

Alexander Kirpich

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EDUCATION

- Doctor of Philosophy in Biostatistics*** August 2015
University of Florida, Gainesville, Florida, USA
Advisors: Dr. Ira M. Longini and Dr. Yang Yang
Dissertation: Dynamic Infectious Disease Modeling Challenges Influenced by Real Life Problems
- Master of Statistics*** May 2011
University of Florida, Gainesville, Florida, USA
Advisor: Dr. Hani Doss
Project: A Comparison of Ridge Regression and LASSO
- Specialist Degree in Mathematics*** June 2006
Belarusian State University, Minsk, Belarus
Advisor: Dr. Yakov V. Radyno
Thesis: Fields with Valuations

PUBLICATIONS

- Roosa K., Lee Y., Luo R., **Kirpich A.**, Rothenberg R., Hyman J.M., Yan P. and Chowell G., (2020). *Real-time forecasts of the COVID-19 epidemic in China from February 5th to February 24th, 2020*. *Infectious Disease Modelling*, 5, pp.256-263.
- Roosa K., Lee Y., Luo R., **Kirpich A.**, Rothenberg R., Hyman J.M., Yan P. and Chowell G., (2020). *Short-term Forecasts of the COVID-19 Epidemic in Guangdong and Zhejiang, China: February 13–23, 2020*. *Journal of Clinical Medicine*, 9(2), p.596.
- Kirpich A.***, Ragavan M.*, Bankson J., McIntyre L.M., Merritt M.E. (2019) *Kinetic Analysis of Hepatic Metabolism Using Hyperpolarized Dihydroxyacetone*. [*First Co-Authors] *Journal of Chemical Information and Modeling*. DOI: 10.1021/acs.jcim.8b00745
- Kirpich A.**, Ainsworth L., Wedow J., Newman J.R., Michailidis G., and McIntyre L. M. (2018) *Variable selection in omics data: a practical evaluation of small sample sizes*. *PLoS ONE* 13(6).
- Kirpich A.**, Ibarra M. A., Moskalenko O., Fear J. M., Gerken J, Mi X., Ashrafi A., Morse A., and McIntyre L. M. (2018) *SECIMTools: A suite of Metabolomics Data Analysis Tools*. *BMC Bioinformatics*, 19(1)151.
- Mir R. A., Weppelmann T. A., Teng L., **Kirpich A.**, Mauricio A. E., Driver J. D., and Jeong K.

C. (2018) *Colonization Dynamics of Cefotaxime Resistant Bacteria in Beef Cattle Raised Without Cephalosporin Antibiotics*. *Frontiers in Microbiology* 9:500

Kirpich A., Weppelmann T. A., Yang Y., Morris J. G., Longini I. M. (2017) *Controlling Cholera in the Ouest Department of Haiti Using Oral Vaccines*. *PLoS Negl Trop Dis* 11(4)

Patterson, R.E., **Kirpich A.**, Koelmel J. P., Kalavalapalli S, Morse A. M., Cusi K, Sunny N. E., McIntyre L. M., Garrett T. J., and Yost R. A. (2017) *Improved experimental data processing for UHPLC–HRMS/MS lipidomics applied to nonalcoholic fatty liver disease*. *Metabolomics* 13:142

Ragavan M., **Kirpich A.**, Fu X., Burgess S.C., McIntyre L.M., Merritt M.E. (2017) *A Comprehensive Analysis of Myocardial Substrate Preference Emphasizes the Need For a Synchronized Fluxomic/Metabolomic Research Design*. *Heart and Circulatory Physiology. American Journal of Physiology*.

Kirpich A. and Leary E. (2016) *Superfund Locations and Cancer Incidence in Florida*. *Statistics and Public Policy*. American Statistical Association.

Kirpich A., Weppelmann T. A., Yang Y., Ali A., Morris J. G., Longini I. M. (2015) *Cholera Transmission in Ouest Department of Haiti: Dynamic Modeling and the Future of the Epidemic*. *PLoS Negl Trop Dis* 9(10)

Kirpich A., Yang Y., Longini I. M., Halloran E. (2013) *Simulation Studies for Dengue Transmission and Within-Host Immune Responses*. In *JSM Proceedings 2013, Section on Statistics in Epidemiology*. Alexandria, VA: American Statistical Association. 4217-4221.

Minarich L. A., **Kirpich A.**, Fiske L. M., Weinstein D. A. (2012) *Bone Mineral Density in Glycogen Storage Disease Type Ia and Ib*. *Genetics in Medicine, Nature Publishing Group* 14(8), 737-741.

Kirpich S. and **Kirpich A.** (2011) *Integrity approach to analyzing of open systems*. *Harmonious development of systems - the third way of human development: monograph* (ISBN: 978-966-8888-03-9); Eds. E. M. Soroko and T. I. Egorova-Gudkova). Institute of Creative Technologies Ltd., Odessa. - pp. 249-253.

Kirpich S., Chernomorets V., **Kirpich A.** (2011) *Structural and temporal organization of systems*. *Harmonious development of systems - the third way of human development: monograph* (ISBN: 978-966-8888-03-9); Eds. EM Soroko and TI Egorova-Gudkova). Institute of Creative Technologies Ltd., Odessa. - pp. 253-260.

IN PROGRESS

Skums P., **Kirpich A.**, Baykal P.I., Zelikovsky A., and Chowell G. (tentative 2020) *Global transmission network of SARS-CoV-2: from outbreak to pandemic*. Submitted.

Norris M.H., **Kirpich A.**, Bluhm A.P., Zincke D., Hadfield T., Blackburn J.K. (tentative 2020) *Alteration of exosporium surface oligosaccharides: Evidence of convergent patho-evolution in Bacillus anthracis*. Submitted.

Paisie T.K., Mavian C., Cash M., Ali A., Browne C., **Kirpich A.**, Cummings D. A., Morris Jr. J. G., Salemi M. (tentative 2020) *Genomic dynamics of the serotype switch of toxigenic Vibrio cholerae O1 in Haiti*. Draft. To be submitted soon.

Kirpich A., Solomon S.S., Mehta S.H., Cummings D.A.T. (tentative 2020) *Assessing the impact of a community intervention targeting HIV transmission among PWID in multiple sites in India: insights from transmission models*. Draft. To be submitted soon.

Weppelmann T. A., **Kirpich A.**, von Fricken M. A., Alam M. T., Jeong K. C., Ali A. (tentative 2020) *Associations between Meteorological Factors, Water Quality, and Incidence of Sporadic Cases of Legionnaire's Disease*. Draft.

HONORS & AWARDS

UF Informatics Institute Postdoctoral One Year Fellowship in **2016** calendar year.

Travel award and modules tuition at the 5th Summer Institute in Statistics and Modeling in Infectious Diseases (**SISMID**) Seattle, WA USA **July 8-24, 2013** (workshop, 3 Modules) **\$500**

Travel award and modules tuition at the 4th Summer Institute in Statistics and Modeling in Infectious Diseases (**SISMID**) Seattle, WA USA **July 9-25, 2012** (workshop, 4 Modules) **\$500**

University of Florida **Grinter Fellowship** in **2011-2012** academic years (Department of Biostatistics) and in **2008-2010** years (Department of Statistics). The Grinter Fellowship is provided to prospective Ph.D. students by corresponding graduate programs to support their studies and research at the University of Florida. **\$4000** Annually.

GlaxoSmithKline Scholar Award 2008. This award was assigned annually to one outstanding first year graduate student of the Statistics Department at the University of Florida. **\$1000**

Belarusian State University extended fellowships in **2001-2006** academic years. The fellowships are provided to students with high GPA to support their studies at the Belarusian State University.

RELEVANT SKILLS

Programming Languages and Software

R, SAS, C++, Python, ArcGIS, Microsoft Windows, Microsoft Office, Unix, L^AT_EX

Language Skills

English (fluent), Belarusian (native), Russian (native), German (basic).

FORMAL TRAINING

Applied Coursework

Spatial Statistics, Regression Analysis, Design of Experiments, Advanced Design and Analysis of Experiments, Categorical Data Analysis, Linear Models, Generalized Linear Models, Longitudinal Data Analysis, Applied Survival Analysis, Stochastic Modeling, Epidemiology, Biostatistical Consulting, Computational Methods.

Theoretical Coursework

Statistical Inference, Probability Theory, Stochastic Processes, Limit Theory, Nonparametric Statistics, Advanced Survival Analysis, Abstract and Linear Algebra, Matrix Algebra, Mathematical

Analysis, Functional Analysis, Analytical Geometry, Topology, Differential Geometry, Differential Equations.

CONFERENCES AND TALKS

Kirpich A. *Infectious Disease Modeling Challenges – COVID 19 Pandemic in the Modern World* (online presentation) University of Florida Informatics Institute, April 2020, Gainesville, FL USA

Kirpich A., Solomon S.S., Mehta S.H., Cummings D.A.T. *Assessing the impact of a community intervention targeting HIV transmission among PWID in multiple sites in India: insights from transmission models.* (poster) Epidemics⁷ - International Conference on Infectious Disease Dynamics, December 2019, Charleston, SC USA

Xinsong D., Manfio L., **Kirpich A.**, Hogan W., Garrett T. J., Lemas D. J. *UMPIRE: A Reproducible Pipeline for Scalable Untargeted Metabolomics Data Analysis.* (poster) 1st Annual Metabolomics Association of North America (MANA) Conference, November 2019, Atlanta, GA USA

Lemas D.J., Xinsong D., Dado-Senn B., **Kirpich A.**, Francois M., Cacho N., Thompson L., Parker L., Neu J., Laporta J., Garrett T. *The human and bovine milk metabolome at 2-weeks postnatal.* (poster) 1st Annual Metabolomics Association of North America (MANA) Conference, November 2019, Atlanta, GA USA

Kirpich A., Merritt M. E., Michailidis G., McIntyre L. M. *Variable selection in untargeted metabolomics data analysis.* (speed talk and poster) Joint Statistical Meeting 2016, August 2016 Chicago, IL USA

McIntyre L. M., Patterson R., Garrett T., Morse A., **Kirpich A.**, Fear J., Ibarra M., Moskalenko O., Koelmel J. *Metabolomic Data Analysis: Data Preprocessing.* (talk) Joint Statistical Meeting 2016, August 2016, Chicago, IL USA

Kirpich A., Weppelmann T. A., Yang Y., Morris J. G., Longini I. *Cholera transmission in Ouest Department of Haiti: dynamic modeling and prediction.* (poster) Epidemics⁵ - International Conference on Infectious Disease Dynamics, December 2015, Clearwater Beach, FL USA

Kirpich A., Weppelmann T. A., Yang Y., Morris J. G., Longini I. *Cholera transmission in Ouest Department of Haiti: dynamic modeling and prediction.* (talk) ENAR Meeting 2015, March 2015, Miami, FL USA

Leary E., **Kirpich A.** *Cancer Incidence and Superfund Sites in Florida.* (talk) ENAR Meeting 2015, March 2015, Miami, FL USA

Kirpich A., Weppelmann T. A., Yang Y., Morris J. G., Longini I. *Cholera transmission in Ouest Department of Haiti: dynamic modeling and prediction.* (poster) 49th US-Japan Conference on Cholera and Other Bacterial Enteric Infections, February 2015, Gainesville, FL USA

Kirpich A., Yang Y., Longini I., Halloran E. *Simulation Studies and Inference Challenges for Dengue Transmission and Within Host Immune Responses.* (poster) University of Florida Emerging Pathogens Institute Research Day 2014, February 2014, Gainesville, FL USA

Kirpich A., Yang Y., Longini I., Halloran E. *Simulation Studies and Inference Challenges for Dengue Transmission and Within Host Immune Responses.* (poster) Joint Statistical Meeting 2013, August 2013, Montreal QC, Canada

WORKSHOPS

ACM-BCB Computational Advances in Molecular Epidemiology (CAME) September 2019
Niagara Falls, NY USA
Presenter. Participant.

Florida ASA Chapter Meeting 2015 February 2015
Tampa, FL USA
Participant.

5th Summer Institute in Statistics and Modeling in Infectious Diseases (SISMID) July 2013
Seattle, WA USA
Workshop participant. Took 3 Modules.

4th Summer Institute in Statistics and Modeling in Infectious Diseases (SISMID) July 2012
Workshop participant. Took 4 Modules.

University of Florida Workshop on New Directions in Monte Carlo Methods February 2013
Gainesville, FL USA
Participant.

RESEARCH EXPERIENCE

Assistant Professor

August 2019 - Present

Georgia State University, School of Public Health, Atlanta, Georgia USA

Georgia State University, Department of Population Health Sciences, Atlanta, Georgia USA

- Conducted research and prepared manuscripts.
 - ◇ Dynamic modeling of HIV transmission among people who inject drugs in India.
 - ◇ Cholera epidemics genetic evolutions simulation studies for Haiti.
 - ◇ Anthrax epidemics genetic evolutions simulation studies for Africa.
- Worked on grant submissions.
 - ◇ Hepatitis C elimination study using phylogenetics.
 - ◇ Georgia Comprehensive Cancer Registry and Superfund sites study.

Postdoctoral Associate

November 2017 - June 2019

University of Florida, Department of Biology, Gainesville, Florida USA

University of Florida, Emerging Pathogens Institute, Gainesville, Florida USA

- Dynamic modeling of HIV transmission among people who inject drugs in India.
 - ◇ Proposed and utilized differential equations framework for intervention and consumption stratified location-specific *SI* model.
 - ◇ Fit the model to data obtained from a cluster randomized intervention trial targeting people who inject drugs across multiple sites in India. Summarized findings and policy recommendations.
 - ◇ Prepared manuscript.
- Respiratory protection effectiveness clinical trial data analysis.
 - ◇ Performed the data analysis of multi site randomized clinical trial of respirator and medical mask effectiveness against respiratory infections among health worker.
- Hepatitis C Study.
 - ◇ The goals of the project are to investigate closely the hepatitis C phylogenetics to find transmission patterns, relationships and mutations of the virus found in different hosts and to look into the relationship between population dynamic and the corresponding samples obtained in vivo.

Postdoctoral Associate/Postdoctoral Fellow

September 2015 - October 2017

University of Florida, Southeast Center for Integrated Metabolomics, Gainesville, Florida USA

University of Florida, Informatics Institute, Gainesville, Florida USA

- Nuclear magnetic resonance data modeling.
 - ◇ Proposed and utilized differential equations framework to describe the difference in metabolic processes in the liver between different treatment group of mice.
 - ◇ Performed traditional analysis of the nuclear magnetic resonance steady state data obtained during the controlled experiments on mice.
 - ◇ Prepared manuscripts.
- Variable selection for small sample sizes.

- ◇ Investigated via the simulations the behavior of LASSO, Elastic and a simple ANOVA variable selectors for extremely small sample sizes typical for omics settings.
 - ◇ Compared the performance of LASSO, Elastic Net and ANOVA on datasets obtained from different experiments.
 - ◇ Prepared manuscript.
- SECIMTools suite of metabolomics data analysis tools.
 - ◇ Developed and programmed the statistical components of SECIMTools
 - ◇ Oversaw and guided day to day coding operations.
 - ◇ Prepared manuscript and user guide.
- Metabolomics data pre-processing and analysis for collaboration.
 - ◇ Developed a protocol for a workflow analysis of metabolomics data.
 - ◇ Applied cleaning, normalization and imputation methods to metabolomics data obtained from the instruments. Compared data-processing techniques for metabolomics data.
 - ◇ Performed data analysis of the processed data.
 - ◇ Participated in collaborative manuscript writing.

Research Assistant

August 2012 - August 2015

University of Florida, Department of Biostatistics, Gainesville, Florida USA

University of Florida, Emerging Pathogens Institute, Gainesville, Florida USA

- Proposed and implemented dynamic compartmental statistical model with complex environmental compartment for cholera transmission in Ouest region of Haiti. The model incorporated available incidence data and environmental readings for temperature and precipitation.
 - ◇ Two primary approaches were considered for estimation such as least square minimization and particle filtering hidden Markov chain framework.
 - ◇ Model parameters were estimated using both approaches and basic reproductive number R_0 was evaluated for the proposed model.
 - ◇ Worked on the simulations of different vaccination campaigns in the proposed model.
- Developed a simulator for dengue epidemics. Complex interactions between four known possible dengue serotypes were implemented. Immune responses of individuals during the course of epidemic were incorporated via enzyme-linked immunologist assay (ELISA) readings.
 - ◇ For the simulated data serotype specific histories were censored for 0%, 25%, 50% and 75% of the population to make it similar to the real data. A few years in the beginning of the epidemics were dropped to imitate non-naive baselines for individuals to make it similar to the Nicaragua cohort data.
 - ◇ Likelihood analysis was performed for the simulated data with different censoring levels as well as for the Nicaragua cohort data. Unobserved quantities in the likelihood were integrated out during the estimation procedure.
- Analyzed field data collected in Haiti by UF collaborators and performed statistical consulting for the UF Emerging Pathogens Institute researchers.
- Performed analysis of laboratory data for UF medical school collaborators.

TEACHING EXPERIENCE

Graduate Teaching Assistant August 2011 - August 2012
PHC6050 Statistical Methods for Health Sciences Research I
University of Florida, Department of Biostatistics, Gainesville, Florida, USA

- The required statistical course for the most graduate non-quantitative degrees in the College of Public Health and Health Profession. The course covered the concepts of the introductory applied statistics in public health.
- Held office hours two times a week, graded homework and projects both online and in paper.
- Answered student's questions to approximately 60 graduate students.
- Graded student exams.

Instructor May 2011 - June 2011
STA3024 Introduction to Statistics II
University of Florida, Department of Statistics, Gainesville, Florida, USA

- The second introductory course in statistics taken for general education and for the major requirement by the large proportion of the University of Florida undergraduate students.
- Supervised two graduate teaching assistants while serving as the primary instructor for the course.
- Planned lectures, typed lecture notes and slides, assigned homework, wrote and conducted the exams for approximately 80 undergraduate students.
- Held office hours weekly three times a week. Answered student questions.
- Prepared and assigned class project with the data analysis using either Minitab software or R statistical language for extra class credit.

Graduate Teaching Assistant August 2008 - April 2011
STA6126-6127, STA6166-6167 Introductory Graduate Sequences to Statistics
University of Florida, Department of Statistics, Gainesville, Florida, USA

- The required statistical course sequences for the many graduate non-quantitative degrees across the University of Florida colleges. Sequence choice depends on the major. Each of the two semester course sequences cover the concepts of the applied statistics necessary for basic statistical analysis.
- Held office hours four times a week for approximately 120 students.
- Graded homework. Answered student's questions.

Graduate Teaching Assistant & Labs Instructor August 2008 - April 2011
STA2023 Introduction to Statistics I
University of Florida, Department of Statistics, Gainesville, Florida, USA

- The first introductory course in statistics taken for general education by the large proportion of the University of Florida freshman and sophomore students.
- Taught three course lab sections to total of 120 undergraduate students.
- Assisted students during the lab sessions with their understanding of the assignments and the discussed topics.
- Graded lab worksheets and proctored the exams.
- Held office hours in the specialized tutoring room three hours per week.

INDUSTRIAL EXPERIENCE

Quality and Service Assurance Analyst

June 2008 - August 2008

Nature Publishing Group, New York City, New York, USA

- Provided testing of weekly maintenance releases, ongoing changes and new implementations in the NPG public web site, NPG administrator web postal and the back end.
- Performed database monitoring and functionality testing using DBVisualizer software.
- Conducted security tests of the credit card billing for different countries by checking the proper encryption and safe personal information processing.
- Evaluated various quality assurance tools used for automated tests and script writing.
- Managed communications with the customer services of the companies that offered the testing tool products.

Marketing Analyst

February 2008 - May 2008

DADA Entertainment LLC (Sony BMG & DADA Joint Venture), New York City, New York, USA

- Gathered information from the business partners and advertisers about ongoing web, mobile phone, and any other advertisement campaigns.
- Calculated the profit and related expenses of the currently running campaigns.
- Analyzed potential problems with the each running campaign based on the collected data.
- Estimated the future expenses and the profit of the different campaigns.

Quality and Service Assurance Analyst

September 2006 - February 2008

DADA Entertainment LLC (Sony BMG & DADA Joint Venture), New York City, New York, USA

- Evaluated compatibility of DADA media content types and functionality of digital rights management protection (DRM) mechanisms on the specific handsets. Test were performed on the actual handsets and the various phone emulators of the handsets used by major US and Canada wireless carriers.
- Tested new and ongoing wireless telephone carrier community messaging programs, mobile marketing campaigns, and billing procedures.
- Monitored media content delivery via DADA proprietary platform to handsets on all stages.
- Performed database functionality monitoring using Toad for Oracle database tool for SQL.
- Conducted regression testing by developing and running automated test scripts using HP QuickTest Professional (QTP) environment.
- Reported and maintained the bugs database using Seapine TestTrack system.

Quality Assurance Specialist

March 2006 - September 2006

ITransition Software Development Company, Minsk, Belarus

- Executed functional and integration tests for the web based applications.
- Reported bugs to the IBM Rational Clear Quest tracking system.
- Tested and maintained multi browser support for both IBM PC compatible and Apple MAC machines.
- Coded automated test scripts for web based applications using Watir Ruby testing language.
- Performed back end database testing using Toad for Oracle database tool for SQL.
- Maintained documentation that reflected recent changes in the current product specifications.

CONSULTING

Postdoctoral Consultant

September 2015 - Present

University of Florida, Genetics Institute

- Performed metabolomics data analysis for collaborators at UF Genetics Institute.
 - ◊ Processed the mass spectroscopy data using various filtering procedures and statistical techniques.
 - ◊ Applied normalization and imputation methods to mass spectroscopy data.
 - ◊ Applied variable selection and visualization methods to the metabolites data including LASSO, Elastic Net, PCA, and others.
 - ◊ Interpreting the results of the analysis.
- Was part of the Southeast Center for Integrated Metabolomics (SECIM).
 - ◊ Taught a seminar on variable selection methods to people with the limited statistical background.
 - ◊ Helped SECIM members with statistical analyses.

Student Consultant

August 2012 - August 2015

University of Florida, Department of Biostatistics

University of Florida, Emerging Pathogens Institute

- Took the required Biostatistical Consulting course (PHC6063) which involved analysis of data for multiple projects in the College of Medicine and in the College of Public Health and Health Professions.
 - ◊ Most weekly project involved analysis of the data collected by either medical doctors or non-quantitative researchers in the public health. Those projects involved meta analysis of the relationship of hepatotoxicity with age, estimation of LD50 for the rats based on radiation exposure, sample size computations for various study designs and some others.
 - ◊ The final project involved the investigation of the potential association between the values of the urine biomarkers and bladder cancer. Current bladder cancer diagnostic methods are precise, however they are painful and invasive. The goal of the project was to provide some decision rule when patient should be send for some additional screening. We had biomarkers data for cancer and control patients. The goal was to identify the biomarkers or their combinations that should had triggered the alarm.
- Consulted collaborators at the UF Emerging Pathogens Institute on the analysis of data collected during the field studies.
 - ◊ Helped in statistical analysis of the Haiti surface water sampling data.
 - ◊ Performed analysis of the associations between meteorological factors, water quality changes and outbreaks of the legionellosis based on in the data collected in the Mid-Atlantic states.