigan, January 13, 2022

9. **Single Cell RNA Sequencing in Abdominal Aortic Aneurysm**

ScGOD Research Club, Michigan Diabetes Research Center, Life Sciences Institute, University of Michigan, Ann Arbor, Michigan, April 8, 2020