Stanford

Casey Gifford

Assistant Professor of Pediatrics (Cardiology) and of Genetics

Pediatrics - Cardiology

CONTACT INFORMATION

- **Administrative Contact**

  Anne-Mari Parkkinen - Administrative Associate

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Bio

ACADEMIC APPOINTMENTS

- Assistant Professor, Pediatrics - Cardiology
- Assistant Professor, Genetics
- Member, Bio-X
- Member, Cardiovascular Institute
- Member, Institute for Stem Cell Biology and Regenerative Medicine
- Member, Maternal & Child Health Research Institute (MCHRI)
- Member, Wu Tsai Neurosciences Institute

PROFESSIONAL EDUCATION

- Postdoctoral fellow, Gladstone Institutes, UCSF , Heart development and disease (2019)
- PhD, Harvard Medical School , Stem cell biology and epigenomics (2013)
- BS, Simmons University , Biochemistry (2006)

LINKS

- Gifford Lab: https://www.caseygiffordlab.com/

Teaching

COURSES

2025-26

- Advanced Genetics: GENE 205 (Win)
- Current Issues in Genetics: GENE 219 (Win)

2024-25

- Advanced Genetics: GENE 205 (Win)

- Current Issues in Genetics: GENE 219 (Win)
- Genetics and Developmental Biology Training Camp: DBIO 200, GENE 200 (Aut)
- Stem Cell Intensive: STEMREM 200 (Aut)
- Stem Cells Immersion: Applications in Medicine, Business and Law: STEMREM 203 (Win)

2023-24

- Advanced Genetics: GENE 205 (Win)
- Stem Cell Intensive: STEMREM 200 (Aut)
- Stem Cells Immersion: Applications in Medicine, Business and Law: STEMREM 203 (Win)

2022-23

- Advanced Genetics: GENE 205 (Win)
- Stem Cell Intensive: STEMREM 200 (Aut)
- Stem Cells Immersion: Applications in Medicine, Business and Law: STEMREM 203 (Win)

STANFORD ADVISEES

Doctoral Dissertation Reader (AC)

Maggie Arriaga, Olivia Crocker, Franco Felix, Nicole Horsley, Geo Janer Carattini, Julie Lake, William Pangburn, Gabe Preising, Alanna Pyke, Nemo Robles, Zhainib Ugokwe

Postdoctoral Faculty Sponsor

Megha Agarwal, Yassine Zouaghi

Doctoral Dissertation Advisor (AC)

Joshua Rico, Lucy Zhang

GRADUATE AND FELLOWSHIP PROGRAM AFFILIATIONS

- Genetics (Phd Program)
- Pediatric Cardiology (Fellowship Program)
- Stem Cell Biology and Regenerative Medicine (Phd Program)

Publications

PUBLICATIONS

- **Anatomy of the Pulmonary Circulation and Outcomes in Tetralogy of Fallot With Major Systemic-to-Pulmonary Collaterals and Unilateral Pulmonary Artery of Ductal Origin.** *Catheterization and cardiovascular interventions : official journal of the Society for Cardiac Angiography & Interventions*
  Ortega, J., Adamson, G. T., Jaggi, A., Gifford, C. A., Asija, R., Hanley, F. L., McElhinney, D. B.
  2026
- **Author Correction: Myocardial reprogramming by HMGN1 underlies heart defects in trisomy 21.** *Nature*
  Ranade, S. S., Li, F., Whalen, S., Pelonero, A., Ye, L., Huang, Y., Brand, A., Nishino, T., Mital, R., Boileau, R. M., Koback, F., Padmanabhan, A., Yu, et al
  2026
- **The ER membrane protein complex acts as a chaperone to promote the biogenesis of multi-bundle membrane proteins.** *bioRxiv : the preprint server for biology*
  Stanton, M., Singal, B., Biswal, M., Agarwal, M., Scheuing, C. E., Vargas, G. D., Gao, A., Gifford, C. A., Pleiner, T.
  2026

- **Editing stem cell genomes at scale to measure variant effects in diverse cell and genetic contexts.** *medRxiv : the preprint server for health sciences*
  Fayer, S., Garge, R. K., Hopkins, M., Friedman, C. E., McGee, A. V., Rico, J., Powell, R. L., McDermot, E., Smith, N. T., Pendyala, S., Richardson, M. E., Smith, E. D., Bowen, et al
  2025

- **Insertion of an invading retrovirus regulates a novel color trait in swordtail fish.** *bioRxiv : the preprint server for biology*
  Haghani, N. B., Dodge, T. O., Baczenas, J. J., Gunn, T. R., He, Q., Pangburn, W., Sood, R., Fascinetto-Zago, P., Du, K., Kaatmann, A., Ou, Z., Dougan, S., Yang, et al
  2025

- **GREGoR: accelerating genomics for rare diseases.** *Nature*
  Dawood, M., Heavner, B., Wheeler, M. M., Ungar, R. A., LoTempio, J., Wiel, L., Berger, S., Bernstein, J. A., Chong, J. X., Délot, E. C., Eichler, E. E., Lupski, J. R., Shojaie, et al
  2025; 647 (8089): 331-342

- **Correction: De novo and inherited variants in coding and regulatory regions in genetic cardiomyopathies.** *Human genomics*
  Vadgama, N., Ameen, M., Sundaram, L., Gaddam, S., Gifford, C., Nasir, J., Karakikes, I.
  2025; 19 (1): 122

- **Myocardial reprogramming by HMGN1 underlies heart defects in trisomy 21.** *Nature*
  Ranade, S. S., Li, F., Whalen, S., Pelonero, A., Ye, L., Huang, Y., Brand, A., Nishino, T., Mital, R., Boileau, R. M., Koback, F., Padmanabhan, A., Yu, et al
  2025

- **Deep learning the dynamic regulatory sequence code of cardiac organoid differentiation.** *bioRxiv : the preprint server for biology*
  Metzl-Raz, E., Zhao, R., Deshpande, S., Powell, J., Porter, E. G., Zouaghi, Y., Liu, B. B., Kim, S. H., Abdi, I., Evergreen, I., Agarwal, M., Sheth, M. U., Rico, et al
  2025

- **Distinct type I and II interferon responses direct cortical and medullary thymic epithelial cell development.** *Science immunology*
  Mohammed, A., Wang, W., Arreola, M., Solomon, B. D., Slepicka, P. F., Hubka, K. M., Nguyen, H. D., Zheng, Z., Chavez, M. G., Yeh, C. Y., Kim, D. K., Ma, M. R., Martin, et al
  2025; 10 (107): eado4720

- **Corrigendum to "Genetic Analysis and multimodal imaging confirm m.12148 T>C mitochondrial variant pathogenicity leading to multisystem dysfunction" [Molecular Genetics and Metabolism 144 (2025); 109049].** *Molecular genetics and metabolism*
  Belle, K., Kreymerman, A., Young, J. L., Vadgama, N., Ji, M. H., Randhawa, S., Caicedo, J., Wong, M., Muscat, S. P., Gifford, C. A., Lee, R. T., Nasir, J., Enns, et al
  2025: 109100

- **Genetic analysis and multimodal imaging confirm m.12148 T > C mitochondrial variant pathogenicity leading to multisystem dysfunction.** *Molecular genetics and metabolism*
  Belle, K., Kreymerman, A., Young, J. L., Vadgama, N., Ji, M. H., Randhawa, S., Caicedo, J., Wong, M., Muscat, S. P., Gifford, C. A., Lee, R. T., Nasir, J., Enns, et al
  2025; 144 (3): 109049

- **GREGoR: Accelerating Genomics for Rare Diseases.** *ArXiv*
  Dawood, M., Heavner, B., Wheeler, M. M., Ungar, R. A., LoTempio, J., Wiel, L., Berger, S., Bernstein, J. A., Chong, J. X., Délot, E. C., Eichler, E. E., Gibbs, R. A., Lupski, et al
  2024

- **Molecular convergence of risk variants for congenital heart defects leveraging a regulatory map of the human fetal heart.** *medRxiv : the preprint server for health sciences*
  Ma, X. R., Conley, S. D., Kosicki, M., Bredikhin, D., Cui, R., Tran, S., Sheth, M. U., Qiu, W. L., Chen, S., Kundu, S., Kang, H. Y., Amgalan, D., Munger, et al
  2024

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

- **Considerations for reporting variants in novel candidate genes identified during clinical genomic testing.** *Genetics in medicine : official journal of the American College of Medical Genetics*
  Chong, J. X., Berger, S. I., Baxter, S., Smith, E., Xiao, C., Calame, D. G., Hawley, M. H., Rivera-Munoz, E. A., DiTroia, S., Bamshad, M. J., Rehm, H. L.
  2024: 101199

- **A lethal mitonuclear incompatibility in complex I of natural hybrids.** *Nature*
  Moran, B. M., Payne, C. Y., Powell, D. L., Iverson, E. N., Donny, A. E., Banerjee, S. M., Langdon, Q. K., Gunn, T. R., Rodriguez-Soto, R. A., Madero, A., Baczenas, J. J., Kleczko, K. M., Liu, et al
  2024

- **Single-cell multimodal analyses reveal epigenomic and transcriptomic basis for birth defects in maternal diabetes** *NATURE CARDIOVASCULAR RESEARCH*
  Nishino, T., Ranade, S. S., Pelonero, A., van Soldt, B. J., Ye, L., Alexanian, M., Koback, F., Huang, Y., Wallace, L., Sadagopan, N., Lam, A., Zholudeva, L. V., Li, et al
  2023; 2 (12): 1190-+

- **Single Cell Multimodal Analyses Reveal Epigenomic and Transcriptomic Basis for Birth Defects in Maternal Diabetes.** *Nature cardiovascular research*
  Nishino, T., Ranade, S. S., Pelonero, A., van Soldt, B. J., Ye, L., Alexanian, M., Koback, F., Huang, Y., Sadagopan, N., Lam, A., Zholudeva, L. V., Li, F., Padmanabhan, et al
  2023; 2 (12): 1190-1203

- **The multi-lineage transcription factor ISL1 controls cardiomyocyte cell fate through interaction with NKX2.5.** *Stem cell reports*
  Maven, B. E., Gifford, C. A., Weilert, M., Gonzalez-Teran, B., Hüttenhain, R., Pelonero, A., Ivey, K. N., Samse-Knapp, K., Kwong, W., Gordon, D., McGregor, M., Nishino, T., Okorie, et al
  2023

- **Functional Human iPSC-Derived Thymic Epithelial Progenitor Cells Reconstitute T Cell Development and Function in an In Vivo Model of Thymic Aplasia**
  Slepicka, P., Hubka, K. M., Hanh Dan Nguyen, Mohammed, A., Wang, J., Gifford, C., Sebastiano, V., Weinacht, K. G.
  AMER SOC HEMATOLOGY.2022: 7340-7341

- **De novo and inherited variants in coding and regulatory regions in genetic cardiomyopathies.** *Human genomics*
  Vadgama, N., Ameen, M., Sundaram, L., Gaddam, S., Genomics England Research Consortium, Gifford, C., Nasir, J., Karakikes, I.
  2022; 16 (1): 55

- **Transcription Factor GATA4 Regulates Cell Type-Specific Splicing Through Direct Interaction With RNA in Human Induced Pluripotent Stem Cell-Derived Cardiac Progenitors.** *Circulation*
  Zhu, L., Choudhary, K., Gonzalez-Teran, B., Ang, Y., Thomas, R., Stone, N. R., Liu, L., Zhou, P., Zhu, C., Ruan, H., Huang, Y., Jin, S., Pelonero, et al
  2022: CIRCULATIONAHA121057620

- **Transcription factor protein interactomes reveal genetic determinants in heart disease.** *Cell*
  Gonzalez-Teran, B., Pittman, M., Felix, F., Thomas, R., Richmond-Buccola, D., Hüttenhain, R., Choudhary, K., Moroni, E., Costa, M. W., Huang, Y., Padmanabhan, A., Alexanian, M., Lee, et al
  2022

- **SARS-CoV-2 Susceptibility and ACE2 Gene Variations Within Diverse Ethnic Backgrounds.** *Frontiers in genetics*
  Vadgama, N., Kreymerman, A., Campbell, J., Shamardina, O., Brugger, C., Research Consortium, G. E., Deaconescu, A. M., Lee, R. T., Penkett, C. J., Gifford, C. A., Mercola, M., Nasir, J., Karakikes, et al
  2022; 13: 888025

- **Early-career researchers in the time of COVID-19: Starting a new lab during a pandemic** *CELL STEM CELL*
  Tikhonova, A. N., Xiang, Y., Gifford, C.
  2021; 28 (5): 808-810

- **Introductions to the Community: Early-Career Researchers in the Time of COVID-19** *CELL STEM CELL*
  Ganesh, K., Patel, J., Orlova, V. V., Gifford, C., Elias, S., Vaughan, A.
  2021; 28 (1): 17–19

- **A transcriptional switch governs fibroblast activation in heart disease.** *Nature*

Alexanian, M., Przytycki, P. F., Micheletti, R., Padmanabhan, A., Ye, L., Travers, J. G., Gonzalez-Teran, B., Silva, A. C., Duan, Q., Ranade, S. S., Felix, F., Linares-Saldana, R., Li, et al
2021

- **Network-based screen in iPSC-derived cells reveals therapeutic candidate for heart valve disease.** *Science (New York, N.Y.)*
  Theodoris, C. V., Zhou, P., Liu, L., Zhang, Y., Nishino, T., Huang, Y., Kostina, A., Ranade, S. S., Gifford, C. A., Uspenskiy, V., Malaschicheva, A., Ding, S., Srivastava, et al
  2020

- **Single-cell analysis of cardiogenesis reveals basis for organ-level developmental defects.** *Nature*
  de Soysa, T. Y., Ranade, S. S., Okawa, S., Ravichandran, S., Huang, Y., Salunga, H. T., Schricker, A., Del Sol, A., Gifford, C. A., Srivastava, D.
  2019; 572 (7767): 120-124

- **Context-Specific Transcription Factor Functions Regulate Epigenomic and Transcriptional Dynamics during Cardiac Reprogramming.** *Cell stem cell*
  Stone, N. R., Gifford, C. A., Thomas, R., Pratt, K. J., Samse-Knapp, K., Mohamed, T. M., Radzinsky, E. M., Schricker, A., Ye, L., Yu, P., van Bemmel, J. G., Ivey, K. N., Pollard, et al
  2019; 25 (1): 87-102.e9

- **Oligogenic inheritance of a human heart disease involving a genetic modifier.** *Science (New York, N.Y.)*
  Gifford, C. A., Ranade, S. S., Samarakoon, R., Salunga, H. T., de Soysa, T. Y., Huang, Y., Zhou, P., Elfenbein, A., Wyman, S. K., Bui, Y. K., Cordes Metzler, K. R., Ursell, P., Ivey, et al
  2019; 364 (6443): 865-870

- **Genetic determinants and epigenetic effects of pioneer-factor occupancy** *NATURE GENETICS*
  Donaghey, J., Thakurela, S., Charlton, J., Chen, J. S., Smith, Z. D., Gu, H., Pop, R., Clement, K., Stamenova, E. K., Karnik, R., Kelley, D. R., Gifford, C. A., Cacchiarelli, et al
  2018; 50 (2): 250-+

- **Differentiation of V2a interneurons from human pluripotent stem cells.** *Proceedings of the National Academy of Sciences of the United States of America*
  Butts, J. C., McCreedy, D. A., Martinez-Vargas, J. A., Mendoza-Camacho, F. N., Hookway, T. A., Gifford, C. A., Taneja, P., Noble-Haeusslein, L., McDevitt, T. C.
  2017; 114 (19): 4969-4974

- **Transcriptional and Chromatin Dynamics of Muscle Regeneration after Severe Trauma** *STEM CELL REPORTS*
  Aguilar, C. A., Pop, R., Shcherbina, A., Watts, A., Matheny, R. W., Cacchiarelli, D., Han, W. M., Shin, E., Nakhai, S. A., Jang, Y. C., Carrigan, C. T., Gifford, C. A., Kottke, et al
  2016; 7 (5): 983–97

- **Heart disease modelling adds a Notch to its belt.** *Nature cell biology*
  Gifford, C. A., Srivastava, D.
  2016; 18 (1): 3-5

- **A qPCRCR ScoreCard quantifies the differentiation potential of human pluripotent stem cells** *NATURE BIOTECHNOLOGY*
  Tsankov, A. M., Akopian, V., Pop, R., Chetty, S., Gifford, C. A., Daheron, L., Tsankova, N. M., Meissner, A.
  2015; 33 (11): 1182-U117

- **In vivo Monitoring of Transcriptional Dynamics After Lower-Limb Muscle Injury Enables Quantitative Classification of Healing** *SCIENTIFIC REPORTS*
  Aguilar, C. A., Shcherbina, A., Ricke, D. O., Pop, R., Carrigan, C. T., Gifford, C. A., Urso, M. L., Kottke, M. A., Meissner, A.
  2015; 5: 13885

- **Integrative Analyses of Human Reprogramming Reveal Dynamic Nature of Induced Pluripotency** *CELL*
  Cacchiarelli, D., Trapnell, C., Ziller, M. J., Soumillon, M., Cesana, M., Karnik, R., Donaghey, J., Smith, Z. D., Ratanasirintrawoot, S., Zhang, X., Sui, S., Wu, Z., Akopian, et al
  2015; 162 (2): 412–24

- **Targeted disruption of DNMT1, DNMT3A and DNMT3B in human embryonic stem cells** *NATURE GENETICS*
  Liao, J., Karnik, R., Gu, H., Ziller, M. J., Clement, K., Tsankov, A. M., Akopian, V., Gifford, C. A., Donaghey, J., Galonska, C., Pop, R., Reyon, D., Tsai, et al

2015; 47 (5): 469–U64

- **Dissecting neural differentiation regulatory networks through epigenetic footprinting** *NATURE*
  Ziller, M. J., Edri, R., Yaffe, Y., Donaghey, J., Pop, R., Mallard, W., Issner, R., Gifford, C. A., Goren, A., Xing, J., Gu, H., Cacchiarelli, D., Tsankov, et al
  2015; 518 (7539): 355–59

- **Transcriptional and Epigenetic Dynamics during Specification of Human Embryonic Stem Cells** *CELL*
  Gifford, C. A., Ziller, M. J., Gu, H., Trapnell, C., Donaghey, J., Tsankov, A., Shalek, A. K., Kelley, D. R., Shishkin, A. A., Issner, R., Zhang, X., Coyne, M., Fostel, et al
  2013; 153 (5): 1149–63

- **Epigenetic obstacles encountered by transcription factors: reprogramming against all odds** *CURRENT OPINION IN GENETICS & DEVELOPMENT*
  Gifford, C. A., Meissner, A.
  2012; 22 (5): 409–15

- **Epigenomics and chromatin dynamics.**
  Akopian, V., Chan, M. M., Clement, K., Galonska, C., Gifford, C. A., Lehtola, E., Liao, J., Samavarchi-Tehrani, P., Sindhu, C., Smith, Z. D., Tsankov, A. M., Webster, J., Zhang, et al
  2012: 313

- **Threonine phosphorylation post-translationally regulates protein secretion in Pseudomonas aeruginosa** *NATURE CELL BIOLOGY*
  Mougous, J. D., Gifford, C. A., Ramsdell, T. L., Mekalanos, J. J.
  2007; 9 (7): 797–U121

- **A virulence locus of Pseudomonas aeruginosa encodes a protein secretion apparatus** *SCIENCE*
  Mougous, J. D., Cuff, M. E., Raunser, S., Shen, A., Zhou, M., Gifford, C. A., Goodman, A. L., Joachimiak, G., Ordonez, C. L., Lory, S., Walz, T., Joachimiak, A., Mekalanos, et al
  2006; 312 (5779): 1526–30