

COLWYN ANSEL HEADLEY, Ph.D.

Instructor, Cardiovascular Medicine | Stanford University School of Medicine & VA PAVIR
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RESEARCH FOCUS

My research program investigates the mitochondria-immune-vascular interface, with a focus on how mitochondrial maladaptations drive aging-associated cardiovascular and immune pathologies. I developed the MitoTags platform, antibody-mitochondria conjugates that enable receptor-guided organelle delivery to defined cell types *in vivo* and *ex vivo*. This bioengineering approach spans therapeutic applications in cardiovascular disease, immune senescence, and neurodegeneration, and represents a new paradigm for precision mitochondrial medicine. My work is supported by >\$2M in total career funding (PI + Co-I) across NIH, AHA, BWF, NASA, and private foundations.

EDUCATION & TRAINING

Dec 2024	Post-Doctoral Fellowship - Cardiovascular Med.	Stanford University
May 2020	Ph.D., Biomedical Sciences - Immunology	The Ohio State University
May 2014	B.S., Microbiology	The Ohio State University

EXPERIENCE

Instructor (Junior Faculty) | Stanford University, Dept. of Medicine, Div. of Cardiovascular Medicine
(courtesy appointment, Dept. of Neurosurgery)

Jan 2025 – Present

- Invented the MitoTags platform for targeted mitochondrial delivery (2 U.S. provisional patents); awarded Stanford SPARK Translational Research Award (\$50K), Burroughs Wellcome Fund CASI (\$560K), and AHA Career Development Award (\$231K) within first year of appointment.
- Leading research on antibody-mitochondria conjugates for therapeutic applications in aging-related cardiovascular disease, immune senescence, and neurodegeneration, with demonstrated 6-fold targeting specificity and functional rescue in Seahorse assays.
- Provides strategic advising to biotech companies (Wonderfeel, Mitrix) on research design and data interpretation in mitochondrial biology, immunology, and cardiovascular medicine.
- Designing curriculum on immune-cardiovascular interactions emphasizing mitochondrial signaling dynamics; guest lecturer for Stanford engineering and biomedical courses.

Post-Doctoral Fellow (Mentor: Dr. Philip Tsao) | Stanford University, Div. of Cardiovascular Medicine

May 2021 – Dec 2024

- PI and Co-I on multiple funded projects (NIH T-32, BWF, Wu Tsai Alliance) investigating mitochondrial dysfunction in abdominal aortic aneurysm, peripheral artery disease, and immune aging.
- Published first-author papers in *Advanced Science* (Top Read Article of 2023) and *Frontiers in Cardiovascular Medicine* establishing mitochondrial transplantation as anti-aging immunotherapy.
- Mentored 10+ graduate, undergraduate, and high school students; co-chaired Stanford Black Postdoc Association.
- Received 5+ awards for translational research and science advocacy including Rockefeller Exceptional Scholar, Sanford Burnham Prebys Rising Star, and Stanford JEDI Award.

Post-Doctoral Scientist I (Mentor: Dr. Joanne Turner) | Texas Biomedical Research Institute

May 2020 – May 2021

- Investigated mitochondrial dysfunction-mediated immune dysregulation during viral infections (influenza A, SARS-CoV-2); co-authored publication in *Nature Communications* on SARS-CoV-2 lethality in K18-hACE2 transgenic mice.
- Designed COVID-19-related rodent studies and trained research scientists on Extracellular Flux Analysis and EPR spectroscopy in BSL-3 facilities.

Graduate Research Associate (Mentor: Dr. Joanne Turner) | The Ohio State University

Jun 2015 – May 2020

- Dissertation: “Mycobacterial Heartbreak: Up in Inflammation & The Redox Opera of Mitochondria in Aged Lymphocytes.” Developed protocols for delivering viable mitochondria into CD4+ T cells from aged mice and characterized functional consequences across metabolism, oxidative stress, activation, and cytokine production.
- BSL-3 research with virulent *M. tuberculosis*; examined cardiopulmonary fitness impacts of mycobacterial infections in aged mice. Published first-author papers in *Aging Cell*, *Organic & Biomolecular Chemistry*, and *Biochemical Pharmacology*.

Earlier Positions

Laboratory Technician - Cardiox Corporation / Anazen Diagnostics (Nov 2014 – May 2015)

Research Assistant II - OSU College of Dentistry (Nov 2014 – May 2015)

Research Assistant - OSU Dept. of Biological Chemistry & Pharmacology (Sep 2011 – May 2015)

Research Assistant - OSU Dept. of Food, Agricultural & Biological Engineering (Apr 2010 – Sep 2011)

FUNDING

Summary: Competitive federal/foundation support as PI and Co-I, including BWF CASI, AHA CDA, NASA NIAC, and Stanford translational awards.

Active / Awarded

02/2026 – 02/2027	SPARK Program in Translational Research (Stanford) Headley (Principal Investigator) – \$50,000 <i>Targeted Mitochondrial Delivery: In Vivo Testing of Antibody-Mitochondria Conjugates</i>
07/2025 – 06/2027	Health Disparities Research LRP Award, NIA Headley (Principal Investigator) – \$17,424 <i>Bioengineering Mitochondria for Targeted Delivery to the Immune-Cardiovascular Axis</i>
05/2025 – 04/2026	Southwest National Primate Research Center (SNPRC) Pilot Research Program Co-Principal Investigator (Olmo-Fontáñez, Headley) – \$100,000 <i>Advancing Immune Restoration in Aging via Targeted Mitochondrial Delivery</i>
01/2025 – 12/2029	Burroughs' Wellcome Fund Career Awards at the Scientific Interface (CASI) Headley (Principal Investigator) – \$560,000 <i>Bioengineering Mitochondria for Targeted Delivery</i>
01/2025 – 12/2027	American Heart Association (AHA) Career Development Award Headley (Principal Investigator) – \$231,000 <i>Rescuing Aging-Associated Cellular Dysfunctions in the Immune-Cardiovascular Axis Through Mitochondrial Transplantation</i>

Completed

09/2023 – 08/2026	Burroughs' Wellcome Fund Postdoctoral Diversity Enrichment Program Headley (Principal Investigator) – \$60,000 <i>Ameliorating Aging-Associated Vascular Dysfunction Through Mitochondrial Transplantation</i>
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01/2024 – 12/2026	Wu Tsai Human Performance Alliance Agility Grant (Stanford) Yang & Ikeda (Principal Investigator), Role: Co-Investigator – \$175,000 <i>Mitochondrial DNA Replenishment Therapy for Sarcopenia</i>
04/2025 – 12/2025	NASA NIAC, Space Technology Mission Directorate Hinshaw (Principal Investigator), Role: Co-Investigator – \$175,000 <i>Mito-Mars: Targeted Mitochondria Replacement Therapy to Boost Deep Space Endurance</i>
02/2025 – 12/2025	XPRIZE in Health-Span Semifinalist Award Co-Principal Investigators (Headley, Tsao, Llorente) – \$250,000 <i>MitoTags</i>
07/2024 – 09/2024	FY24 BID & PROPOSAL (VAPA PAVIR) Llorente, Tsao & Headley, Role: Co-Principal Investigators – \$20,000 <i>Mitochondrial Transplantation for Improving Cerebrovascular Health</i>
01/2023 – 01/2025	Stanford University Propel Post-Doctoral Scholar Award Headley (Principal Investigator) – \$180,000 <i>Mitochondrial Dysfunction and Transplantation in the Cardiovascular System</i>
01/2024 – 12/2024	Stanford Cardiovascular Institute Seed Grant Ikeda (Principal Investigator), Role: Co-Investigator – \$20,000 <i>Mitochondrial Transplantation Therapy for Mitochondrial Disease</i>
09/2021 – 07/2022	Stanford's Jump Start Award for Excellence in Research Headley (Principal Investigator) – \$3,000 <i>Mitochondrial Dysfunction in Abdominal Aortic Aneurysm (AAA) Pathology</i>
05/2021 – 04/2023	NIH-NHLBI T-32 Mechanisms and Innovations in Cardiovascular Disease (1T32HL098049) Tsao (Principal Investigator), Role: Co-Investigator – \$109,988 <i>Mitochondrial Phoenix: The dysfunction, transplantation, and rejuvenation of mitochondria in CVD</i>
01/2021 – 12/2021	Texas Biomedical Post-Doctoral Fellowship Headley (Principal Investigator) – \$60,000 <i>Ameliorating Aging-Associated T Cell Dysfunction Through Mito-Transplantation</i>
01/2017 – 01/2019	Douglass Foundation Forum Grant Headley (Principal Investigator) – \$77,890 <i>Mitochondrial Dysfunction & Aging Adaptive Immunity in M.tb</i>
09/2013 – 05/2014	OSU Arts and Sciences' Undergraduate Research Award Headley (Principal Investigator) – \$3,000
09/2012 – 05/2013	OSU Arts and Sciences' Undergraduate Research Award Headley (Principal Investigator) – \$3,000
Under Review/Submitted.	
12/2026 – 11/2028	NASA Innovative Advanced Concepts (NIAC) Phase II, Space Technology Mission Directorate Hinshaw (Principal Investigator), Role: Co-Investigator – \$750,000

	<i>MitoMars Phase II: Targeted Mitochondria Replacement Therapy to Boost Deep Space Endurance</i>
01/2026 – 12/2026	Michelson Prizes: Next Generation Grants (Michelson Medical Research Foundation) Headley (Principal Investigator) – \$150,000 <i>Targeted Mitochondrial Repair to Restore Vaccine Responsiveness in Aging</i>
12/2026 – 11/2029	AACR-Novocure Tumor Treating Fields Research Grant Lim (Principal Investigator), Role: Co-Investigator – \$350,000 <i>Tumor Treating Fields Enhance Anti-Tumor Immunity by Reprogramming Glioblastoma Metabolism and Preserving Immune Cell Bioenergetics</i>

AWARDS & HONORS

2026	Propel Alumni Travel Award
2026	Treva T. Brown Microscopy Impact & Leadership Award
2026	Ernest Everett Just Legacy Award for Exceptional Microscopy
2025	STAT Wunderkind: Rising star of science, medicine
2025	Excellence in Innovation Award – Stanford Grant Writing Academy
2025	NASA Institute for Advanced Concepts (NIAC) Fellow
2025	Top Read Article of 2023 – Advanced Science Journal (Wiley)
2025 - 2026	Keystone Symposia Fellow
2024 - 2025	NASA STAR (Spaceflight Technology, Applications and Research) Trainee (5 th Cohort)
2023 - 2024	Judge Travel Award; Annual Biomedical Research Conference for Minoritized Scientists
2023	Post-Doctoral Leadership Institute, SACNAS
2023	NIA Summer Training Course Travel Award
2023	Stanford University Justice Equity Diversity & Inclusion (JEDI) Post-Doctoral Award
2023 – 2026	Burroughs' Wellcome Fund Postdoctoral Diversity Enrichment Program
2023	Sanford Burnham Prebys Rising Star
2023 – 2025	Stanford University's Propel Fellowship
2022	Best Poster, Stanford-Cornell Cardiovascular Research Symposium
2022	Vasculata Scholarship
2022	Rockefeller University Exceptional Scholar Award
2021 – 2022	Jump Start Award for Excellence in Research
2021 – 2023	Mechanisms & Innovations in Vascular Disease NIH T-32 – Stanford University
2020 – 2021	Texas Biomedical Post-Doctoral Forum Fellowship
2020, 2021	Honorable Mention - Stanford.Berkeley.UCSF Next Generation Faculty Symposium
2020	Stanford PRISM Spring Cohort 5
2017 – 2019	Douglass Foundation Forum Scholarship
2017	Hodges Family Legacy Trainee Travel Award for Infectious Diseases
2014	The Ohio State University, College of Arts and Sciences Dean's list

2014	The Davis Heart and Lung Institute Research Day (Undergraduate Div. – 2nd Place)
2012 – 2014	The Ohio State University Arts and Sciences' Undergraduate Research Scholar
2011	The Ohio State University Scarlet and Gray-Grant

PUBLICATIONS

21 peer-reviewed publications | h-index: 11

Selected Highlights

- **Headley, C. A.**, Gautam, S., Olmo-Fontanez, A., Garcia-Vilanova, A., Dwivedi, V., Schami, A., Weintraub, S., Tsao, P. S., Torrelles, J. B., & Turner, J. (2024). Mitochondrial Transplantation Promotes Protective Effector and Memory CD4+ T Cell Response During Mycobacterium Tuberculosis Infection and Diminishes Exhaustion and Senescence in Elderly CD4+ T cells. *Adv Sci (Weinh)*. <https://doi.org/10.1002/advs.202401077>
- **Headley, C. A.**, Gautam, S., Olmo-Fontanez, A., Garcia-Vilanova, A., Dwivedi, V., Akhter, A., Schami, A., Chiem, K., Ault, R., Zhang, H., Cai, H., Whigham, A., Delgado, J., Hicks, A., Tsao, P. S., Gelfond, J., Martinez-Sobrido, L., Wang, Y., Torrelles, J. B., Turner, J. (2023). Extracellular Delivery of Functional Mitochondria Rescues the Dysfunction of CD4+ T Cells in Aging. *Adv. Sci (Weinh)*. 2303664. <https://doi.org/10.1002/advs.202303664>
- **Headley, C. A.**, Gerberick, A., Mehta, S., Wu, Q., Yu, L., Fadda, P., Khan, M., Ganesan, L. P., Turner, J., & Rajaram, M. (2019). Nontuberculous mycobacterium *M. avium* infection predisposes aged mice to cardiac abnormalities and inflammation. *Aging cell*, 18(3), e12926. <https://doi.org/10.1111/ace1.12926>
- **Headley C.A.**, DiSilvestro D, Bryant KE, Hemann C, Chen CA, Das A, Ziouzenkova O, Durand G, Villamena FA. (2016), Nitrones Reverse Hyperglycemia-Induced Endothelial Dysfunction in Bovine Aortic Endothelial Cells. *Biochemical Pharmacology*, 104, 108-117. <https://doi.org/10.1016/j.bcp.2016.01.005>

Full list

1. Hayes, C. A., **Headley, C. A.**, Nava, A. R., Vizcarra, E. A., Garcia, K. C., Mullen, M. M. S., Morales, J. F., Venida, A. C., & Follis, S. (2024). Revolutionizing postdoctoral training using the social ecological model: Insights and experiences from the Propel Scholars. *GEN Biotechnology*, 00(00). <https://doi.org/10.1089/genbio.2024.0014>
2. Joseph, A., & **Headley, C. A.** (2024). Early onset of Alzheimer's is on the rise - Evidence and implications. *International Journal of Life Sciences*. (In press)
3. **Headley, C. A.** (2024). Mitochondrial transplantation in the immune compartment. In *Mitochondrial Transplantation and Transfer: Biology, Methods, Applications, and Disease, Translational and Applied Bioenergetics* (In press). <https://doi.org/10.1016/B978-0-443-18858-9.00024-X>
4. **Headley, C. A.**, Gautam, S., Olmo-Fontanez, A., Garcia-Vilanova, A., Dwivedi, V., Schami, A., Weintraub, S., Tsao, P. S., Torrelles, J. B., & Turner, J. (2024). Mitochondrial Transplantation Promotes Protective Effector and Memory CD4+ T Cell Response During Mycobacterium Tuberculosis Infection and Diminishes Exhaustion and Senescence in Elderly CD4+ T cells. *Adv Sci (Weinh)*. <https://doi.org/10.1002/advs.202401077>
5. Hayes, C. A., Moore, J. T., **Headley, C. A.**, Berrios-Negron, A. L., & Lambert, W. M. (2024). Unlocking the power of virtual networking for early-career researchers. *eLife*, 13, e96381. <https://doi.org/10.7554/eLife.96381>
6. **Headley, C. A.**, Gautam, S., Olmo-Fontanez, A., Garcia-Vilanova, A., Dwivedi, V., Akhter, A., Schami, A., Chiem, K., Ault, R., Zhang, H., Cai, H., Whigham, A., Delgado, J., Hicks, A., Tsao, P. S., Gelfond, J., Martinez-Sobrido, L., Wang, Y., Torrelles, J. B., Turner, J. (2023). Extracellular Delivery of Functional Mitochondria Rescues the Dysfunction of CD4+ T Cells in Aging. *Adv. Sci (Weinh)*. 2303664. <https://doi.org/10.1002/advs.202303664>

7. Roychowdhury, T., Klarin, D., Levin, M. G., Spin, J. M., Rhee, Y. H., Deng, A., **Headley, C. A.**, Tsao, N. L., Gellatly, C., Zuber, V., Shen, F., Hornsby, W. E., Laursen, I. H., Verma, S. S., Locke, A. E., Einarsson, G., Thorleifsson, G., Graham, S. E., Dikilitas, O., Pattee, J. W., Judy, R. L., Pauls-Verges, F., Nielsen, J. B., Wolford, B. N., Brumpton, B. M., Dilmé, J., Peypoch, O., Juscafresa, L. C., Edwards, T. L., Li, D., Banasik, K., Brunak, S., Jacobsen, R. L., Garcia-Barrio, M. T., Zhang, J., Rasmussen, L. M., Lee, R., Handa, A., Wanhainen, A., Mani, K., Lindholt, J. S., Obel, L. M., Strauss, E., Oszkinis, G., Nelson, C. P., Saxby, K. L., van Herwaarden, J. A., van der Laan, S. W., van Setten, J., Camacho, M., Davis, F. M., Wasikowski, R., Tsoi, L. C., Gudjonsson, J. E., Eliason, J. L., Coleman, D. M., Henke, P. K., Ganesh, S. K., Chen, Y. E., Guan, W., Pankow, J. S., Pankratz, N., Pedersen, O. B., Erikstrup, C., Tang, W., Hveem, K., Gudbjartsson, D., Gretarsdottir, S., Thorsteinsdottir, U., Holm, H., Stefansson, K., Ferreira, M. A., Baras, A., Kullo, I. J., Ritchie, M. D., Christensen, A. H., Iversen, K. K., Eldrup, N., Sillesen, H., Ostrowski, S. R., Bundgaard, H., Ullum, H., Burgess, S., Gill, D., Gallagher, K., Sabater-Lleal, M., Surakka, I., Jones, G. T., Bown, M. J., Tsao, P. S., Willer, C. J., & Damrauer, S. M. (2023). Genome-wide association meta-analysis identifies risk loci for abdominal aortic aneurysm and highlights PCSK9 as a therapeutic target. *Nature Genetics*, 55(11), 1831-1842. <https://doi.org/10.1038/s41588-023-01510-y>
8. Marshall, A. G., Vue, Z., Beasley, H. K., Neikirk, K., Stephens, D., Wanjalla, C. N., Damo, S. M., Trejo, J., Rodriguez-Aliaga, P., **Headley, C. A.**, Shuler, H., Liu, K., Smith, N., Garza-Lopez, E., Barongan, T., Scudese, E., Spencer, E., Heemstra, J., Vazquez, A. D., Murray, S. A., & Hinton, A. Jr. (2023). Diversity, equity, and inclusion in the laboratory: Strategies to enhance inclusive laboratory culture. *Molecular Cell*, 83(21), 3766-3772. <https://doi.org/10.1016/j.molcel.2023.09.011>
9. **Headley, C. A.**, & Tsao, P. S. (2023). Building the case for mitochondrial transplantation as an anti-aging cardiovascular therapy. *Frontiers in Cardiovascular Medicine*, 10, 1141124. <https://doi.org/10.3389/fcvm.2023.1141124>
10. Dwivedi, V., Gautam, S., Beamer, G., Stromberg, P. C., **Headley, C. A.**, & Turner, J. (2023). IL-10 Modulation Increases Pyrazinamide's Antimycobacterial Efficacy against Mycobacterium tuberculosis Infection in Mice. *ImmunoHorizons*, 7(6), 412–420. <https://doi.org/10.4049/immunohorizons.2200077>
11. Ransey, E., Brookens, S., Beasley, H. K., Marshall, A., Marlin, B. J., Rodriguez-Aliaga, P., **Headley, C. A.**, Wanjalla, C., Vazquez, A. D., Murray, S., Damo, S., Taabazuing, C. Y., & Hinton, A., Jr (2023). A Practical Guide to Graduate School Interviewing for Historically Excluded Individuals. *American journal of physiology. Heart and circulatory physiology*, 10.1152/ajpheart.00123.2023. <https://doi.org/10.1152/ajpheart.00123.2023>
12. Dwivedi, V., Gautam, S., **Headley, C. A.**, Piergallini, T., Torrelles, J. B., & Turner, J. (2022). IL-10 receptor blockade delivered simultaneously with Bacillus Calmette–Guérin vaccination sustains long-term protection against mycobacterium tuberculosis infection in mice. *The Journal of Immunology*. <https://doi.org/10.4049/jimmunol.2100900>
13. Scordo, J. M., Piergallini, T. J., Reuter, N., **Headley, C. A.**, Hodara, V. L., Gonzalez, O., Giavedoni, L. D., Papin, J. F., & Turner, J. (2021). Local immune responses to tuberculin skin challenge in Mycobacterium Bovis BCG-vaccinated baboons: a pilot study of younger and older animals. *Immunity & ageing: I & A*, 18(1), 16. <https://doi.org/10.1186/s12979-021-00229-w>
14. Oladunni, F. S., Park, J. G., Pino, P. A., Gonzalez, O., Akhter, A., Allué-Guardia, A., Olmo-Fontánez, A., Gautam, S., Garcia-Vilanova, A., Ye, C., Chiem, K., **Headley, C.**, Dwivedi, V., Parodi, L. M., Alfson, K. J., Staples, H. M., Schami, A., Garcia, J. I., Whigham, A., Platt, R. N., 2nd, ... Torrelles, J. B. (2020). Lethality of SARS-CoV-2 infection in K18 human angiotensin-converting enzyme 2 transgenic mice. *Nature Communications*, 11(1), 6122. <https://doi.org/10.1038/s41467-020-19891-7>
15. Ault, R. C., **Headley, C. A.**, Hare, A. E., Carruthers, B. J., Mejias, A., & Turner, J. (2020). Blood RNA signatures predict recent tuberculosis exposure in mice, macaques, and humans. *Scientific Reports*, 10(1), 16873. <https://doi.org/10.1038/s41598-020-73942-z>

16. **Headley, C.**, Turner, J., & Rajaram, M. V. (2019). Aging heart and infection. *Aging*, 11(14), 4781–4782. <https://doi.org/10.18632/aging.102128>
17. **Headley, C. A.**, Hoffman, C. N., Freisen, J. M., Han, Y., Macklin, J. M., Zweier, J. L., Rockenbauer, A., Kuret, J., & Villamena, F. A. (2019). Membrane-specific spin trap, 5-dodecylcarbamoyl-5-N-dodecylacetamide-1-pyrroline-N-oxide (diC12PO): theoretical, bioorthogonal fluorescence imaging and EPR studies. *Organic & Biomolecular Chemistry*, 17(33), 7694–7705. <https://doi.org/10.1039/c9ob01334b>
18. **Headley, C. A.**, Gerberick, A., Mehta, S., Wu, Q., Yu, L., Fadda, P., Khan, M., Ganesan, L. P., Turner, J., & Rajaram, M. (2019). Nontuberculous mycobacterium *M. avium* infection predisposes aged mice to cardiac abnormalities and inflammation. *Aging cell*, 18(3), e12926. <https://doi.org/10.1111/acer.12926>
19. Lloyd, B., Tee, B. C., **Headley, C.**, Emam, H., Mallery, S., & Sun, Z. (2017). Similarities and differences between porcine mandibular and limb bone marrow mesenchymal stem cells. *Archives of oral biology*, 77, 1–11. <https://doi.org/10.1016/j.archoralbio.2017.01.012>
20. **Headley C.A.**, DiSilvestro D, Bryant KE, Hemann C, Chen CA, Das A, Ziouzenkova O, Durand G, Villamena FA. (2016), Nitrones Reverse Hyperglycemia-Induced Endothelial Dysfunction in Bovine Aortic Endothelial Cells. *Biochemical Pharmacology*, 104, 108-117. <https://doi.org/10.1016/j.bcp.2016.01.005>
21. Pérez-Cruz, F., Villamena, F., Zapata-Torres, G., Das, A., **Headley, C.**, Quezada, E., Lopez-Alarcon, C. and Olea-Azar, C. (2013). Selected hydroxycoumarins as antioxidants in cells: physicochemical and reactive oxygen species scavenging studies. *Journal of Physical Organic Chemistry*, 26(10), pp.773-783. <https://doi.org/10.1002/poc.3155>

PREPRINTS/ UNDER REVIEW/ MANUSCRIPTS IN PREP

22. Guarnieri, J. W., Maghsoudi, Z., Kim, J., Bya, P., Widjaja, G. A., Barker, R., Burke, M., Cen, Z., Fazelinia, H., Tsoy, S., Tiersky, R., Peczak, A., Kim, J., Kim, Y.-A., Haltom, J., Almeida, M., Garriss, M. A., Day, S., Sanchez-Hodge, R., Zilberman, A. H., Allen, N. G., Kukib, A. J., Blaber, E. A., Mathyk, B., Harris, F. C., Singh, K., Sen, C. K., Innes, L., Ali, N., Berliner, A. J., Kar, U., Overbey, E., Giunta, S., Podrabsky, J. E., Neal, M. D., Billiar, T. R., **Headley, C.**, Meydan, C., Tasoula, A., Szewczyk, N. J., Ikeda, Y., Gotoh-Katoh, A., Schisler, J. C., Kim, M. S., Schwartz, R. E., Wallace, D. C., Mason, C. E., Nguyen, T., & Beheshti, A. (2024). Guardians of the mitochondria: Space Mitochondria 2.0 systemic analysis reveals bioenergetic dysregulation across species. SSRN. <https://doi.org/10.2139/ssrn.5087025> (Under review)
23. Tu, M., Fang, C., **Headley, C. A.**, Wang, C., Zhou, J., Mao, M., Lin, Q., Xiang, Y., Hu, Q., Dong, Y., Wu, W., Dong, N., Zhang, Y., Wang, L., Yuan, H., & Ban, Z. Predicting nutrition-related disease risks through machine learning: Guiding interventions for healthier diets (Under review)
24. Vohra, D., & Headley, C. (2024). Detrimental Effect of Mitochondrial Dysfunction on The Onset Of ATTR Amyloidosis. *Research Archive of Rising Scholars*. <https://doi.org/10.58445/rars.996>
25. **Headley, C. A.**, Pena, C, & Botham, C. Teaching Grant Writing in the Age of AI (Under prep)
26. Headley, C., Wilson, K., Chitayat, L., Boominathan, A., Rohrer, B., Beamud, B., Ivanov, B. S., Domene, C., Contini, C., Oniscu, G. C., Ikeda, G., Ma, H., Collinson, I., McCully, J. D., James, J. S., Gombeau, K., Magni, L., Bruce, M., Bullock, N., . . . Elani, Y. Toward a bioenergetic renaissance: Unlocking mitochondria to transform science, medicine, and technology (Under review).
27. Olmo-Fontáñez, A. M., Turner, J., **Headley, C. A.**, Rescuing the Aging Immune System via Mitochondrial Transplantation to Extend Health-Span. (Under prep).

PATENTS

- U.S. Provisional Patent Application No. 63/502,036 (Mitochondrial transfer for the treatment of disease)
 U.S. Provisional Patent Application No. 63/560,421 (Bioengineered mitochondria for targeted delivery to cells)

ORAL PRESENTATIONS, SEMINARS & INVITED PANELS

Over 40 total presentations; selected invited talks at peer institutions and major conferences listed below.

2026	Mitochondrial Transplantation and Genome Editing: Engineering the Metabolic Engine of Complex Life (Panelist), <i>SynBioBeta 2026 (Longevity Track)</i> , San Jose, CA
2026	Expert Roundtable on Mitochondrial Health & Medicine (Speaker & Discussion Leader), <i>Countdown: An Afternoon of Energy</i> , The Hamptons, NY
2025	Mitochondrial Transplantation in CVD, <i>The Cardiovascular – Kidney – Metabolic Syndrome Meeting (virtual)</i> , Austria
2025	Bioengineering Mitochondria for Precision Medicine, <i>Stanford.Berkeley.UCSF Next Generation Faculty Symposium (virtual)</i> , San Francisco, CA
2025	Building the Case for Targeted Mitochondrial Delivery via MitoTags, <i>2060 Forum</i> , Aix-En-Provence, France.
2025	Bioengineering Mitochondria for Transplantation Therapy, <i>Foresight Institute's Biotech and Health Extension Program</i> , San Francisco, CA
2025	Targeting Immune Aging with Mitochondrial Transplantation, <i>Lifespan Research Institute</i> , Mountain View, CA.
2025	Mitochondria (Seminar), Lim Lab, Stanford School of Medicine, Palo Alto, CA.
2025	Pivot & Pitch: Reframing Your Research to Increase Funding Success (Panelist), <i>Stanford Grant Writing Academy & Office of PostDoctoral Affairs</i> , Palo Alto, CA.
2025	MitoTags, Xprize HealthSpan Competition, Investor's Forum, Manhattan, NY
2025	Bioengineering Mitochondria for Targeted Mitochondrial Transplantation, <i>Mitochondrial Transplantation and Next Generation Therapeutics Conference</i> , Long Island NY,
2025	What we do Know and What We Don't Know (Panelist), <i>Mitochondrial Transplantation and Next Generation Therapeutics Conference</i> , Long Island NY,
2025	Building the Case for Mitochondrial Transplantation for Enhanced Immune Health in Aging, <i>Lunch & Learn Seminar Series</i> , University of Colorado, Anschutz Medical Campus, Aurora, CO
2025	Bioengineering Mitochondria for Targeted Mitochondrial Transplantation in Aging & Disease, <i>Maximum Life Extension Summit</i> , Prospera, Honduras
2025	Mitochondrial Rejuvenation, <i>Stanford Applied Longevity Technology Symposium (SALTS)</i> , Stanford University, Palo Alto, CA
2024	Building the Case for Mitochondrial Transplantation to Enhance Immune Health in Aging <i>Einstein-MSSM DRC WIP Seminar</i> , Albert Einstein School of Medicine, NYC, USA
2024	Rescuing Aging-Associated Immune Dysfunctions via Mitochondrial Transplantation, <i>Samuel M. Narbrit Symposium</i> , Brown University, Providence, RI
2024	Recharging Your Powerhouses: Mitochondrial Transplantation for Improved Immune & Cardiovascular Health in Aging, <i>Longevity San Juan</i> , Old San Juan PR
2024	Immune Responses to Vaccines and Pathogens Across Age Groups (Panel Moderator), <i>Day of Immunology Celebration</i> ; Partnership between Black-In-Immuno & Immuno-Africa podcast (Virtual)

Outreach & Community Presentations

2026	White Coats & Clinical Codes: Career Pathways in Medicine (Career Panelist), Stanford Dept. of Medicine & Neighborhood X Labs, Stanford, CA
2025	Pivot & Pitch: Reframing Your Research to Increase Funding Success (Panelist), Stanford Grant Writing Academy

2024	Immune-Engineering – Mitochondrial Transplantation for Healthy Aging, Black Engineering Week, San Jose State University
2024	Following the electrons: My Journey Through Science, IMSD, UT Health San Antonio
2024	WTF is a PostDoc, Biomedical Sciences Graduate Program, The Ohio State University
2024	Mitochondria, Design & Technology Academy, ED White Middle School, San Antonio, TX
2024	Immune Responses to Vaccines and Pathogens Across Age Groups (Panel Moderator), Day of Immunology, Black-In-Immuno
2023	Hip Hop & Mitochondria: My Pathway to Science, Biotech Partners, San Francisco, CA
2022	My Pathway to Science, Pathways in BME Seminar Series, San Jose State University
2021	COVID-19 & Cardiovascular Health, Black in Cardio Week
2021	My Science Odyssey, Palo Alto College STEM Center Black History Month Speaker Series

ABSTRACTS & POSTERS

Over 30 total conference abstracts; selected recent presentations listed below.

2024	Headley CA , Hu C, Chiang G, Oropeza BP, Tsao PS, Huang NF. Delivery of Allogeneic Mitochondria Reverses Signatures of Endothelial Aging & Senescence. <i>Cell Symposia: Multifaceted Mitochondria</i> (Sitges, Spain)
2024	Headley CA , Hu C, Chiang G, Oropeza BP, Tsao PS, Huang NF. Delivery of Allogeneic Mitochondria Accelerates Revascularization In A Murine Model Of Peripheral Arterial Disease And Reverses Metabolic Signatures Of Endothelial Senescence. <i>AHA Vascular Discovery</i> (Chicago, IL, USA)
2023	Headley CA , Hu C, Chiang G, Oropeza BP, Tsao PS, Huang NF. Delivery of Allogeneic Mitochondria Accelerates Revascularization in A Murine Model of Peripheral Arterial Disease and Reverses Metabolic Signatures of Endothelial Senescence. <i>Annual American Heart Association Meeting</i> (Philadelphia, USA)
2022	Headley CA , Rhee YH, Spin JM, Deng A, Tsao PS. Rescuing Aging-Associated Cardiovascular Dysfunction Through Mitochondrial Transfer. <i>Stanford-Cornell Cardiovascular Research Symposium</i> (Stanford, USA)
2022	Spin JM, Mulorz J, Mulorz P, Rhee YH, Butterfield J, Amirahmadi A, Chavan S, Headley CA , Deng A, Wagenhaeuser M, Tsao PS. Nicotine Transgenerationally Alters Gene Methylation and Risk of Abdominal Aortic Aneurysm. <i>Stanford-Cornell Cardiovascular Research Symposium</i> (Stanford, USA)
2022	Headley CA , Rhee YH, Spin JM, Deng A, Tsao PS. Rescuing Aging-Associated Cardiovascular Dysfunction Through Mitochondrial Transfer. <i>13th World Mitochondrial Congress</i> (Berlin, GER)
2022	Headley CA , Rhee YH, Spin JM, Deng A, Tsao PS. Rescuing Aging-Associated Cardiovascular Dysfunction Through Mitochondrial Transfer. <i>Annual North American Vascular Biology Meeting (Vasculata)</i> , Duke University (NC, USA).
2022	Kim J, Daadi E, Oh T, Daadi E, Headley C , Turner J, Deleidi M, Daadi M. LRRK2 attenuates antioxidant response in familial Parkinson's disease derived neural stem cells. <i>Annual Research Symposium at Texas Biomedical Research Institute</i> (Texas, USA).
2022	Rhee YH, Spin JM, Deng A, Butterfield J, Headley CA , Tsao PS. IRF8 and Securinine: Seeking Treatments for Abdominal Aortic Aneurysm. <i>Vascular Discovery</i> (WA, USA).

2020	Scordo JM, Piergallini TJ, Headley CA , Hodara V, Reuter N, Papin JF, Turner J. The role of old age on <i>Mycobacterium bovis</i> BCG vaccine-induced tissue immunity. <i>American Association of Immunologists Annual Meeting</i> .
2020	Headley CA , Gautam S, Akhter A, Dwivedi V, Ault R, Torrelles J, Gelfond J, Turner J. Ameliorating Mitochondrial Oxidative Stress in Old CD4+ T cells. <i>Research Symposium at Texas Biomedical Research Institute</i> (Texas, USA).
2019	Headley CA , Dwivedi V, Ault R, Turner J. Ameliorating Mitochondrial Oxidative Stress in Old CD4+ T cells. <i>Research Symposium at Texas Biomedical Research Institute</i> (Texas, USA).
2019	Headley CA , Dwivedi V, Ault R, Turner J. Ameliorating Mitochondrial Dysfunction in Aging CD4+ T cells Through Extracellular Delivery of Viable Mitochondria. <i>4th International Conference on ImmunoMetabolism: Molecular and Cellular Immunology of Metabolism</i> (Rhodes, Greece).

TEACHING

Year	Course Code	Role	Hours	Class Size	Institution
2025	TECH 28	Guest Lecture	8	112	Stanford
2025	W25-INDE-267-01	Teaching Asst.	10	15	Stanford
2024	F23-BIOS 299 (Writing)	Teaching Asst.	20	7	Stanford
2024	Research Writing	Instructor	48	7	Education Unlimited (Stanford)
2024	Cardiology	Instructor	40	15	Education Unlimited (Stanford)
2024	Genetics	Instructor	40	19	Education Unlimited (Stanford)
2024	W24-INDE-267-01	Teaching Asst.	10	20	Stanford
2023	F23-BIOS 299 (Writing)	Teaching Asst.	20	8	Stanford
2022	F22-BIOS 299	Teaching Asst.	20	10	Stanford

MENTEES

Year	Name	Capacity	Institution
2023	Ines Ross Taco	Flow Cytometry	Stanford / VA Palo Alto
2025	Joseph Hyunjong Ha	MD Candidate - Research	Stanford University
2024 - 2025	Jaelin Helm	College Applications	N/A
2024	Simran Singh	Summer Research	VA PAVIR SRP
2023 - 2025	Juliette Noyer	Master's Research	San Jose State University
2023 - 2024	Aldan Joseph	High School Science	Polygence
2023 - 2024	Dilpreet Voltra	High School Science	Polygence
2022 - 2023	Shahzad Khan	Grant Writing Facilitator	Stanford University
2022	Amanda Pacheco Lebron	Summer Research	Stanford University
2022	Joiliana Lecointe	Summer Research	Stanford University
2022	Theodora Abah	Summer Research	Stanford University
2022	Nahom Zewde	Summer Research	Stanford University
2020 - 2021	Justin Sharp	Post-Bac	UT-Health San Antonio
2020 - 2021	Mariame Diabate	Post-Bac	The Ohio State University
2020 - 2021	Nahara Maldonado Vargas	Post-Bac	The Ohio State University
2020 - 2021	Rodnei Colon-Ortiz	Post-Bac	The Ohio State University
2020 - 2021	David Akanonu	Post-Bac	The Ohio State University
2020 - 2021	Erika Mendoza-Mendoza	Post-Bac	The Ohio State University

2020 - 2021	Nashali Massa-Arroyo	Post-Bac	The Ohio State University
2018 -	Dominic Crute	HS & Undergrad Science	Stanford University
2013 - 2014	Drew Peth	Undergrad - Research techniques	San Jose State University
2013	Devin Fambro	Undergrad - Research techniques	The Ohio State University
2013	Cindy Lin	Undergrad - Research techniques	The Ohio State University

LEADERSHIP & SERVICE

2026–	Affiliate Scientist, Southwest National Primate Research Center (SNPRC)
2025–2028	Research Affairs Core Committee, Endocrine Society
2025–	Chair, Science Advisory Board, Countdown For A Cure
2024–	Organizing Committee, Mito-Transplantation and Next Generation Therapeutics Conference
2024–	Lecturer, Geneva College of Longevity Science (GCLS)
2023–	Review Editor in Bioenergetics, Frontiers in Molecular Biosciences
2023–2024	Co-Chair, Stanford University Black Postdoc Association
2022–2024	Executive Board, VP of Diversity, Equity & Inclusion, Biotech Connection Bay Area (501(c)(3))
2022–2023	Mentor, Metascience Analyses of Reproducibility in Cardiovascular Science, Stanford
2021–2023	Co-Organizer & Social Media Coordinator, Black-In-Immuno (501(c)(3))
2020–2021	Diversity & Inclusion Committee Lead, Texas Biomedical Research Institute
2020–2021	Post-Baccalaureate Research Education Program (PREP) Mentor, UT Health San Antonio
2019–2021	Community Outreach Committee Member, Texas Biomedical Research Institute
2019–2020	Co-founder, Deputy Director, Enventure San Antonio (Non-profit)
2018–2020	Co-founder/Treasurer then Executive Board, Texas Biomed Student Association (TBAT)
2016–2020	Graduate Student Ambassador, Biomedical Sciences Graduate Program, OSU
2016–2020	Discovery PREP Mentor, The Ohio State University
2011–2015	Research Techniques Trainer (8 students), Dept. of Pharmacology, OSU

PEER REVIEW

Journal Review (Ad Hoc)

2025	Aging Cell, iScience, Frontiers in Pharmacology, Frontiers in Molecular Biosciences, Frontiers in Immunology, Cell Cycle, Frontiers in Psychiatry, Frontiers in Cardiovascular Med,
2024	Frontiers in Nutrition, Frontiers in Cellular Neuroscience, Circulation Research, Journal of Cellular Physiology
2023	Immunity, Inflammation and Disease, Journal of Cellular Physiology, Cell Cycle, Advanced Biology, Aging Cell, JVS-Vascular Science
2022	Journal of Molecular Medicine, Scientific Reports, Oxidative Medicine and Cellular Longevity, Frontiers in Neurology, Cell Cycle
2019	European Journal of Immunology
2018	Immunity & Ageing

Grant Review

2026	American Heart Association – Basic Sciences
2025	American Heart Association - Virology & Diseases: Immunology
2025	NASA - E.9 SBRS - Precision Health: Cardiovascular
2024	New Frontiers in Research Fund (NFRF) (Canada) – Mitochondrial Biology
2024	Stanford Cardiovascular Institute (CVI) – Seed Funds

SCIENTIFIC ADVISORY BOARDS & CONSULTING

2026	Organelyx – Role: Scientific Advisory Board Member
2026	Thermogen Biotherapeutics – (Santa Barbara, CA) – Role: Scientific Advisory Board Member
2024	We Hear You (St. Louis, MO) – Role: Executive Advisory Board Member
2024	Countdown For A Cure (Atlanta, GA) – Role: Scientific & Executive Advisory Board Member
2024	Wonderfeel, Inc (San Francisco, CA) – Role: Scientific Advisory Board Member
2023	Mitrix Corp (Pleasanton, CA) – Role: Scientific Advisory Board Member
2022 – 2024	Biotech Connection-Bay Area (BCBA) (San Francisco, CA) – Role: Consultant
2020 – 2021	Enventure (San Antonio, TX) – Role: Consultant

PROFESSIONAL DEVELOPMENT, CERTIFICATES & ADDITIONAL TRAINING

Memberships: Endocrine Society (2022–), American Aging Association (2022–), American Heart Association (2022–), National Black Post-Doc Association (2020–)

Certificates: Leverage Diversity and Inclusion for Organizational Excellence (Stanford, 2023), MAVERICs Mentorship (Stanford, 2022), Essentials of Clinical Research (Stanford, 2022), Basic Patent Law (Stanford, 2021), Peer Mentorship (OSU, 2021)

Workshops: ARIA Precision Mitochondria (2025), NIA Summer Training Course (2023), SACNAS Post-Doctoral Leadership Institute (2023), DivSch24 Conference (2023), BWF New Awardee Networking Meeting (2023)

MEDIA COVERAGE

- **Stanford University** – [Propel Scholar Profile](#)
- **Keystone Symposia** – [Fellows Directory \(2025\)](#)
- **Foresight Institute** – [Biotech & Health Extension: Bioengineering Mitochondria](#)
- **Longevity Global Summit** – [Peak Mitochondrial Performance for Life's Bioenergetic Marathon](#)
- **SynBioBeta** – [2026 Speaker Profile](#)
- **Wonderfeel** – [Scientific Advisory Board Profile](#)
- Selected Online Profiles / Features
- **Rockefeller University** – [Exceptional Scholars Workshop Symposium](#)
- **Texas Biomed** – [Friday Seminar Series / Author Archive](#)
- **Startups San Antonio** – [Enventure San Antonio & Student Opportunities](#)
- **Texas Biomed** – [2021 Forum Grant Recipients](#)
- **Texas Biomed Podcast** – [Ep. 048: Next Gen Scientists](#)
- **Texas Biomed** – [Bill & Melinda Gates Foundation SARS-COV-2 Grant](#)