

Ahmed Elmokadem

PHARMACOMETRICIAN

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Education

Ph.D. in Biomedical Sciences

Connecticut, USA

University of Connecticut

2017

- Developed statistical models and software tools to solve issues with super-resolution imaging microscopy.

Bachelor's in Pharmaceutical Sciences

Cairo, Egypt

Misr International University

2005

Work Experience

Senior Scientist II

Masachusetts, USA

Metrum Research Group

2023 - PRESENT

- Developing mathematical and statistical models for a variety of human diseases such as HIV, anemia and muscle dystrophy using NONMEM, mrgsolve, julia, and other software tools.
- Developing software tools and algorithms to facilitate construction of mathematical models used in the drug development process.
- Conducting workshops that help the pharmacometrics community in the model building process.
- Teaching pharmacometrics and model development concepts to graduate and undergraduate interns

Senior Scientist I

Masachusetts, USA

Metrum Research Group

2022 - 2023

Research Scientist

Masachusetts, USA

Metrum Research Group

2018 - 2022

Research Associate

Masachusetts, USA

Metrum Research Group

2017 - 2018

Adjunct Clinical Assistant Professor

Indianapolis, USA

Indiana University

2022 - PRESENT

- Teaching pharmacometrics and PBPK modeling to undergraduate and graduate students.

Adjunct Associate in the Department of Cell Biology

Connecticut, USA

University of Connecticut

2023 - PRESENT

- Teaching "Introduction to PK/PD Modeling and Simulation" class to undergraduate and graduate students.

Frontiers in Pharmacology Editorial Board

Frontiers

2023 - PRESENT

Senior Teaching Assistant

Cairo, Egypt

Misr International University

2005 - 2012

- I led a team of 7 TAs Supervised teaching undergraduate pharmacy students microbiological lab techniques and pharmacokinetics/pharmacodynamics principles.
- Organized student's practical exams.
- Carried out my research on Gram negative bacterial antibiotic resistance.

Skills

Languages

Arabic (Native), English (Fluent)

Programming Languages

Markup Languages

Quarto, LaTeX

Software

NONMEM, mrgsolve, PK-Sim, Stan/Torsten, OpenBUGS, VCell, COPASI, CellDesigner, Cytoscape

Other

Machine Learning, Git/Github, subversion, shiny, cluster and cloud-based parallelization

Publications

Hierarchical deep compartment modeling: A workflow to leverage machine learning and Bayesian inference for hierarchical pharmacometric modeling

*Clinical and
Translational Science*

October 2024

- <https://doi.org/10.1111/cts.70045>

Bayesian PBPK Modeling using R/Stan/Torsten and Julia/SciML/Turing.jl

*CPT: Pharmacometrics &
Systems Pharmacology*

January 2023

- <https://doi.org/10.1002/psp4.12926>

A Quantitative Modeling and Simulation Framework to Support Candidate and Dose Selection of Anti-SARS-CoV-2 Monoclonal Antibodies to Advance Bamlanivimab into a First-in-Human Clinical Trial

*Clinical Pharmacology &
Therapeutics*

October 2021

- <https://doi.org/10.1002/cpt.2459>
- This manuscript received the “Outstanding Research Manuscript Award” from the International Society of Pharmacometrics (ISoP) in October 2022.

Impact of Obesity on Brexpiprazole Pharmacokinetics: Proposal for Improved Initiation of Treatment

*Journal of Clinical
Pharmacology*

August 2021

- <https://doi.org/10.1002/jcph.1947>

Brexpiprazole Pharmacokinetics in CYP2D6 Poor Metabolizers: Using Physiologically Based Pharmacokinetic Modeling to Optimize Time to Effective Concentrations

*Journal of Clinical
Pharmacology*

July 2021

- <https://doi.org/10.1002/jcph.1946>

A Model-Informed Drug Development (MIDD) Approach for a Low Dose of Empagliflozin in Patients with Type 1 Diabetes

Pharmaceutics

April 2021

- <https://doi.org/10.3390/pharmaceutics13040485>

Quantification of the Impact of Partition Coefficient Prediction Methods on PBPK Model Output Using a Standardized Tissue Composition

*Drug Metabolism and
Disposition*

July 2020

- <https://doi.org/10.1124/dmd.120.090498>
- The paper was listed among the “Papers Worth Reading” by the International Society of Pharmacometrics (ISoP) newsletter issued in September 2020 <http://go-isop.org/wp-content/uploads/2020/10/ISOP-Newsletter-September-2020-V2.1-converted.pdf>

Low-dose empagliflozin as adjunct to insulin therapy in type 1 diabetes: A valid modelling and simulation analysis to confirm efficacy

*Diabetes, Obesity and
Metabolism*

December 2019

- <https://doi.org/10.1111/dom.13945>

Quantitative Systems Pharmacology and Physiologically-Based Pharmacokinetic Modeling With mrgsolve: A Hands-On Tutorial

CPT: Pharmacometrics & Systems Pharmacology

October 2019

- <https://doi.org/10.1002/psp4.12467>

Single-Molecule Localization Microscopy as Nonlinear Inverse Problem

Proceedings of the National Academy of Sciences of the United States of America

September 2019

- <https://doi.org/10.1073/pnas.1912634116>

Optimal Drift Correction for Superresolution Localization Microscopy with Bayesian Inference

Biophys Journal

November 2015

- <https://doi.org/10.1016/j.bpj.2015.09.030>

Presentations

Rise of the Machines: Will Machine Learning Take Over the World of Pharmacometrics?

Exploring the potential impact of machine learning on the field of pharmacometrics.

University of Florida Seminar Series

January 16, 2024

Immuno-Oncology QSP Modeling Using Open-Science Julia Solvers

Discussing the application of Julia solvers in immuno-oncology QSP modeling.

ACoP14, National Harbor, MD

November 5-8, 2023

UDE Know It If UDE Saw It: Leveraging Deep Machine Learning for QSP Model Development and Evaluation

Utilizing deep machine learning for QSP model development and evaluation.

ACoP14, National Harbor, MD

November 5-8, 2023

Immuno-Oncology QSP Modeling Using Open-Science Julia Solvers

Application of Julia solvers in immuno-oncology QSP modeling.

JuliaCon, MIT Campus, Cambridge, Massachusetts

July 28, 2023

Open-Source Bayesian Hierarchical PBPK Modeling in Julia

Discussing open-source Bayesian hierarchical PBPK modeling using Julia.

JuliaCon, MIT Campus, Cambridge, Massachusetts

July 27, 2023

Transparent, Open and Reproducible PBPK and QSP Modeling and Simulation Using an R-Based Framework

Presenting an R-based framework for transparent, open, and reproducible PBPK and QSP modeling.

Indiana CTSI Symposium on Disease and Therapeutic Response Modeling and Simulation, Indianapolis

November 12, 2019

Development of an Open-source Physiologically-based Pharmacokinetic Model to Predict Maternal-Fetal Exposures of CYP450-metabolized Drugs

Developing an open-source PBPK model to predict maternal-fetal exposures.

American Society for Clinical Pharmacology and Therapeutics (ASCPT) annual meeting, Washington DC

March 13-16, 2019

- Presented by Gastonguay MS, Russell S, Freling R, Riggs MM, Kay K, Utsey K, Elmokadem A.

A Physiologically-based Pharmacokinetic Model for Voriconazole Explores Differences in Pharmacokinetics between Adults and Children

Exploring pharmacokinetic differences of Voriconazole between adults and children using a PBPK model.

American Conference on Pharmacometrics (ACoP9), San Diego, CA

October 9-11, 2018

- Presented by Elmokadem A, Gastonguay MR, Baron KT, Barrett K, Zane N, Yankee T, Riggs MM.

A Physiologically-based Pharmacokinetic Model for Voriconazole Explores Differences in Pharmacokinetics between Adults and Children

Exploring pharmacokinetic differences of Voriconazole between adults and children using a PBPK model.

- Presented by Elmokadem A, Gastonguay MR, Baron KT, Barrett K, Zane N, Yankee T, Riggs MM.

*Quantitative Systems
Pharmacology (QSP)
Day, Cambridge, MA*

April 12, 2018

Optimal Drift Correction for Superresolution Imaging Using Bayesian Inference

Presenting optimal drift correction for superresolution imaging using Bayesian inference.

- Presented by Elmokadem A, Moraru I, Yu J.

*University of Connecticut
Health Center Graduate
Student Research Day*

June 9, 2016

BaSDI: A Computational Tool for Superresolution Imaging Drift Correction Using Bayesian Statistics

Introducing BaSDI, a computational tool for superresolution imaging drift correction using Bayesian statistics.

- Presented by Elmokadem A, Moraru I, Yu J.

*Annual Cell and Genome
Sciences Retreat,
University of Connecticut
Health Center*

December 15, 2015

Characterization of p130Cas recruitment and phosphorylation using single particle tracking

Characterizing p130Cas recruitment and phosphorylation using single particle tracking.

- Presented by Elmokadem A, Moraru I, Yu J.

*University of Connecticut
Health Center Graduate
Student Research Day*

June 11, 2015

Characterization of p130Cas recruitment and phosphorylation using single particle tracking

Characterizing p130Cas recruitment and phosphorylation using single particle tracking.

- Presented by Elmokadem A, Moraru I, Yu J.

*Experimental Biology
conference, Boston*

March 28 – April 1, 2015

Rule-Based Mathematical Modeling of the Cell Cycle

Presenting rule-based mathematical modeling of the cell cycle.

- Presented by Elmokadem A, Blinov M.

*University of Connecticut
Health Center Graduate
Student Research Day*

June 20, 2013

Abstracts

Hierarchical Deep Compartment Modeling: A Workflow for Leveraging Machine Learning in Hierarchical Pharmacometric Modeling

Presented a workflow for leveraging machine learning in hierarchical pharmacometric modeling.

- Authors: Elmokadem A, Utsey K, Jordie E, Knab T.

*American Conference on
Pharmacometrics
(ACoP14), National
Harbor, MD*

November 5-8, 2023

Deep QSP Modeling: Leveraging Machine Learning for QSP Model Development and Evaluation

Discussed leveraging machine learning for QSP model development and evaluation.

- Authors: **Elmokadem A**, Knab T, Jordie E, Li Y.

*American Conference on
Pharmacometrics
(ACoP14), National
Harbor, MD*

November 5-8, 2023

Bayesian PBPK Modeling using R/Stan/Torsten and Julia/SciML/Turing.jl

Presented Bayesian PBPK modeling using R/Stan/Torsten and Julia/SciML/Turing.jl.

- Authors: Elmokadem A, Zhang Y, Knab T, Jordie E, Gillespie BR.

*American Conference on
Pharmacometrics
(ACoP13), Denver, CO*

*October 30-November 2,
2022*

Impact of Partition Coefficient Prediction Methods on PBPK Model Output Using a Unified Tissue Composition

Explored the impact of partition coefficient prediction methods on PBPK model output.

- Authors: Utsey K, Elmokadem A, Riggs MM, Johnston C, Marquard J, Soleymanlou N, Nock V, Liesenfeld K.

*American Conference on
Pharmacometrics
(ACoP10), Orlando, FL*

October 20-23, 2019

Measurement of stereoselective bupropion disposition in rat brain to support translational PBPK model development and application

Measured stereoselective bupropion disposition in rat brain to support PBPK model development.

- Authors: Bhattacharya CS, Elmokadem A, Masters A, Stratford RE.

*American Conference on
Pharmacometrics
(ACoP10), Orlando, FL*

October 20-23, 2019

M-EASE-1: A Modelling and simulation study conducted to further characterize the efficacy of low-dose Empagliflozin as Adjunctive to inSulin thErapy (M-EASE) in Type 1 Diabetes Mellitus

Modeling and simulation study on the efficacy of low-dose Empagliflozin in Type 1 Diabetes Mellitus.

- Authors: Eudy-Byrne R, Elmokadem A, Riggs MM, Johnston C, Marquard J, Soleymanlou N, Nock V, Liesenfeld K.

*Population Approach
Group in Europe (PAGE),
Stockholm, Sweden*

June 13, 2019

The M-EASE Studies: A Modeling and simulation approach to further characterize the efficacy of low-dose Empagliflozin as Adjunctive to InSulin ThErapy in type 1 diabetes

Modeling and simulation approach to characterize the efficacy of low-dose Empagliflozin in type 1 diabetes.

- Authors: Perkins BA, Soleymanlou N, Rosenstock J, Skyler JS, Laffel LM, Liesenfeld K, Neubacher D, Riggs MM, Johnston CK, Eudy-Byrne RJ, Elmokadem A, George JT, Marquard J, Nock V.

*American Diabetes
Association (ADA) 79th
Scientific Sessions, San
Francisco, CA*

June 7-11, 2019

Teaching

PBPK modeling and simulation using mrgsolve

2-day workshop on PBPK modeling and simulation.

- Invited by Eli Lilly and Company and Indiana University.

*Eli Lilly and Company
and Indiana University,
Indianapolis, IN, USA*

September 29-30, 2022

A case-study driven introduction to the Julia language for R

Online workshop introducing the Julia language for R users.

- Presented at R/Pharma conference.

*R/Pharma conference
(online)*

October 27, 2021

PBPK modeling with R/mrgsolve

Two sessions on PBPK modeling for T32 fellows and Pharmacy Practice graduate students.

- Invited to give sessions as part of a PBPK Modeling course.

*Indiana University and
Purdue University*

*November 19 and December
3, 2020*

Introduction to mrgsolve for PBPK modeling and simulation

2-day workshop on PBPK modeling and simulation using mrgsolve.

- Invited by Eli Lilly and Company.

*Eli Lilly and Company,
Indianapolis, IN, USA*

February 12-13, 2019

Introduction to PBPK Modeling in R with mrgsolve

Day and a half workshop on PBPK modeling in R.

- Presented at the American Conference on Pharmacometrics 9.

ACoP9, San Diego, USA

October 11-12, 2018

Introduction to PBPK Modeling in R with mrgsolve

Day and a half workshop on PBPK modeling in R.

- Taught the pharmacometric community.

*Cambridge Innovation
Center (CIC), Boston,
MA, USA*

October 6-7, 2018

PBPK modeling in R

Metrum Research Group

Teaching and overseeing PBPK modeling projects for Summer interns.
• Responsible for teaching Metrum Research Group Summer interns.

2018

Mathematical and computational modeling concepts

University of Connecticut

Teaching Summer undergraduate interns.

2016-2017

- Taught mathematical and computational modeling concepts.

Annual VCell short course

University of Connecticut
Health Center

Instructor for the VCell short course.

2015-2016

- Taught participants how to implement mathematical models in VCell.

Teaching assistant in microbiology and pharmacokinetics departments

Misr International
University

Teaching assistant in microbiology and pharmacokinetics.

2005-2012

- Responsible for teaching and assisting in the departments.

Workshops

The future of Modeling and Simulation as the Engine for Strategic Decision-Making in Pharma Development, Economics, and Therapeutics: an Interactive Discussion

Annual American Society
for Clinical
Pharmacology and
Therapeutics (ASCPT)
meeting

Workshop on the future of modeling and simulation in pharma development, economics, and therapeutics.

March 16, 2019

- Taught by Metrum Research Group.

PK-Sim and MoBi Workshop on Integrating PBPK and QSP

Boston, MA, USA

Workshop on integrating PBPK and QSP using PK-Sim and MoBi.

October 3-4, 2018

- Taught by esqLABS.

R for Reproducible Scientific Analysis

Farmington, CT, USA

Workshop on reproducible scientific analysis using R.

October 6-7, 2016

- Taught by Software Carpentry and sponsored by Jackson Laboratories.

Certificates

Bayesian Statistics

Duke University
(Coursera)

Certificate for completion of the Bayesian Statistics course.

September 28, 2016

Machine Learning

Stanford University
(Coursera)

Certificate for completion of the Machine Learning course.

July 15, 2016

Statistical Inference

Johns Hopkins University
(Coursera)

Certificate for completion of the Statistical Inference course.

February 3, 2016

Foreign Pharmacy Graduate Examination Committee (FPGEC) Certificate

Foreign Pharmacy
Graduate Examination
Committee

Certificate that equilibrates my Egyptian Bachelor's degree in Pharmaceutical Sciences to its counterpart in the USA.

2010

Awards

Abstract Quality Award

American Conference on
Pharmacometrics

Outstanding Research Manuscript Award

A Quantitative Modeling and Simulation Framework to Support Candidate and Dose Selection of Anti-SARS-CoV-2 Monoclonal Antibodies to Advance Bamlanivimab into a First-in-Human Clinical Trial

2022

Misr International University

Best Teaching Assistant Award

2007

Misr International University

Best Scientific Achievement Award

2005

Organizations

International Society of Pharmacometrics (ISoP) QSP+ML Working Group

2024 - PRESENT

International Society of Pharmacometrics (ISoP)

2020 - PRESENT

American Society for Clinical Pharmacology and Therapeutics (ASCPT)

2024 - PRESENT