Timothy Keyes — Curriculum Vitae

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Education

MD — Stanford University School of Medicine, Stanford, CA (*Expected 2028*)

- MD/PhD program

PhD in Cancer Biology — Stanford University School of Medicine, Stanford, CA (*Conferred*)

- Advisors: Kara L. Davis, DO & Garry P. Nolan, PhD
- Focus: machine learning applied to single-cell data in pediatric leukemia

MS in Biomedical Data Science — Stanford University School of Medicine, Stanford, CA (*Conferred*)

- Thesis readers: Robert Tibshirani, PhD & Trevor Hastie, PhD

BA in Psychology and Neuroscience — Princeton University, Princeton, NJ (*Conferred*)

- Summa cum laude
- Concentrations in Neurobiology and Quantitative/Computational Neuroscience
- Phi Beta Kappa

Year Abroad — St Edmund Hall - University of Oxford, Oxford, UK (*Completed*)

- Concentrations: Biochemistry, Experimental Psychology

Experience

Senior Data Scientist — Stanford Health Care - Technology & Digital Solutions, Stanford, CA (*Current*)

- Clinical AI platform (ChatEHR)
- LLM-powered automations for clinical workflows
- Continuous monitoring of deployed AI systems

Data Science Mentor (Contract) — Posit, PBC, Remote (*Current*)

- Mentor for Posit Academy cohorts learning R and Python

Graduate Research Assistant — Davis and Nolan Laboratories, Stanford University School of Medicine, Stanford, CA (*Former*)

- PhD research in computational cancer biology
- Machine learning on single-cell data in pediatric leukemia
- Developed several R/Python packages for single-cell data analysis

Data Scientist & Founding Member — Medical Student Pride Alliance (MSPA), Remote (*Former*)

- Data analysis and visualization for strategic decision-making
- Mentored student analysts in Python and R

Laboratory Technician — Kipnis Laboratory, University of Virginia, Charlottesville, VA (*Former*)

- Contributed to the novel characterization of meningeal lymphatic vessels in the mouse and human CNS
- Led 3D computational modeling of meningeal lymphatics

Undergraduate Research Assistant — Gould Laboratory, Princeton University, Princeton, NJ (*Former*)

- Investigated effects of physical activity and norepinephrine signaling on astrocyte and microglial morphology in the adult rat hippocampus

Publications

†Co-first author · ‡Co-second author

2026

- **Timothy Keyes**†, Jane Wang†, April S. Liang, Stephen P. Ma, Jason Shen, Jerry Liu, et al.. Deployment and Evaluation of an EHR-integrated, Large Language Model-Powered Tool to Triage Surgical Patients. *arXiv*.
- **Timothy Keyes**†, Shyon Parsa†, Dev Dash, Danton Char, Michelle M. Mello, Alison Callahan, et al.. Designing Clinically Useful AI: A Blueprint for Impact. *NEJM AI*.
- **Timothy Keyes**†, Tim Ellis-Caleo†, Nerissa Ambers, Faraah Bekheet, Wen-wai Yim, Nikesh Kotecha, et al.. Development, Evaluation, and Deployment of a Multi-Agent System for Thoracic Tumor Board. *arXiv*.
- Francois Grolleau, **Timothy Keyes**‡, April S. Liang‡, Stephen P. Ma, Thomas Lew, Tridu R. Huynh, et al.. MedAgentBrief for Hospital Course Summarization: Safety, Use, and Discharge Documentation Burden. *medRxiv*.
- Nigam H. Shah, Nerissa Ambers, Abby Pandya, **Timothy Keyes**, Juan M. Banda, Srikar Nallan, et al.. Adoption and Use of LLMs at an Academic Medical Center. *arXiv*.
- Yuxuan Liu, Haowen Jiang, Jingjing Liu, Lucille Stuani, Milton J Merchant, **Timothy Keyes**, et al.. DHODH as a Targetable Metabolic Achilles' Heel for chemo-resistant B-ALL. *Blood*.

2025

- **Timothy Keyes**†, Alison Callahan†, Abby S. Pandya†, Nerissa Ambers, Juan M. Banda, Miguel Fuentes, et al.. Monitoring Deployed AI Systems in Health Care. *arXiv*.
- **Timothy Keyes**†, Erin Craig†, Jolanda Sarno, Jeremy P. D'Silva, Pablo Domizi, Maxim Zaslavsky, et al.. Annotation-free discovery of disease-relevant cells in single-cell datasets. *Science Advances*.
- Eugenia Miranti, **Timothy Keyes**, Alvaro Ayala, Nerissa Ambers, Gina Newman, Elmer de Leon, et al.. Use of a large language model integrated within the electronic medical record for the evaluation of surgical site infections. *Infection Control & Hospital Epidemiology*.
- Francois Grolleau, Emily Alsentzer, **Timothy Keyes**, Philip Chung, Akshay Swaminathan, Asad Aali, et al.. MedFactEval and MedAgentBrief: A Framework and Workflow for Generating and Evaluating Factual Clinical Summaries. *Biocomputing 2026: Proceedings of the Pacific Symposium*.
- Guillermo Rodriguez-Nava, **Timothy Keyes**, Nerissa Ambers, Eugenia Miranti, Erika Paola Viana-Cardenas, Wajeeha Tariq, et al.. Using secure artificial intelligence agents integrated within the electronic medical record for the evaluation of blood culture appropriateness. *Infection Control & Hospital Epidemiology*.
- Shyon Parsa, **Timothy Keyes**, Dev Dash, Michelle Mello, Heidi Salisbury, Alison Callahan, et al.. Target Product Profile to Evaluate the Clinical Utility, Financial Impact, and Ethical Implications of an AI-Based HCM Detection Model. *Circulation*.
- Suhana Bedi, Hejie Cui, Miguel Fuentes, Alyssa Unell, Michael Wornow, **Timothy Keyes**, et al.. Holistic evaluation of large language models for medical tasks with MedHELM. *Nature Medicine*.
- Tomasz Wlodarczyk, Aaron Lun, Diana Wu, Minyi Shi, Xiaofen Ye, **Timothy Keyes**, et al.. Epiregulon: Single-cell transcription factor activity inference to predict drug response and drivers of cell states. *Nature Communications*.

2024

- **Timothy Keyes**†, William J. Hutchison†, Helena L. Crowell, Jacques Serizay, Charlotte Soneson, Eric S. Davis, et al.. The tidyomics ecosystem: enhancing omic data analyses. *Nature Methods*.
- Alea Delmastro, Candace Liu, Xiao-Wen Ding, Serena Tan, Inna Averbukh, **Timothy Keyes**, et al.. IFN-gamma-Expressing Myeloid Cells Localize within Lipoproteinosis during Drug-Associated Pulmonary Alveolar Proteinosis occurring in Systemic Juvenile Idiopathic Arthritis. *bioRxiv*.

- Darnell K. Adrian Williams, Briana Christophers, **Timothy Keyes**, Rachit Kumar, Michael C. Granovetter, Alexandria Adigun, et al.. Sociodemographic factors and research experience impact MD-PhD program acceptance. *JCI Insight*.

2023

- **Timothy Keyes**, Abhishek Koladiya, Yu-Chen Lo, Garry P. Nolan, Kara L. Davis. tidytof: a user-friendly framework for scalable and reproducible high-dimensional cytometry data analysis. *Bioinformatics Advances*.
- Michael Albert Gisondi, **Timothy Keyes**, Shana Zucker, Deila Bumgardner. Teaching LGBTQ+ health, a web-based faculty development course: program evaluation study using the RE-AIM framework. *JMIR Medical Education*.
- Yu-Chen Lo, Yuxuan Liu, Marte Kammersgaard, Abhishek Koladiya, **Timothy Keyes**, Kara L. Davis. Single-cell technologies uncover intra-tumor heterogeneity in childhood cancers. *Seminars in Immunopathology*.

2022

- **Timothy Keyes**, Astraea Jager, Mason Krueger, Sylvia Plevritis, Robert Tibshirani, Richard Aplenc, et al.. Improved Relapse Prediction in Pediatric Acute Myeloid Leukemia By Deconvolving Lineage-Specific and Cancer-Specific Features in Single-Cell Data. *Blood*.
- **Timothy Keyes**, Shana Zucker, Teddy G. Goetz, Justin L. Jia, Samuel R. Bunting, Mitchell R. Lunn, et al.. Sexual and gender minority identity disclosure from undergraduate to graduate medical education: perceptions of professional Outness among Medical Students. *Annals of LGBTQ Public and Population Health*.
- Yu-Chen Lo, **Timothy Keyes**, Astraea Jager, Jolanda Sarno, Pablo Domizi, Ravindra Majeti, et al.. CytofIn enables integrated analysis of public mass cytometry datasets using generalized anchors. *Nature Communications*.

2020

- **Timothy Keyes**, Pablo Domizi, Yu-Chen Lo, Garry P. Nolan, Kara L. Davis. A cancer biologist's primer on machine learning applications in high-dimensional cytometry. *Cytometry Part A*.
- Connie H. Lin, Hye Sun Kuehn, Timothy J. Thauland, Christine M. Lee, Suk See De Ravin, **Timothy Keyes**, et al.. Progressive B Cell Loss in Revertant X-SCID. *Journal of Clinical Immunology*.
- Samuel R. Bunting, Sarah S. Garber, Robert H. Goldstein, Timothy D. Ritchie, Tamzin J. Batteson, **Timothy Keyes**. Student Education About Pre-Exposure Prophylaxis (PrEP) Varies Between Regions of the United States. *Journal of General Internal Medicine*.
- Teddy G. Goetz, Shana Zucker, **Timothy Keyes**, Michael Gisondi. Medical Student Pride Alliance: The First National LGBTQ+ Medical Student Affinity Organization. *Medical Education*.

2018

- Justin L. Jia, Marija Kamceva, **Timothy Keyes**. Navigating Controversy: A Critical Element of Medical Education. *Academic Medicine*.

2015

- Antoine Louveau, Igor Smirnov, **Timothy Keyes**, Jacob D. Eccles, Sherin J. Rouhani, J. David Peske, et al.. Structural and functional features of central nervous system lymphatic vessels. *Nature*.

Awards & Honors

- **Integrated Strategic Plan Star Award (ChatEHR Team)**, Stanford Medicine (2025)
- **Health Catalyst Ignite Award**, Health Catalyst (with Stanford Hospital Quality) (2025)
- **Point Graduate Student Scholarship**, Point Foundation (2020)
- **Ruth L. Kirschstein Pre-doctoral NRSA (F31)**, National Institutes of Health (2019)
- **Community Impact Award**, Stanford University (2019)
- **Integrated Strategic Plan Star Award**, Stanford Medicine (2019)

- **LGBT Workforce Junior Leadership Award**, Building the Next Generation of Academic Physicians (BNGAP) (2019)
- **Award for Excellence in Promotion of Diversity and Societal Citizenship**, Stanford University School of Medicine (2018)
- **Award for Academic Excellence**, Princeton Neuroscience Institute (2014)
- **Phi Beta Kappa**, Princeton University (2013)
- **Howard Crosby Warren Junior and Senior Prizes in Psychology**, Princeton University (2013 & 2014)
- **Shapiro Prize for Academic Excellence**, Princeton University (2011 & 2012)

Media & Press

- **Meet 4 developers leading the way with AI agents** — Featured Article, Microsoft Source (2025)
- **Microsoft Opens AI 'Store' for Healthcare Developers** — Featured Article, The New Stack (2025)
- **Stanford Medicine and the healthcare agent orchestrator: Satya Nadella at Microsoft Build 2025** — Keynote Feature, Microsoft Build 2025 (2025)
- **U.S. medical schools boost LGBTQ students, doctor training** — Featured Interview, Associated Press, New York Times, Washington Post (2020)
- **Meet the Point Foundation's Class of 2020** — Featured Bio, The Advocate (2020)
- **Why being a programmer will make me a better doctor** — Blog Post, Stanford Medicine Scope Blog (2020)
- **Is becoming a physician-scientist worth sacrificing work-life balance?** — Blog Post, Stanford Medicine Scope Blog (2020)
- **Advice for LGBTQ+ medical school applicants** — Blog Post, Stanford Medicine Scope Blog (2019)
- **Finding a lab that feels like home** — Blog Post, Stanford Medicine Scope Blog (2019)

Selected Talks

- **From chats to workflows to "agents": Demystifying LLM jargon by example**. posit::conf 2026, Houston, TX.
- **Trust, but Verify: Lessons from Deploying LLMs in a Large Health System**. posit::conf 2025, Atlanta, GA.
- **tidytof: An R Package to Predict Patient Outcomes from Single-Cell Data Using Tidy Data Principles**. R/Medicine 2021, Virtual.

Skills

Clinical AI & LLM Systems: EHR-integrated AI, agentic workflow design, LLM evaluation, RAG, clinical summarization, post-deployment monitoring

Machine Learning & Statistics: Supervised learning, calibration, bootstrap inference, survival analysis, clustering, gradient boosting, deep learning, tabPFN

Healthcare Data & Governance: Epic EHR data, FHIR, clinical workflow integration, AI governance, model lifecycle management, clinical operations analytics

Programming & Data Science: Python, R, SQL, Bash, pandas, scikit-learn, XGBoost, PyTorch, tidyverse, tidymodels, Bioconductor, Shiny

Platforms & Tools: Databricks, Azure OpenAI, LiteLLM, FastAPI, Pydantic, Git, Docker, Epic, MCP, Quarto

Biomedical Domains: Clinical ML, LLMs in health care, single-cell analysis, mass cytometry, computational cancer biology, pediatric leukemia