BIOGRAPHICAL SKETCH

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NAME: Michael A Lyons

eRA COMMONS USER NAME (credential, e.g., agency login): mlyons7

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Marquette University, Milwaukee, WI	B.S.	05/1984	Mechanical Engineering
Marquette University, Milwaukee, WI	M.S.	05/1987	Physics
Purdue University, West Lafayette, IN	Ph.D.	08/1992	Physics

A. Personal Statement

This proposal is to develop training modules on principles and techniques of data collection and pre-processing aimed at laboratory-based biomedical researchers for the purpose of improving the reproducibility of their scientific results. Here, I will use my background and skills in teaching, software development, and mathematical modeling and data analysis for antimicrobial drug development to contribute content to the proposed training modules. I am currently an Assistant Professor at Colorado State University (CSU) where I work on the computational biology and pharmacology of tuberculosis (TB) infection and treatment in experimental animal models and TB patients. This work depends critically on integrating primary experimental data from both laboratory scientists and industry-based clinical trial researchers with a variety of modeling and data analysis tools. My background and training in this area began with an NIH Mentored Quantitative Research Development Award (K25) from 2011-2016. As part of the K25 award, I obtained significant classroom and hands-on training and exposure to laboratory methods related to drug and vaccine development for TB, providing me with a solid understanding of how preclinical and clinical data are used for evidence-based decision making in the biomedical sciences. Prior to my joining CSU full-time in 2011, I was a software engineer in the computer industry for 12 years, and prior to that, a theoretical physicist. I am highly attuned to the problems that this project aims to address, and I have a clear understanding of the practical limitations and challenges for both the laboratory scientist and data analyst. Examples of recent work relevant to this proposal are,

Lyons MA, Lenaerts AJ. (2015). Computational pharmacokinetics/pharmacodynamics of rifampin in a mouse tuberculosis infection model. *J Pharmacokinet Pharmacodyn.* Aug;42(4):375-89.

Lyons MA. (2018) Modeling and simulation of pretomanid pharmacokinetics in pulmonary tuberculosis patients. *Antimicrob Agents Chemother.* 62(7) [In press]

B. Positions and Honors

1984-1987 Teaching Assistant, Physics Department, Marquette University, Milwaukee, WI
1988-1992 Teaching Assistant, Physics Department, Purdue University, West Lafayette, IN
1992-1993 High School Teacher (half-time), East Noble High School, Kendalville, IN
1993-1997 Assistant Professor, College of Natural Sciences and Mathematics, The Richard Stockton College of New Jersey, Pomona, NJ

1997-1999 Visiting Assistant Professor, Department of Physics, Colorado State University, Fort Collins, CO
1999-2000 Unix Systems Administrator, Hunter Douglas Inc., Broomfield, CO.
2000-2010 Technical Support Engineer/Kernel Engineer, Sun Microsystems Inc, Broomfield, CO
2005-2007 Faculty Affiliate, Department of Environmental and Radiological Health Sciences, Colorado State University, Fort Collins, CO
2007-2011 Research Scientist (half-time), Department of Chemical and Biological Engineering, Colorado State University, Fort Collins, CO
2010-2011 Senior Technical Support Engineer/Kernel Engineer, Oracle Corporation, Broomfield, CO
2011-2015 Research Scientist, Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO
2015-present Assistant Professor, Department of Microbiology, Immunology, Colorado State University, Fort Collins, CO

C. Contributions to Science

1) Problems related to dosing of drugs (or any exogenous chemical) in various scenarios that did not have existing solutions. I have addressed two major problems in this area: (1) reconstruction of external exposure to environmental toxicants based on population measurements of biomarkers for exposure (parent compound and metabolites) in blood and urine, and (2) dose optimization with multiple simultaneous conflicting therapeutic objectives applicable to large numbers of drugs in combination.

Lyons MA, Yang RS, Mayeno AN, Reisfeld B. (2008). Computational toxicology of chloroform: reverse dosimetry using Bayesian inference, Markov chain Monte Carlo simulation, and human biomonitoring data. *Environ Health Perspect.* 116(8):1040-6 .

Lyons, MA**.** (2014). Computational pharmacology of rifampin in mice: an application to dose optimization with conflicting objectives in tuberculosis treatment. *J Pharmacokinet Pharmacodyn.* 41(6):613-23.

2) My formal educational background is theoretical high energy physics/mathematical physics. In collaboration with Richard Capps, we discovered and developed an entire class of symmetries in string theories (which combine quantum mechanics and general relativity) that provided new mathematical tools to calculate structural properties of these theories that were previously inaccessible due to combinatorial complexity:

R. Capps, M. Lyons. (1994). Multiplicity formulas for a class of representations of affine Kac-Moody algebras. *Rev. Math. Physics.* 6:97-114.

3.) From 1999-2011 my work involved investigation and solution of mission-critical technical problems related to large-scale computing for Sun Microsystems Inc. and Oracle Corporation, and their customers. This work is not publicly available.

Link to refereed journal articles:
http://www.ncbi.nlm.nih.gov/sites/myncbi/michael.lyons.3/bibliography/44049740/public/

D. Additional Information: Research Support and/or Scholastic Performance

<u>Active research support</u>

R01AI25454 (Lyons PI) 08/01/2016 - 07/31/2021 10 cal months
NIH/NIAID
Improving Combination Chemotherapy of Tuberculosis: A Computational Approach

The major goal of this project is to implement a novel computational framework to identify optimized dosage regimens for combination chemotherapies of tuberculosis for late-phase clinical development.