Stanford

Chad S. Weldy, M.D., Ph.D.

Instructor, Medicine - Cardiovascular Medicine

CLINICAL OFFICE (PRIMARY)

- **Medicine**

  300 Pasteur Dr Rm JC007

  Stanford, CA 94305

  Tel (650) 725-5071 **Fax** (650) 725-8381

Bio

BIO

Dr. Chad Weldy is a clinical cardiologist specializing in inherited cardiomyopathies and a faculty member in the Division of Cardiovascular Medicine at Stanford University School of Medicine. He cares for patients and families with genetic heart disease—including hypertrophic and dilated cardiomyopathy—through the Stanford Center for Inherited Cardiovascular Disease (SCICD), where he trained under Dr. Euan Ashley.

As a physician-scientist, Dr. Weldy leads a research program focused on defining how human genetic variation translates into causal mechanisms of cardiovascular disease. His work integrates human genetics with single-cell genomics and molecular biology to uncover pathways governing vascular cell identity and disease progression. He has made key contributions to understanding ADAR1-mediated RNA editing and RNA sensing as drivers of cardiovascular pathology (Weldy et al., Nature Cardiovascular Research, 2025; PMID 40958051), as well as the epigenomic landscape of vascular cells across anatomical territories (Molecular Systems Biology, 2025; PMID 40931195).

Dr. Weldy received his M.D. from Duke University School of Medicine and completed his internal medicine residency and cardiology fellowship at Stanford University as part of the Stanford Translational Investigator Program (TIP). During his fellowship, he trained in the laboratory of Dr. Thomas Quertermous, where he studied epigenetic and RNA-based mechanisms of cardiovascular disease. He also holds a Ph.D. from the University of Washington and completed postdoctoral training in cardiovascular biology, with a focus on redox biology, toxicology, and epigenetics.

His research is supported by an NIH/NHLBI K08 Clinical Scientist Development Award, an American Heart Association Career Development Award, an NIH F32 NRSA Fellowship, and an NIH Loan Repayment Award. At Stanford, he has received the Gerald Reaven Award for Basic Science, the Timothy F. Beckett Jr. Award for Excellence in Clinical Teaching, and was inducted into Alpha Omega Alpha (AOA).

Dr. Weldy is originally from Bainbridge Island, Washington. Outside of medicine, he enjoys running, cycling, snowboarding, and spending time with his wife and two children.

CLINICAL FOCUS

- Inherited Cardiovascular Disease
- Cardiovascular Genetics
- Cardiovascular Disease
- Hypertrophic cardiomyopathy
- Dilated Cardiomyopathy
- arrhythmogenic cardiomyopathy
- Left ventricular noncompaction cardiomyopathy

ACADEMIC APPOINTMENTS

- Instructor, Medicine - Cardiovascular Medicine
- Member, Cardiovascular Institute

HONORS AND AWARDS

- 2024 Louis N. and Arnold M. Katz Basic Science Research Prize — Finalist, American Heart Association, BCVS (August, 2024)
- NIH/NHLBI K08 Mentored Clinical Scientist Development Award, NIH/NHLBI (August, 2023)
- AHA Career Development Award (CDA), American Heart Association (March, 2023)
- NIH Loan Repayment Program (LRP) Award, NIH/NHLBI (July, 2021)
- Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (F32), NIH/NHLBI (July, 2021)
- Gerald Reaven Award for Basic Science, Stanford University (June, 2021)
- Timothy F. Beckett Jr. Award for Best Clinical Teaching by a Medicine Fellow, Stanford University (June, 2021)
- AOA - Alpha Omega Alpha Medical Honor Society, Stanford University School of Medicine (6/2020)
- 2019 Residency Research Travel Award, Stanford University Internal Medicine Residency Program (April, 2019)
- 2014 Paper of the Year Award, Society of Toxicology, Inhalation and Respiratory Specialty Section (March 24, 2014)
- 2014 Postdoctoral Travel Award, Society of Toxicology, Cardiovascular Toxicology Specialty Section (March 25, 2014)
- 1st Place Postdoctoral Presentation Award, Pacific Northwest Association of Toxicologists (September 2013)
- 2012 Innovations in Research Award, University of Washington Center for Ecogenetics and Environmental Health (CEEH) (May 2012)
- Departmental nominee and one of four finalists, University of Washington Graduate School Medal (May 2011)
- Young Investigator Award (YIA), Society for Free Radical Biology and Medicine (SFRBM) (November 2011)
- 1st Place Student/Post Doc Oral Presentation Award, Pacific Northwest Association of Toxicologists (October 2010)
- 2007 Professor Ming-Ho Yu Award: Outstanding Student in Environmental Toxicology, Huxley College of the Environment, Western Washington University (May 2007)

PROFESSIONAL EDUCATION

- Board Certification: Adult Echocardiography, National Board of Echocardiography (2021)
- Board Certification: Cardiovascular Disease, American Board of Internal Medicine (2023)
- Residency: Stanford University Internal Medicine Residency (2019) CA
- Fellowship: Stanford University Cardiovascular Medicine Fellowship Program CA
- Board Certification: Internal Medicine, American Board of Internal Medicine (2020)
- Medical Education: Duke University School of Medicine (2017) NC
- Cardiovascular Med Fellowship, Stanford University Hospitals , Cardiology (2023)

- Internal Medicine Residency, Stanford University Hospitals , Internal Medicine (2019)
- Internal Medicine Internship, Stanford University Hospitals , Internal Medicine (2018)
- MD, Duke University School of Medicine , Medicine (2017)
- Postdoctoral Fellowship, University of Washington, School of Medicine, Division of Cardiology , Cardiovascular Biology, Heart Failure, Epigenetics (2014)
- PhD, University of Washington, School of Public Health , Toxicology, Vascular Physiology, Free Radical Biology (2012)
- BS, Western Washington University, Huxley College of the Environment , Environmental Toxicology, Chemistry (2007)

LINKS

- Weldy Lab Website: https://weldylab.org/
- X profile: https://x.com/ChadSWeldy

Research & Scholarship

CURRENT RESEARCH AND SCHOLARLY INTERESTS

As a physician-scientist I work to understand the genetic basis of cardiovascular disease and the transcriptional and epigenomic mechanisms of atherosclerosis. My work is focused across four main areas of cardiovascular genetics and mechanisms of coronary artery disease and smooth muscle biology:

1. Vascular smooth muscle specific ADAR1 mediated RNA editing of double stranded RNA and activation of the double stranded RNA receptor MDA5 in coronary artery disease and vascular calcification
2. Defining on single cell resolution the cellular and epigenomic features of human vascular disease across vascular beds of differing embryonic origin
3. CRISPRi screening with targeted perturb seq (TAPseq) to identify novel CAD genes in human coronary artery smooth muscle cells
4. Investigation of the epigenetic and molecular basis of coronary artery disease and smooth muscle cell transition in mice with conditional smooth muscle genetic deletion of CAD genes Pdgfd and Sox9

My work is focused on discovery of causal mechanisms of disease through leveraging human genetics with sophisticated molecular biology, single cell sequencing technologies, and mouse models of disease. This work attempts to apply multiple scientific research arms to ultimately lead to novel understandings of vascular disease and discover important new therapeutic approaches for drug discovery.

First Author Manuscripts for this work:

• Weldy, C. S., et al. (2025). Smooth muscle cell expression of RNA editing enzyme ADAR1 controls activation of RNA sensor MDA5 in atherosclerosis. (2025). Nature Cardiovascular Research. 1-17, PMID: 40958051, doi: 10.1038/s44161-025-00710-5
• *Selected as finalist for Louis N. and Arnold M. Katz Basic Science Research Prize from the American Heart Association, finalist competition November 16, 2024, Chicago
• Work was highlighted in the Stanford Department of Medicine News
https://medicine.stanford.edu/news/current-news/standard-news/RNA-editing.html

• Weldy, C.S., et al. (2025). Epigenomic landscape of single vascular cells reflects developmental origin and disease risk loci. Molecular Systems Biology. 1-25, PMID: 40931195, doi:10.1038/s44320-025-00140-2.

• *Selected for the cover of November 2025 edition of Molecular Systems Biology

Grant funding received for this work:

Mentored Clinical Scientist Research Career Development Award (K08)(NIH/NHLBI, 1 K08 HL167699-01), August, 2023 – July 2028. PI: Weldy, Chad

• Title of proposal: “ADAR Mediated RNA editing is a causal mechanism in coronary artery disease”.

• Activated 08/01/2023

• $850,000 over 5 years

Career Development Award, American Heart Association (AHA CDA)(23CDA1042900), July, 2023 – June, 2026. PI: Weldy, Chad

• Title of proposal: “Linking RNA editing to coronary artery calcification and disease”

• Activated 07/01/2023

• $231,000 over three years

NIH Loan Repayment Program (LRP) Award (NIH/NHLBI) Renewal Award, July, 2023. PI: Weldy, Chad

• Title of proposal: “RNA editing is a causal mechanism of coronary artery disease”

Ruth L. Kirschstein National Research Service Award (NRSA) Individual Postdoctoral Fellowship (F32) (NIH/NHLBI, 1 F32 HL160067-01), July, 2021 – June 2023 (Completed). PI: Weldy, Chad

• Titled, “A transcriptional network which governs smooth muscle transition is mediated by causal coronary artery disease gene PDGFD”

• *Received perfect score with impact score 10, 1st percentile

NIH Loan Repayment Program (LRP) Award (NIH/NHLBI), July, 2021. PI: Weldy, Chad

• Title of proposal: "Single cell transcriptomic and epigenomic features of human atherosclerosis".

• This will award up to $100,000 towards student loans over the next 24 months with opportunity for renewal after 24 months.

Publications

PUBLICATIONS

- **Vascular smooth muscle cell state trajectories mediate molecular mechanisms of coronary disease risk.** *Nature communications*
  Li, D. Y., Kundu, S., Cheng, P., Gu, W., Worssam, M. D., Jackson, W. R., Zhao, Q., Nguyen, T., Yu, A. M., Monteiro, J. P., Caceres, R. D., Dale, S., Palmisano, et al
  2026
- **Adenosine-to-Inosine (A-to-I) RNA Editing by ADAR1 to Control RNA Sensing in Cardiovascular Disease.** *Arteriosclerosis, thrombosis, and vascular biology*
  Weldy, C. S., Li, J. B., Quertermous, T.
  2026
- **A cell and transcriptome atlas of human arterial vasculature.** *Cell genomics*
  Zhao, Q., Pedroza, A., Sharma, D., Gu, W., Dalal, A., Weldy, C., Jackson, W., Li, D. Y., Ryan, Y., Nguyen, T., Shad, R., Palmisano, B. T., Monteiro, et al
  2025: 101034
- **Smooth muscle expression of RNA editing enzyme ADAR1 controls activation of the RNA sensor MDA5 in atherosclerosis.** *Nature cardiovascular research*

Weldy, C. S., Li, Q., Monteiro, J. P., Peters, T. S., Guo, H., Galls, D., Gu, W., Cheng, P. P., Ramste, M., Li, D., Palmisano, B. T., Sharma, D., Worssam, et al
2025

- **Epigenomic landscape of single vascular cells reflects developmental origin and disease risk loci.** *Molecular systems biology*
  Weldy, C. S., Kundu, S., Monteiro, J., Gu, W., Pedroza, A. J., Dalal, A. R., Worssam, M. D., Li, D., Palmisano, B., Zhao, Q., Sharma, D., Nguyen, T., Kundu, et al
  2025

- **Enhancer-targeting CRISPR screens at coronary artery disease loci suggest shared mechanisms of disease risk.** *medRxiv : the preprint server for health sciences*
  Ramste, M., Weldy, C., Kundu, S., Zhao, Q., Li, D., Brand, K., Sharma, D., Ramste, A., Jagoda, E., Ray, J., Caceres, R. D., Galante, J., Gschwind, et al
  2025

- **Epistasis regulates genetic control of cardiac hypertrophy.** *Nature cardiovascular research*
  Wang, Q., Tang, T. M., Youlton, M., Weldy, C. S., Kenney, A. M., Ronen, O., Hughes, J. W., Chin, E. T., Sutton, S. C., Agarwal, A., Li, X., Behr, M., Kumbier, et al
  2025

- **Environmental pollutants and atherosclerosis: Epigenetic mechanisms linking genetic risk and disease.** *Atherosclerosis*
  Damiani, I., Solberg, E. H., Iyer, M., Cheng, P., Weldy, C. S., Kim, J. B.
  2025: 119131

- **Deciphering the impact of genomic variation on function.** *Nature*
  2024; 633 (8028): 47-57

- **One-year real-world experience with mavacamten and its physiologic effects on obstructive hypertrophic cardiomyopathy** *FRONTIERS IN CARDIOVASCULAR MEDICINE*
  Kim, D., Chu, E. L., Keamy-Minor, E. E., Paranjpe, I., Tang, W. L., O'Sullivan, J. W., Desai, Y. B., Liu, M. B., Munsey, E., Hecker, K., Cuenco, I., Kao, B., Bacolor, et al
  2024; 11

- **Genome-Wide Genetic Associations Prioritize Evaluation of Causal Mechanisms of Atherosclerotic Disease Risk.** *Arteriosclerosis, thrombosis, and vascular biology*
  Quertermous, T., Li, D. Y., Weldy, C. S., Ramste, M., Sharma, D., Monteiro, J. P., Gu, W., Worssam, M. D., Palmisano, B. T., Park, C. Y., Cheng, P.
  2024; 44 (2): 323-327

- **From Founder to Function: can we unravel phenotype from genotype?** *Heart rhythm*
  Weldy, C. S., Perez, M. V.
  2023

- **Discovery of Transacting Long Noncoding RNAs That Regulate Smooth Muscle Cell Phenotype.** *Circulation research*
  Shi, H., Nguyen, T., Zhao, Q., Cheng, P., Sharma, D., Kim, H. J., Brian Kim, J., Wirka, R., Weldy, C. S., Monteiro, J. P., Quertermous, T.
  2023

- **Molecular mechanisms of coronary artery disease risk at the PDGFD locus.** *Nature communications*
  Kim, H., Cheng, P., Travisano, S., Weldy, C., Monteiro, J. P., Kundu, R., Nguyen, T., Sharma, D., Shi, H., Lin, Y., Liu, B., Haldar, S., Jackson, et al
  2023; 14 (1): 847

- **miR Profile of Chronic Right Ventricular Pacing: a Pilot Study in Children with Congenital Complete Atrioventricular Block.** *Journal of cardiovascular translational research*
  Navarre, B. M., Clouthier, K. L., Ji, X., Taylor, A., Weldy, C. S., Dubin, A. M., Reddy, S.
  2022

- **Dissecting the Genomics of Spontaneous Coronary Artery Dissection.** *Circulation. Genomic and precision medicine*
  Weldy, C. S., Murtha, R., Kim, J. B.
  2022: 101161CIRCGEN122003867

- **Mulibrey Nanism and the Real Time Use of Genome and Biobank Engines to Inform Clinical Care in an Ultrarare Disease.** *Circulation. Genomic and precision medicine*

Weldy, C. S., Ashley, E. A.
2021: CIRCGEN121003430

- **Towards precision medicine in heart failure.** *Nature reviews. Cardiology*
  Weldy, C. S., Ashley, E. A.
  2021

- **Circulating whole genome miRNA expression corresponds to progressive right ventricle enlargement and systolic dysfunction in adults with tetralogy of Fallot.** *PloS one*
  Weldy, C. S., Syed, S. A., Amsallem, M., Hu, D., Ji, X., Punn, R., Taylor, A., Navarre, B., Reddy, S.
  2020; 15 (11): e0241476

- **In utero exposure to diesel exhaust particulates is associated with an altered cardiac transcriptional response to transverse aortic constriction and altered DNA methylation** *FASEB Journal*
  Goodson, J. M., Weldy, C. S., MacDonald, J. W., Bammler, T. K., Chien, W., Chin, M. T.
  2017: 4935-4945

- **Neonatal Diesel Exhaust Particulate Exposure Does Not Predispose Mice to Adult Cardiac Hypertrophy or Heart Failure** *INTERNATIONAL JOURNAL OF ENVIRONMENTAL RESEARCH AND PUBLIC HEALTH*
  Liu, Y., Weldy, C. S., Chin, M. T.
  2016; 13 (12)

- **Myocardial deletion of transcription factor CHF1/Hey2 results in altered myocyte action potential and mild conduction system expansion but does not alter conduction system function or promote spontaneous arrhythmias** *FASEB JOURNAL*
  Hartman, M. E., Liu, Y., Zhu, W., Chien, W., Weldy, C. S., Fishman, G. I., Laflamme, M. A., Chin, M. T.
  2014; 28 (7): 3007-3015

- **In Utero Exposure to Diesel Exhaust Air Pollution Promotes Adverse Intrauterine Conditions, Resulting in Weight Gain, Altered Blood Pressure, and Increased Susceptibility to Heart Failure in Adult Mice** *PLOS ONE*
  Weldy, C. S., Liu, Y., Liggitt, H. D., Chin, M. T.
  2014; 9 (2)

- **In utero and early life exposure to diesel exhaust air pollution increases adult susceptibility to heart failure in mice** *PARTICLE AND FIBRE TOXICOLOGY*
  Weldy, C. S., Liu, Y., Chang, Y., Medvedev, I. O., Fox, J. R., Larson, T. V., Chien, W., Chin, M. T.
  2013; 10

- **Inhalation of diesel exhaust does not exacerbate cardiac hypertrophy or heart failure in two mouse models of cardiac hypertrophy** *PARTICLE AND FIBRE TOXICOLOGY*
  Liu, Y., Chien, W., Medvedev, I. O., Weldy, C. S., Luchtel, D. L., Rosenfeld, M. E., Chin, M. T.
  2013; 10

- **Glutathione (GSH) and the GSH synthesis gene Gclm modulate plasma redox and vascular responses to acute diesel exhaust inhalation in mice** *INHALATION TOXICOLOGY*
  Weldy, C. S., Luttrell, I. P., White, C. C., Morgan-Stevenson, V., Cox, D. P., Carosino, C. M., Larson, T. V., Stewart, J. A., Kaufman, J. D., Kim, F., Chitaley, K., Kavanagh, T. J.
  2013; 25 (8): 444-454

- **The Glutathione Synthesis Gene Gclm Modulates Amphiphilic Polymer-Coated CdSe/ZnS Quantum Dot-Induced Lung Inflammation in Mice** *PLOS ONE*
  McConnachie, L. A., Botta, D., White, C. C., Weldy, C. S., Wilkerson, H., Yu, J., Dills, R., Yu, X., Griffith, W. C., Faustman, E. M., Farin, F. M., Gill, S. E., Parks, et al
  2013; 8 (5)

- **Glutathione (GSH) and the GSH synthesis gene Gclm modulate vascular reactivity in mice** *FREE RADICAL BIOLOGY AND MEDICINE*
  Weldy, C. S., Luttrell, I. P., White, C. C., Morgan-Stevenson, V., Bammler, T. K., Beyer, R. P., Afsharinejad, Z., Kim, F., Chitaley, K., Kavanagh, T. J.
  2012; 53 (6): 1264-1278

- **DIESEL particulate exposed macrophages alter endothelial cell expression of eNOS, iNOS, MCP1, and glutathione synthesis genes** *TOXICOLOGY IN VITRO*
  Weldy, C. S., Wilkerson, H., Larson, T. V., Stewart, J. A., Kavanagh, T. J.

2011; 25 (8): 2064-2073

- **Heterozygosity in the glutathione synthesis gene Gclm increases sensitivity to diesel exhaust particulate induced lung inflammation in mice** *INHALATION TOXICOLOGY*
  Weldy, C. S., White, C. C., Wilkerson, H., Larson, T. V., Stewart, J. A., Gill, S. E., Parks, W. C., Kavanagh, T. J.
  2011; 23 (12): 724-735