Dominic Tong, Ph.D.

Principal Bioengineer Data Scientist | Pharmacometrics, Machine Learning & AI
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Profile

Pharmacometrician and data scientist who pioneered hybrid machine learning/population PK/PD methods for precision dosing, with models deployed across 1,000+ U.S. hospitals. Now applying agentic AI to model-informed drug development (MIDD) as domain expert, validation lead, and demo presenter for an AI-native clinical pharmacology analysis platform built for pharma. Developed the first population PK model to pool multiple aminoglycosides across the human lifespan. Led cross-institutional research with Memorial Sloan Kettering, LPCH Stanford, Children's Hospital of Philadelphia, and Brigham and Women's Hospital. Eleven peer-reviewed publications translating real-world evidence and hybrid ML/PK modeling into clinical impact. Chair-elect of the ISoP/ACCP Clinical Pharmacometrics Special Interest Group.

Professional Experience

Principal Bioengineer Data Scientist Feb. 2025 – present
InsightRX — San Francisco, CA / remote Jan. 2020 – present

I lead pharmacometric and machine learning model development for a precision-dosing platform deployed across 1,000+ U.S. hospitals; five of my population PK models are live in the platform.

- Shaped an AI-native agentic workflow that runs clinical pharmacology analyses for pharma drug development (InsightRX Astra) as its domain expert: ran user testing, recommended UI and workflow fixes, and presented product demos to 5 pharma clients and 45 participants in an ACoP workshop
- Designed the GxP validation package for this agentic AI platform: human testing plus programmatic validation of nondeterministic outputs, intended to run each release
- Prototyped an LLM agent-based tool (GPT-4o) to assist pharmacometricians in NONMEM model development, then partnered with Pfizer to evaluate a more advanced version of this tool for pharmacometric model development against a manual workflow
- Led scientific direction and a large-scale quasi-experimental study across 90,295 patients in 19 hospital systems, demonstrating that pharmacokinetic model selection meaningfully improves vancomycin AUC target attainment and reduces AKI rates in precision dosing contexts
- Led ML development on a cross-institutional collaboration with Memorial Sloan Kettering — feature engineering, algorithm selection, and evaluation — producing a hybrid PK/PD-ML model that improved grade 3–4 neutropenia prediction precision from 47% to 61% across 9,121 patients
- Directed simulation-based analysis identifying precision dosing failures in a pharma client's conditioning regimen; presented recommendations directly to clinical decision-makers, resulting in a redesigned trial dosing strategy
- Mentored a summer intern, now a senior engineer in medical devices
- Developed the first population PK model to pool multiple aminoglycosides across the human lifespan, using real-world data from 5,659 patients across 130+ sites; now deployed in the platform

Previously: Senior Bioengineer Data Scientist (2020–2025); Bioengineer Data Scientist (2020)

Health Data Science Fellow, Insight Data Science June – Dec. 2019

Doctoral Researcher, University of California, San Francisco Aug. 2014 – June 2019

Leadership & Service

Chair-elect Oct. 2026 – present
ISoP/ACCP Clinical Pharmacometrics Special Interest Group Jan. 2025 – present
Previously: Vice-Chair (2026); Scientific Secretary (2025)

Abstract Committee Member, Clinical PMX SIG Representative 2025 – present
American Conference on Pharmacometrics (ACoP) Abstract Committee

- Serve as the Clinical Pharmacometrics SIG's representative to the ACoP abstract review committee, evaluating submitted abstracts for scientific merit and selecting recipients of the conference's trainee awards

Peer Review

Invited reviewer for 13 international journals (17 reviews, 2025–2026), including Clinical Pharmacokinetics, Journal of Pharmacokinetics and Pharmacodynamics, and Clinical Microbiology and Infection.

Selected Publications

- **Tong DMH**, Faldasz JD, Keizer RJ, Hughes JH. One model to dose them all: a population pharmacokinetic model for multiple aminoglycosides across the human lifespan. *J Clin Pharmacol.* 2026;66(9). doi:10.1002/jcph.70231
- **Tong DMH**, Brooks JT, Keizer RJ, Hughes JH. Vancomycin target attainment improved following population pharmacokinetic model switch: a large-scale quasi-experimental study of precision dosing. *JAC Antimicrob Resist.* 2026;8(1):dlag016. doi:10.1093/jacamr/dlag016
- **Tong DMH**, Keizer RJ, Hughes JH. Improved prediction of vancomycin pharmacokinetics in patients receiving continuous renal replacement therapy using a novel population model validated with real-world data. *Ther Drug Monit.* 2026;48. doi:10.1097/FTD.0000000000001432
- **Tong DMH**, Hughes MA, Hu J, Pearson JC, et al. Comparing two-sample log-linear exposure estimation with Bayesian model-informed precision dosing of tobramycin in adult patients with cystic fibrosis. *Antimicrob Agents Chemother.* 2025;69:e01040-24. doi:10.1128/aac.01040-24
- Hughes JH, **Tong DMH**, Burns VM, Daly B, et al. Clinical decision support for chemotherapy-induced neutropenia using a hybrid pharmacodynamic/machine learning model. *CPT Pharmacometrics Syst Pharmacol.* 2023;12:1–13. doi:10.1002/psp4.13019
- **Tong DMH**, Hughes JH, Keizer RJ. Evaluating and improving neonatal gentamicin pharmacokinetic models using aggregated routine clinical care data. *Pharmaceutics.* 2022;14(10):2089. doi:10.3390/pharmaceutics14102089
- **Tong DMH**, Hughes JH, Keizer RJ. Use of age-adjusted serum creatinine in a vancomycin pharmacokinetic model decreases predictive performance in elderly patients. *Ther Drug Monit.* 2021;43(1):139–140. doi:10.1097/FTD.0000000000000819

Eleven peer-reviewed publications; full list in CV.

Selected Presentations

- **Tong DMH**, Brooks JT, Hughes JH, Keizer RJ. Towards a structured workflow for semi-automated data cleaning and outlier removal in real-world pharmacometric data (Poster). *American Conference on Pharmacometrics (ACoP)*, National Harbor, MD, USA. Oct. 2026.
- **Tong DMH**, Faldasz JD, Keizer RJ, Hughes JH. One model to dose them all: a population pharmacokinetic model for multiple aminoglycosides across the human lifespan (Oral presentation; presented by Hughes JH). *IATDMCT Annual Congress*, Rennes, France. Sept. 2026.
- **Tong DMH**, Bio L, Downes KJ, Sharova A, et al. Early sampling improves voriconazole target attainment in pediatric patients dosed with MIPD tools: a simulation study (Poster). *American Conference on Pharmacometrics (ACoP)*, Aurora, CO, USA. Oct. 2025.
- **Tong DMH**, Keizer RJ, Hughes JH. Evaluation of population pharmacokinetic model predictive performance in adults on hemodialysis treated with vancomycin (Poster). *Population Approach Group Europe (PAGE)*, Thessaloniki, Greece. June 2025.

Skills and Expertise

- **Pharmacometrics:** population PK/PD modeling, model-informed precision dosing, simulation-based trial design
- **Machine Learning & AI:** hybrid ML/PK/PD modeling, agentic AI for MIDD, AI validation (GxP), deep learning
- **Software:** NONMEM, R (tidyverse, Shiny), Python (pandas, scikit-learn, XGBoost), Docker, git

Education

Ph.D. in Bioengineering June 2019
University of California, Berkeley – UC San Francisco
- Thesis in computational human genetics with work in machine learning and statistics

Bachelor of Applied Science in Engineering Physics (Electrical option) May 2014
University of British Columbia
- Combines electrical engineering, applied physics, and emphasis on innovation

Awards

Top Poster Ribbon 2025
American Society for Clinical Pharmacology and Therapeutics (ASCPT) Annual Meeting
- Agentic AI platform for PK/PD analysis, developed with Pfizer

Postgraduate Scholarship – Doctoral (PGS D) 2015
Natural Sciences and Engineering Research Council of Canada (NSERC)
- National award for academic performance, research potential, and excellence in natural sciences and engineering