CURRICULUM VITA

Patrick Trainor
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OBJECTIVE

My objective is to obtain a postdoctoral research position in proteomics or metabolomics. My primary research interests are: (1) developing Bayesian methodology for integrating extra-experimental knowledge and data sources for integrated -omics analyses, and (2) developing Bayesian methodologies for solving problems in analytical chemistry.

EDUCATION

PhD Bioinformatics (in progress)
University of Louisville, Louisville, KY, 2015-2018 (expected)

MS Biostatistics
University of Louisville, Louisville, KY, 2012-2014

MA Mathematics
University of Louisville, Louisville, KY, 2012-2014

BS Mathematics
Seattle University, Seattle, WA, 2012

RESEARCH POSITIONS

Graduate Research Assistant 2012-2014, 2015-Current
Institute of Molecular Cardiology & J.G. Brown Cancer Center (formerly), University of Louisville

- Provided statistical and bioinformatics support to scientists and clinicians at the Institute of Molecular Cardiology while conducting original research in metabolomics and in the biology of acute myocardial infarction
- Developed the statistical and machine learning methodology to facilitate the detection of circulating cancer cells using carbon nanotube micro-arrays
- Provided statistical and bioinformatics support to scientists and clinicians at Brown Cancer Center

Consultant & Intern 2012-2013
Theravance Inc. (Theravance Biopharma)

- Designed and simulated cardiovascular safety studies with time-to-event outcome measures for a therapeutic in development
- Developed national incidence estimates of paralytic ileus and associated comorbidities to determine medical need for a therapeutic in development
- Conducted other applied statistical projects as needed

Undergraduate Research Assistant 2010-2012
Seattle University

- Retrospective spatial-statistical analysis of a Jeffrey Pine beetle epidemic that took place in the Lake Tahoe basin region from 1991-1996
- Developed generalized linear models for predicting the probability of mortality in Jeffrey Pine trees during epidemiological phases

TEACHING POSITIONS

Graduate Teaching Assistant 2012-2014
University of Louisville
Courses taught or assisted in teaching:

- Introductory Statistics
- College Algebra
- Contemporary Mathematics

Math Laboratory Assistant 2009-2011
Seattle University

OTHER PROFESSIONAL EXPERIENCE

Clinical Analytics Consultant 2014-2015
Humana, Inc., Louisville, KY

- Developed models and process for forecasting revenue and loss for a Medicaid health insurance plan subject to a "Pay-for-Performance" structure based on performance across quality and utilization metrics
- Served as a statistical and analytics consultant to Humana's internal healthcare quality organization

Financial Analyst 2012
Centennial Mortgage, Inc., Seattle, WA

- Developed relational databases for financial data
- Developed software for preliminary underwriting analysis for multifamily and healthcare mortgage loans

Rifleman & Infantry Squad Leader 2007-2013
4th Anti-Terrorism Battalion
United States Marine Corps (R)

PUBLICATIONS

*Denotes equally contributing authorship

Trainor, P.J., Yampolskiy, R.V.*, & DeFilippis, A.P.* (2018). Wisdom of artificial crowds feature selection in untargeted metabolomics: An application to the development of a blood-based diagnostic test for thrombotic myocardial infarction. *Journal of Biomedical Informatics, 81.* doi: 10.1016/j.jbi.2018.03.007

Trainor, P.J., DeFilippis, A.P., & Rai, S.N. (2017). Classifier performance for multiclass phenotype discrimination in metabolomics. *Metabolites, 7*(2). doi: 10.3390/metabo7020030

Trainor, P.J., Hill, B.G., Carlisle, S.M., Rouchka, E.C., Bhatnagar, A., Rai, S.N., & DeFilippis, A.P. (2017). Systems characterization of differential plasma metabolome perturbations following thrombotic and non-thrombotic myocardial infarction *Journal of Proteomics, 160.* doi: 10.1016/j.jprot.2017.03.014.

DeFilippis, A.P., **Trainor, P.J.**, Hill, B.G., Amraotkar, A.R., Rai, S.N., Hirsch, G.A., Rouchka, E., & Bhatnagar, A. (2017). Identification of a plasma metabolomic signature of thrombotic myocardial infarction that is distinct from non-thrombotic myocardial infarction and stable coronary artery disease. *PLoS One, 12*(4). doi: 10.1371/journal.pone.0175591.

Gibb, A.A., Epstein, P.N., Uchida, S., McNally, L.A., Obal, D., Katragadda, K., **Trainor, P.J.**, Conklin, D.J., Brittian, K.R., Tseng, M.T., Wang J., Jones, S.P., Bhatnagar, A., & Hill, B.G. (2017). Exercise-Induced Changes in Glucose Metabolism Promote Physiologic Cardiac Growth *Circulation, 136*(21). doi: 10.1161/CIRCULATIONAHA.117.028274

Khanal, S. **Trainor, P.J.**, Zahin, M., Ghim, S.J., Joh, J., Rai, S.N., Jenson, A.B., & Shumway, B.S. (2017). Histologic variation in high grade oral epithelial dysplasia when associated with high-risk human papillomavirus. *Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology, 123*(5). doi: 10.1016/j.oooo.2017.01.008.

Sultan, A., Zheng, Y., **Trainor, P.J.**, Yong, S., Amraotkar, A.R. Hill, B.G., & DeFilippis, A.P. (2017). Circulating prolidase activity in patients with myocardial infarction. *Frontiers in Cardiovascular Medicine.* doi: 10.3389/fcvm.2017.00050.

Amraotkar, A.R., Ghafghazi, S., **Trainor, P.J.**, Hargis C.W., Irfan A.B., Rai S.N., Bhatnagar A., & DeFilippis A.P. (2017). Presence of multiple coronary angiographic characteristics for the diagnosis of acute coronary thrombus. *Cardiology Journal, 24*(1). doi: 10.5603/CJ.a2017.0004.

Khosravi, F., **Trainor, P.J.**, Lambert, C., Kloecker, G., Wickstrom, E. Rai, S.N., & Panchapakesan, B. (2016). Static micro-array isolation, dynamic time series classification, capture and enumeration of spiked breast cancer cells in blood: the nanotube–CTC chip. *Nanotechnology, 27*(44). doi: 10.1088/0957-4484/27/44/44LT03.

Carlisle, S.M., **Trainor, P.J.**, Yin, X., Doll, M.A., Stepp, M.W., States, J.C., Zhang, X., & Hein, D.W. (2016). Untargeted polar metabolomics of transformed MDA-MB-231 breast cancer cells expressing varying levels of human arylamine N-acetyltransferase 1. *Metabolomics, 12*(7). doi: 10.1007/s11306-016-1056-z.

Amraotkar, A.R., Song, D.D., **Trainor, P.J.**, Ismail, I., Kothari, K., Sing, A., Moore, J.B., Rai, S.N., Bhatnagar, A., & DeFilippis, A.P. (2016). Platelet count and mean platelet volume at the time of and after acute myocardial infarction. *Clinical and Applied Thrombosis/Haemostasis, online publication before print.* doi: 10.1177/1076029616683804.

DeFilippis, A.P., Chernyavskiy, I., Amraotkar, A.R., **Trainor, P.J.**, Kothari, S., Ismail, I., Hargis, C.W., Korley, F.K., Tsimikas, S., Rai, S.N., & Bhatnagar, A. (2016). Circulating levels of plasminogen and oxidized phospholipids bound to plasminogen distinguish between atherothrombotic and non-atherothrombotic myocardial infarction. *Journal of Thrombosis and Thrombolysis, 42*(1). doi: 10.1007/s11239-015-1292-5.

Egan, J.M., Sloughter, J.M., Cardoso, T., **Trainor, P.J.**, Wu, K., Safford, H., & Fournier, D. (2016). Multi-temporal ecological analysis of Jeffrey pine beetle outbreak dynamics within the Lake Tahoe Basin. *Population Ecology, 58*(3). doi: 10.1007/s10144-016-0545-2.

Rai, S.N.*, **Trainor, P.J.***, Khosravi, F., & Panchapakesan, B. (2016). Classification of biosensor time series using dynamic time warping: applications in screening cancer cells with characteristic biomarkers. *Open Access Medical Statistics, 6.* doi: 10.2147/OAMS.S104731.

Khosravi, F., **Trainor, P.J.**, Rai, S.N., Kloecker, G., Wickstrom, E. & Panchapakesan, B. (2016). Label-free capture of breast cancer cells spiked in buffy coats using carbon nanotube antibody micro-arrays. *Nanotechnology, 27*(13). doi: 10.1088/0957-4484/27/13/13LT02.

Khanal, S., Cole, ET., Joh, J., Ghim, S.J., Jenson, A.B., Rai, S.N., **Trainor, P.J.**, & Shumway, B.S. (2015). Human papillomavirus detection in histologic samples of multifocal epithelial hyperplasia: a novel demographic presentation. *Oral Surgery, Oral Medicine, Oral Pathology, and Oral Radiology, 120*(6). doi: 10.1016/j.oooo.2015.07.035.

PUBLISHED SOFTWARE

Trainor, P.J. & Wang H. (2017). *BayesianGLasso: Bayesian Graphical Lasso.* Available from https://CRAN.R-project.org/package=BayesianGLasso

ACCEPTED PUBLICATIONS

DeFilippis, A.P. (2018) & **Trainor, P.J.**. When given a lemon, make lemonade: Revising cardiovascular risk prediction scores. *Annals of Internal Medicine.*

Khanal S., Shumway B.S., Zahin M., Redman R., **Trainor P.J.**, Rai S.N., Ghim S.J., Jenson A.B., & Joh J. (2018). Human Papillomavirus DNA integration, but not viral methylation, is associated with malignant progression of head and neck cancers. *Oncotarget.*

PUBLICATIONS UNDER REVIEW / REVISION

Carlisle, S.M., **Trainor, P.J.**, Doll, M.A., Stepp, M.W., Klinge, C.M.,& Hein, D.W. Knockout of human arylamine N-acetyltransferase 1 (NAT1) in MDA-MB-231 breast cancer cells leads to increased reserve capacity, maximum mitochondrial capacity, and glycolytic reserve capacity.

PUBLICATIONS IN PREPARATION

Trainor, P.J., Mitchell, J.M., Carlisle, S.M., Moseley, H.N.B., Rai, S.N., & DeFilippis, A.P. Inferring metabolite interactomes via Bayesian graphical model selection utilizing molecular structure informative priors.

Trainor, P.J., Mitchell, J.M., Carlisle, S.M., Moseley, H.N.B., Rai, S.N., & DeFilippis. Hierarchical Bayesian modeling with informative chemical structure priors for probabilistic compound identification from LC-MS data.

Trainor, P.J, DeFilippis, A.P., & Rai, S.N. Frequentist and Bayesian estimation of Gaussian Graphical Models.

INVITED TALKS

Trainor, P.J. (2017). Metabolomics of thrombotic myocardial infarction: systems characterization of plasma metabolome perturbations and the development of a diagnostic classifier. *Systems Biology Seminar Series*, University of Kentucky, Lexington, Kentucky.

ORAL/POSTER PRESENTATIONS

Trainor, P.J. (2018). High Performance R: Parallel computing, seamless C++ integration, optimizing linear algebra routines, and deep learning in the R language. *Kentucky Biomedical Research Infrastructure Network Seminar Series*, University of Louisville, Louisville, Kentucky.

Trainor, P.J., Carlisle, S.M., Hill, B.G., Rouchka, E.C., Bhatnagar, A., Rai, S.N., & DeFilippis, A.P. (2017). Metabolomic analysis of thrombotic and non-thrombotic Myocardial Infarction: From systems biology to diagnostic classification. *Symposium in Molecular Biology "Metabolism: Disease Models and Model Organisms"*. Pennsylvania State University, State College, Pennsylvania.

Trainor, P.J., Carlisle, S.M., DeFilippis, A.P.*, & Rai, S.N.* (2017). Molecular fingerprinting for inferring a Gaussian Graphical Model representation of a stable coronary artery disease plasma interactome using adaptive graphical Lasso penalization. *UT-KBRIN Annual Bioinformatics Summit*, Burns, Tennessee.

Trainor, P.J., Bhatnagar, A., Rai, S.N., & DeFilippis, A.P. (2016). Dynamic changes in topologically related plasma metabolites following atherothrombotic and non-atherothrombotic myocardial infarction: A weighted network analysis. *Kentucky Academy of Science Annual Meeting*, University of Louisville, Louisville, Kentucky.

Trainor, P.J., & Rai, S.N. (2015). Comparison of partial least squares-discriminant analysis, random forests, and rotation forests for phenotype discrimination given metabolomic data. *Research!Louisville*, University of Louisville, Louisville, Kentucky.

Trainor, P.J. & Rai, S.N. (2013). Patient rule induction method for identifying subgroups in clinical studies. *Kentucky Academy of Science Annual Meeting*, Morehead State University, Morehead, Kentucky.

Trainor, P.J., & Barnes, C. (2013). Statistical considerations for dedicated cardiovascular safety studies. *Theravance, Inc. (now Theravance Biopharma) company seminar*, San Francisco, California.

Trainor, P.J., & Sloughter, J.M. (2012). Generalized Linear Modeling in Population Ecology. *Northwest Undergraduate Mathematics Symposium*, Lewis & Clark College, Portland, Oregon.

GRANTS

- Co-investigator. NIH West Coast Metabolomics Center Pilot and Feasibility Award: "Targeted plasma metabolomic profiling of thrombotic myocardial infarction". PI: DeFilippis, A.P. (2017-2018). $50,000 direct cost.
- Co-Investigator. Alpha Phi Foundation Heart-to-Heart Grant (2016 award): "Circulating Levels of Oxidized Phospholipids, Sub-Clinical Atherosclerosis and Atherosclerotic Cardiovascular Disease". PI: DeFilippis, A.P. (2016-2017). $100,000 direct costs.

COMPUTING EXPERTISE

Programming Languages: R, Python, C++, MATLAB/Octave
Machine Learning & Deep Learning: TensorFlow, Keras, WEKA
Statistical Software: R, SAS
Bioinformatics Software: Many packages distributed via Bioconductor
Computer Algebra Systems: SAGE, Mathematica
Operating Systems: UNIX, Linux (openSUSE is my favorite flavor), and Windows

GRADUATE LEVEL COURSEWORK

- Advanced Biochemistry I/II
- Cell Biology
- Molecular Biology
- Epidemiological Methods
- Advanced Probability Theory
- Statistical Inference
- Differential Equations and Dynamical Systems
- Mathematical Modeling
- Real Analysis
- Abstract Algebra
- Biostatistical Methods

- Linear Models
- Categorical Data Analysis
- Time Series Data Analysis
- Survival Analysis
- Clinical Trials Statistics
- Statistical Programming
- Statistical & Machine Learning
- Artificial Intelligence (Computer Science)
- Data Mining (Computer Science)
- Introduction to Bioinformatics
- Statistical Methods in Bioinformatics
- Current Topics in Bioinformatics (Next Generation Sequencing, RNA-Seq, ChIP-Seq, miRNA target prediction, Epigenetics, Metagenetics)
- Introduction to Next Generation Sequencing
- Research Ethics

OTHER ACADEMIC TRAINING

NIH-NIGMS Short Course on Statistical Genetics and Genomics
Awarded Fellowship
University of Alabama, Birmingham, 2016

NIH Common Fund Metabolomics Initiative Workshop on Metabolomics
Awarded Fellowship
University of Alabama, Birmingham, 2015

AWARDS

- 2nd Place Graduate Research Competition in Health Sciences, 2016, Kentucky Academy of Science
- 1st Place Graduate Research Competition in Mathematics, 2013, Kentucky Academy of Science
- Janet E. Mills Award for Outstanding Undergraduate Research in Mathematics, Seattle University