Katherine L. Titterton Curriculum Vitae

Scientist-engineer and technical storyteller in neuroscience, imaging and AI

San Francisco, CA
kattitterton@gmail.com
macrofluidic.me
kat-titter
Katherine Titterton
@KatTitterton
ORCID 0009-0008-3579-1793

Neuroscientist-engineer at the seam of imaging, signal extraction and machine learning. Follows a hard question until the tool that answers it works, then makes the case in the room with numbers and a story. Eight years across academia (MGH, MIT), big pharma (AbbVie) and ML-first biotech (Insitro, Axiom Bio) have given a wide view of how science gets done, and of the biases that shape it.

Self-taught coder: took graduate night courses in Python (2019) and computer vision (2020, during COVID), then spent nights and weekends automating data analysis in Python and R, before AI could write code. Has kept automating the bench since, from liquid-handler scheduling and R dose-response pipelines to PyTorch segmentation, and now builds with agentic coding.

Prefers the work to the credit: co-author of eight peer-reviewed papers, including two in *Nature Communications*, contributing the assays, imaging and analysis behind them.

SELECTED CONTRIBUTIONS

[n] = publication number below

- Achieved ~10× more sensitive bioactivity detection than standard toxicity assays with two new methods.
- Delivered two of the world's largest Cell Painting datasets (100,000+ compounds) for in silico toxicology.
- Reached 0.92 AUC (77% sensitivity, 90% specificity) with an interpretable in silico liver-injury (DILI) risk model, matching or exceeding standard in vitro assays (SOT 2025).
- Showed, with collaborators, that widely used small-molecule bioactivity benchmarks are largely predicted by counting cells (*Nat Commun* 2026 [4]).
- Enabled nanoscale imaging of 30+ proteins in 16× expanded brain tissue (*Nat Commun* 2024 [6]).

EXPERIENCE

Axiom Bio Founding Member of the Technical Staff — San Francisco, CA — 2023–2026

- Invented two image-based bioactivity-detection methods that flag small-molecule effects at ~10× lower concentrations than conventional toxicity assays (LDH, MT-Glo, cell count); owned development and testing.
- Led image labeling specs, QC and PyTorch U-Net segmentation of 100,000+ compound Cell Painting images; models in production for more than a year after benchmarking Segment Anything (SAM).
- Oversaw assay development, QC and data generation for two of the world's largest Cell Painting datasets, built as AI-ready training data; led feature engineering on them.
- Partnered on an interpretable in silico DILI clinical-risk model reaching 0.92 AUC.
- Shaped scientific product direction as a founding technical hire.

Nat Commun 2026 [4] Cell Syst 2026 [3]

Insitro Associate Scientist III, Arrayed Screening — South SF, CA — 2022–2023

- Onboarded tuberous sclerosis complex and ALS small-molecule screens, from assay development to automated 384-well feeding, staining and imaging (BioTek, HighRes Biosolutions).
- Trained two screen operators; automated analysis of hundreds of 384-well plates in Python and R.
- Developed a label-free digital phase-contrast timecourse imaging method and Python analysis suite to track live neuron growth.

MIT Technical Associate II, Synthetic Neurobiology Group Cambridge, MA 2021–2022

- Imaged 30+ proteins at nanoscale by optimizing multiplexed expansion revealing (mExR) for 7+ rounds of immunostaining on 16× expanded brain tissue.
- Ran and optimized the Boyden Lab's shared ImageJ/Fiji and MATLAB image-analysis pipelines for the published method.

Nat Commun 2024 [6]

AbbVie Associate Scientist II, Foundational Neuroscience Center Cambridge, MA 2018–2021

- Established tau-aggregation high-content screens in primary murine and human iPSC neurons (Revvity Opera, Harmony), from assay development to R dose-response pipelines that ranked lead candidates.
- Screened anti-tau antibodies by high-content analysis in primary neurons (SBI2 2019).
- Designed microfluidic neuron cultures that model tau spread between cells, for testing propagation inhibitors (SfN 2021).

Mol Neurodegener Adv 2026 [1] iScience 2026 [2] J Biol Chem 2025 [5] iScience 2022 [7]

Massachusetts General Hospital Research Technician I Boston, MA 2017–2018

- Recorded voltage-clamp currents from GABA-A receptors expressed in *Xenopus* oocytes to study how general anesthetics act.

Eur J Med Chem 2019 [8]

EDUCATION

Colgate University B.A. Cellular Neuroscience, *cum laude* Hamilton, NY 2013–2017
Minor in Mathematical Systems Biology. Co-captain, Division I Track & Field.

Harvard Extension School Graduate coursework Cambridge, MA 2019–2020

- Introduction to Programming in Python with Applications in Life Science (CSCI E-7, 2019), a CS50-style course for life scientists, taken while working full-time on AbbVie tuition support.
- Image Processing and Computer Vision (CSCI S-25, 2020), taught in Python: color representation, segmentation, feature extraction and early deep models including U-Nets.

PEER-REVIEWED PUBLICATIONS

8 papers, newest first

[1] Yanamandra K, Romanul N, Patel H, Sanders H, Chang R, Darcy A, Brown N, Kane C, Wu HY, Jagtap K, Chancellor S, Morozova O, Xi M, Hogan C, **Titterton K**, Wu JW, Manos J, Karran E, Dellovade T, Langlois X. Conformation-specific anti-pathological tau antibody raised against AD brain-derived seed-competent tau reduces tau pathology in transgenic mice. *Mol Neurodegener Adv*. 2026;2(1):43. doi:10.1186/s44477-026-00049-6 ABBVIE

[2] Sebastian RM, Kupp R, Nanavati D, Parfentev I, Krzystek TJ, Romanul N, Yanamandra K, Preiss CN, Manos JD, Wu HY, Volkova A, Crescenti S, **Titterton K**, Welker AM, Townsend M, Karran E, Langlois X, Wu JW. SynCAR platform for capturing neuronal synaptic proteopathic seeds. *iScience*. 2026;29(7):116362. doi:10.1016/j.isci.2026.116362 PMID 42325569, PMC13276770 ABBVIE

[3] Ewald JD, **Titterton KL**, Bäuerle A, Beatson A, Boiko DA, Cabrera ÁA, Cheah J, Cimini BA, Gorissen BL, Harrill J, Jones TR, Karczewski KJ, Crute CE, Rouquie D, Seal S, Weisbart E, White B, Carpenter AE, Singh S. Cell Painting for cytotoxicity and mode-of-action analysis in primary human hepatocytes. *Cell Syst*. 2026;17(5):101566. doi:10.1016/j.cels.2026.101566 PMID 41903531 AXIOM BIO

[4] Seal S, Dee W, Shah A, Cerisier N, Zhang A, Miglietta E, **Titterton K**, Cabrera ÁA, Boiko D, Beatson A, Slabaugh G, Taboureau O, Carreras Puigvert J, Singh S, Spjuth O, Bender A, Carpenter AE. Counting cells can accurately predict small-molecule bioactivity benchmarks. *Nat Commun*. 2026;17(1). doi:10.1038/s41467-026-68725-5 PMID 41651839, PMC12988037 AXIOM BIO featured on axi.om

[5] Wu JW, **Titterton K**, Sebastian R, Romanul N, Yanamandra K, Mastis B, Chang R, Khasnavis S, Kwon T, Chai Y, Manos JD, Preiss CN, Hu M, Welker AM, Liao F, Dellovade T, Karran E, Langlois X. Development of a robust, physiologically relevant neuronal tau aggregation assay for tau-related drug discovery. *J Biol Chem*. 2025;301(12):110853. doi:10.1016/j.jbc.2025.110853 PMID 41135680, PMC12670552 ABBVIE

[6] Kang J, Schroeder ME, Lee Y, Kapoor C, Yu E, Tarr TB, **Titterton K**, Zeng M, Park D, Niederst E, Wei D, Feng G, Boyden ES. Multiplexed expansion revealing for imaging multiprotein nanostructures in healthy and diseased brain. *Nat Commun*. 2024;15(1):9722. doi:10.1038/s41467-024-53729-w PMID 39521775, PMC11550395 MIT

[7] Manos JD, Preiss CN, Venkat N, Tamm J, Reinhardt P, Kwon T, Wu J, Winter AD, Jahn TR, Yanamandra K, **Titterton K**, Karran E, Langlois X. Uncovering specificity of endogenous TAU aggregation in a human iPSC-neuron TAU seeding model. *iScience*. 2022;25(1):103658. doi:10.1016/j.isci.2021.103658 PMID 35072001, PMC8761709 ABBVIE

[8] Wu B, Jayakar SS, Zhou X, **Titterton K**, Chiara DC, Szabo AL, Savechenkov PY, Kent DE, Cohen JB, Forman SA, Miller KW, Bruzik KS. Inhibitable photolabeling by neurosteroid diazirine analog in the β3-subunit of human heteropentameric type A GABA receptors. *Eur J Med Chem*. 2019;162:810-824. doi:10.1016/j.ejmech.2018.11.019 PMID 30544077, PMC6912599 MGH

TALKS, CONFERENCE PRESENTATIONS & POSTERS

[1] **Titterton K**. Using AI to Combine Exposure, Metabolism, and Liver Function to Model DILI in Modern Molecules. Recorded talk, Axiom Bio. video

[2] **Titterton K**, Boiko D, Cabrera ÁA, Bäuerle A, Tyagi A, Saneinejad S, Beatson A, White B. Accurate and interpretable in silico clinical risk assessment for drug-induced liver injury (DILI) from molecular structure. *Society of Toxicology (SOT) Annual Meeting*, 2025. poster

[3] **Titterton K**, et al. Development of a tau propagation neuronal microfluidic cell culture model for assessing inhibitors of tau propagation. *Society for Neuroscience (SfN) Global Connectome Virtual Meeting*, January 2021. poster

[4] **Titterton K**, et al. High content analysis (HCA) of tau aggregation in primary neurons: screening anti-tau antibodies and modeling tauopathy progression in vitro. *SBI2 High Content Meeting*, September 2019, Harvard Medical School, Boston, MA. poster

Earlier research presentations

- Investigating RNAi as a potential therapeutic for Huntington's disease in a transgenic mHTT145Q zebra finch (*Taeniopygia guttata*) model. Colgate University Neuroscience Thesis Poster Presentations, 2017.
- Atopy and helminth infection in Ethiopian schoolchildren. Colgate Summer Research Poster Symposium, 2016.
- PDE2 regulation of β-arrestin signaling. Systems Biology Center New York (SBCNY) Summer Trainee Poster Symposium, Icahn School of Medicine at Mount Sinai, 2015.

INDEPENDENT WORK

questions explored with AI agents

Datum Line Designing my ideal AI × bio startup 2026

What would the right startup be for my own strengths, work and the state of the field? A venture pitch built on one question, "do my cells look normal?" Every result is a difference from a control, and nobody checks the control against other labs. On 93,228 public control wells from 1,872 plates in 11 labs, a classifier names the lab from controls alone at 99.9% balanced accuracy, and a lab's drift predicts disagreement on known answers. code and evidence

Overdose Watch Public overdose tracker kept current by a weekly agent 2026

Official 12-month overdose death counts (CDC, state and county health departments, the SF medical examiner) and primary-sourced incident reports on one map and timeline. A scheduled Claude Code agent pulls new data, finds new reports, validates them and publishes every Monday. code and data

Vanitas / Veritas AI slop as vanitas 2026

What does a model drinking its own output look like? An 8.5-minute 4K loop melting eight vanitas portraits, built with open-source diffusion (Stable Diffusion 1.5, LCM-LoRA, Real-ESRGAN) on a laptop; the key finding was that going slow, not more diffusion, made it beautiful. Plus an interactive web piece. pipeline and docs

treble A one-hour DJ set coded with AI 2026

Can taste be taught to a process? A one-hour set built from beat-aligned transitions and a listening studio, refined by ear over 44 versions; building it into a general tool. Available on request.

claude-code-learns Can an agent keep what it learns? Corrections become skills 2026

EARLIER PROJECTS & CREATIVE WORK

Bare Metal Solo generative-art exhibit, Human Tech Week SF; post-hoc analysis 2025

Vivarium 2.0 Automated poison-dart-frog habitat with misting and live video 2024

OpenTronsformers LLM copilot for the OT-2 lab robot; 2nd place, BioHack NYC 2023

HONORS & AWARDS

2nd place, BioHack NYC OpenTronsformers, LLM-driven lab-robot automation 2023

Dorothy-Waltham Award for Athletic Leadership Colgate University 2017

cum laude Colgate University 2017

SKILLS

ML & data: PyTorch; U-Net segmentation (SAM evaluated); labeling specs and dataset QC; feature engineering; image embeddings (visualization, clustering, feature derivation, normalization); Python (NumPy, SciPy, scikit-learn, pandas, matplotlib, seaborn, Jupyter); R (tidyverse, ggplot2, drc, platetools); dose-response curve fitting (Prism, R, Python); univariate and multivariate statistics; design of experiments; agentic coding (Claude Code, Cursor)

Imaging & signal: high-content and confocal microscopy (Opera Phenix, Operetta, Harmony); expansion microscopy; label-free phase-contrast timecourse imaging; image formation and instrument artifacts; voltage-clamp electrophysiology; ImageJ/Fiji macros; MATLAB

Story & design: data visualization and figure generation; pitch-deck and web design; generative art (Midjourney, Stable Diffusion); scientific storytelling for talks and posters

Lab & automation: primary murine and human iPSC neuron culture; microfluidic culture models; immunocytochemistry and immunohistochemistry; assay development; high-throughput, high-content screening; stereotaxic surgery and tissue microdissection; liquid handlers and schedulers (OpenTrons, Integra, BioTek, Labcyte Echo, HighRes Biosolutions, Green Button Go); Benchling

MEMBERSHIPS & CERTIFICATIONS

Memberships: Society of Toxicology, Society for Neuroscience, Society of Biomolecular Imaging and Informatics

Certifications: freediving, FII Level 1 (2019) and Molchanov Level 2 (2025); SII Shark Ecology Specialty (2020)