Cole Brokamp

Contact Information

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Research Interests

Machine learning applied to biomedical data, statistical inference methods for random forest, statistical computing, environmental health, air pollution, land use modeling

Education

Cincinnati Children's Hospital Medical Center, Cincinnati, Ohio USA

Postdoctoral Research Fellow, April 2016 – present

University of Cincinnati, Cincinnati, Ohio USA

Ph.D., Biostatistics, April 2016

University of Cincinnati, Cincinnati, Ohio USA

B.S., Biomedical Engineering, June 2010

Academic Experience

University of Cincinnati, Cincinnati, Ohio USA

Instructor *August - December, 2015*

Co-taught graduate level course for the Department of Biostatistics and Epidemiology. Shared responsibility for lectures, exams, homework assignments, and grades.

BE-9063 Computing with R Shiny, Fall 2015.

Publications

Rhonda D. Szczesniak, Dan Li, Weiji Su, **Cole Brokamp**, John Pestian, Michael Seid, John P. Clancy. Phenotypes of Rapid Cystic Fibrosis Lung Disease Progression during Adolescence and Young Adulthood. *Under Review.*

Todd Florin, Lilliam Ambroggio, **Cole Brokamp**, Mantosh S. Rattan, Eric J. Crotty, Andrea Kachelmeyer, Richard M. Ruddy, Samir Shah. Interrater Reliability of Examination Findings in Children with Suspected Community-Acquired Pneumonia. *Under Review.*

Rebecca Gernes, **Cole Brokamp**, Glenn Rice, J. Michael Wright, Michelle Kondo, Yvonne Michael, Geoffrey Donovan, Demetrios Gatziolis, David Bernstein, Grace LeMasters, James Lockey, G. Khurana Hershey, Patrick Ryan. Evaluation of Multiple Measures of Residential Greenspace Exposure and Early and Late-onset Allergy Outcomes in a Cincinnati Children's Cohort. *Under Review.*

Patrick Ryan, James E. Lockey, Brad Black, Carol H. Rice, Jeff Burkle, Tim Hilbert, Linda Levin, **Cole Brokamp**, Roy McKay, Ted Larson, Grace K. LeMasters. Childhood exposure to libby amphibole asbestos and respiratory symptoms in young adulthood. *Under Review.*

Lusine Yaghjyan, R Aroa, **Cole Brokamp**, E O'Meara, B Sprague, G Ghita, Patrick Ryan. Association of air pollution with mammographic breast density in the Breast Cancer Surveillance Consortium. Breast Cancer Research. *In Press.*

Cole Brokamp, MB Rao, Patrick Ryan, Roman Jandarov. A comparison of resampling and recursive partitioning methods in random forest for estimating the asymptotic variance using the infinitesimal jackknife. *In Preparation.*

Kristin A. Schmidlin, **Cole Brokamp**, Grace K. LeMasters, David I. Bernstein, James E. Lockey, Manuel Villareal, Gurjit K. Khurana Hershey, Patrick Ryan. Cluster analysis of childhood asthma phenotypes identifies specific environmental risk factors. *In Preparation*.

Jessica S. Tan, **Cole Brokamp**, David I. Bernstein, Grace K. LeMasters, Gurjit K. Khurana Hershey, James E. Lockey, Manuel Villareal, Patrick Ryan. Patterns of longitudinal allergic sensitization identifies phenotypes of children at increased risk for asthma. *In Preparation*.

Cole Brokamp, Roman Jandarov, MB Rao, Grace LeMasters, Patrick Ryan. Exposure assessment models for elemental components of particulate matter in an urban environment: A comparison of regression and random forest approaches. Atmospheric Environment. 151. 1-11. 2017. *Download*.

Hong Ji, Jocelyn M Biagini Myers, Eric B Brandt, **Cole Brokamp**, Patrick H Ryan, Gurjit K Khurana Hershey. Air pollution, epigenetics, and asthma. Allergy, Asthma & Clinical Immunology. 12(1). 51. 2016. *Download*.

Jennifer Kannan, **Cole Brokamp**, David I. Bernstein, Grace K. LeMasters, Gurjit K. Khurana Hershey, Manuel Villareal, James E. Lockey, Patrick Ryan. Parental Snoring and Environmental Pollutants, but Not Aeroallergen Sensitization, Are Associated with Childhood Snoring in a Birth Cohort. Pediatric Allergy, Immunology, and Pulmonology. 0. 2016. *Download*.

Cole Brokamp, Grace LeMasters, Patrick Ryan. Residential mobility impacts exposure assessment and community socioeconomic characteristics in longitudinal epidemiology studies. Journal of Exposure Science and Environmental Epidemiology. online. 2016. *Download*.

Kanistha C. Coombs, Ginger L. Chew, Christopher Schaffer, Patrick H. Ryan, **Cole Brokamp**, Sergey A. Grinshpun, Gary Adamkiewicz, Steve Chillrude, Curtis Hedman, Meryl Colton, Jamie Ross, Tiina Reponen. Indoor air quality in green-renovated vs. non-green low-income homes of children living in a temperate region of US (Ohio). Science of The Total Environment. 554-555. 178-185. 2016. *Download*.

Patrick Ryan, **Cole Brokamp**, Z-H Fan, MB Rao. Analysis of personal and home characteristics associated with the elemental composition of PM2.5 in indoor, outdoor, and personal air in the RIOPA study. Health Effects Institute Research Report 185. 2015. *Download*.

Kelly J Brunst, Patrick H Ryan, **Cole Brokamp**, David Bernstein, Tiina Reponen, James Lockey, Gurjit K Khurana Hershey, Linda Levin, Sergey A Grinshpun, Grace LeMasters. Timing and duration of traffic-related air pollution exposure and the risk for childhood wheeze and asthma. American Journal of Respiratory and Critical Care Medicine. 192(4). 421-427. 2015. *Download*.

Patrick H Ryan, Sang Young Son, Christopher Wolfe, James Lockey, **Cole Brokamp**, Grace LeMasters. A field application of a personal sensor for ultrafine particle exposure in children. Science of The Total Environment. 508. 366-373. 2015. *Download*.

Cole Brokamp, MB Rao, Tina Zhihua Fan, Patrick H Ryan. Does the elemental composition of indoor and outdoor PM2.5 accurately represent the elemental composition of personal PM2.5?. Atmospheric Environment. 101. 226-234. 2015. *Download*.

Cole Brokamp, Jacob Todd, Carlo Montemagno David Wendell. Electrophysiology of single and aggregate Cx43 hemichannels. PLoS ONE. 7(10):e47775. 2012. *Download*.

Sheryl E Koch, Xiaoqian Gao, Lauren Haar, Min Jiang, Valerie M Lasko, Nathan Robbins, Wenfeng Cai, **Cole Brokamp**, Priyanka Varma, Michael Tranter, Yong Liu, Xiaoping Ren, John N. Lorenz, Hong-Sheng Wang, W Keith Jones, Jack Rubinstein. Probenecid: novel use as a non-injurious pos-

itive inotrope acting via cardiac TRPV2 stimulation. Journal of Molecular and Cellular Cardiology. 53(1). 134-144. 2012. *Download*.

Michael Tranter, Robert N Helsley, Waltke R Paulding, Michael McGuinness, **Cole Brokamp**, Lauren Haar, Yong Liu, Xiaoping Ren, W Keith Jones. Coordinated post-transcriptional regulation of HSP70. 3 gene expression by microRNA and alternative polyadenylation. Journal of Biological Chemistry. 286(34). 29828-29837. 2011. *Download*.

Talks

Geocoding to Characterize Community and Environmental Exposures for Multi-site Studies. Cincinnati Children's Hospital Medical Center Division of Biomedical Informatics Hutton Lecture Series. Cincinnati, OH. 2017. *Download*.

GIS Tools for Environmental Epidemiology. Biomedical Informatics (BMIN8001) Practicum Lecture. Cincinnati, OH. 2017. *Download*.

Building A Platform for Data Sharing. Cincinnati Children's Hospital Medical Center Academy Health Site Visit. Cincinnati, OH. 2017. *Download*.

Land Use Models for Elemental Components of Particulate Matter in an Urban Environment: A Comparison of Regression and Random Forest Models. International Society of Exposure Science Annual Meeting. Utrecht, NL. 2016. *Download*.

Predictive Comparisons: Interpreting Input Effects for Any Supervised Learner. Cincinnati Children's Hospital Medical Center Division of Biostatistics & Epidemiology Journal Club. Cincinnati, OH. 2016. *Download*.

Land Use Models for Elemental Components of Particulate Matter in an Urban Environment: A Comparison of Regression and Random Forest Models. University of Cincinnati Division of Biostatistics and Bioinformatics Seminar Series. Cincinnati, OH. 2016. *Download*.

Data Visualization for Population Health Initiatives. All In Data Visualization Webinar. Cincinnati, OH. 2016. *Download*.

Using Machine Learning and Interactive Dashboards to Understand How Children's Health is Impacted by their Community and Surrounding Environment. University of Cincinnati Institute for Analytics Innovation Showcase and Networking Event. Cincinnati, OH. 2016. *Download*.

Combined Sewer Overflow and Childhood Hospital Admissions. Cincinnati Children's Hospital Medical Center Division of Biostatistics & Epidemiology Seminar Series. Cincinnati, OH. 2016. *Download*.

Land Use Random Forests for Estimation of Exposure to Elemental Components of Particulate Matter. University of Cincinnati Division of Biostatistics and Bioinformatics Doctoral Dissertation Defense. Cincinnati, OH. 2016. *Download*.

Geospatial Data for Environmental Epidemiology. Cincinnati Children's Hospital Medical Center Environmental Epidemiology Shared Interest Group Seminar Series. Cincinnati, OH. 2016. *Download*.

Confidence Intervals for Random Forest Predictions Using the Infinitesimal Jackknife. University of Cincinnati Division of Biostatistics and Bioinformatics Seminar Series. Cincinnati, OH. 2015. *Download*.

Childhood Residential Changes are Associated with Decreased Traffic Exposure and Improved Neigh-

borhood Characteristics. International Society of Exposure Science Annual Meeting. Las Vegas, NV. 2015. *Download*.

R Studio and R Markdown: An integrated IDE and report generator for R. University of Cincinnati BE7022 (Intro To Biostatistics) Guest Lecture. Cincinnati, OH. 2015. *Download*.

Does the Elemental Composition of Indoor and Outdoor PM2.5 Accurately Represent the Elemental Composition of Personal PM2.5?. University of Cincinnati Division of Epidemiology Seminar Series. Cincinnati, OH. 2014.

Assessing Personal PM2.5 Exposure Prediction Improvement After Addition of Indoor PM2.5 Exposure and Personal Characteristics to Outdoor PM2.5 Exposure Measurements. Joint Statistical Meeting. Boston, MA. 2014.

Exact Sampling and Counting for Fixed-Margin Matrices.. University of Cincinnati Division of Epidemiology Seminar Series. Cincinnati, OH. 2013.

Small Molecule Disruption of G Beta Gamma Signaling Inhibits the Progression of Heart Failure.. University of Cincinnati Department of Pharmacology and Biophysics Seminar Series. Cincinnati, OH. 2011.

Ultrasound-Targeted Microbubble Destruction to Deliver Nucleic Acid to the Heart.. University of Cincinnati Department of Pharmacology and Biophysics Seminar Series. Cincinnati, OH. 2011.

An academic research cooperative education experience.. University of Cincinnati BME321 Guest Lecture. Cincinnati, OH. 2011.

Computer Skills

Statistical Packages: R (including GIS packages: rgdal, rgeos, sp, raster)

Languages: Python, Unix shell scripting, R Markdown, Max

Applications: RShiny, Knitr, LaTeX, Vim, MS Office, qGIS, ArcGIS, GEOS, LSF

Operating Systems: Unix/Linux, Mac, Windows

Software

`automagic`
Automagically install packages necessary to run R code.
https://github.com/cole-brokamp/automagic

`rize`
Dockerize R shiny apps.
https://github.com/cole-brokamp/rize

`RFinfer`
A package for R that implements novel versions of the random forest from my dissertation research, produces confidence intervals and prediction variances.
https://cran.r-project.org/web/packages/RFinfer/index.html

`aiRpollution`
A package for R that assesses exposure to air pollution components in Cincinnati, Ohio. Also includes other convience functions for extracting Cincinnati GIS variables.
https://github.com/cole-brokamp/aiRpollution

`DeGAUSS`

A family of standalone software packages designed for Decentralized Geomarker Assessment for multi Site Studies. Allows for coordinate extraction from addresses and estimation of environmental exposures and community characteristics without exposing private health information outside of the institution.
https://github.com/cole-brokamp/DeGAUSS

`geocodeCAGIS`
A package for R that uses exact address files from CAGIS to geocode addresses in Cincinnati, Ohio and link to address based information from the City of Cincinnati and the Hamilton County Auditor's Office.
https://github.com/cole-brokamp/geocodeCAGIS

`geocoder`
A software package for linux that geocodes using TIGER/Line data. Offline geocoding is useful when dealing with private health information. This software is also implemented on a internal server, available to researchers at CCHMC.
https://github.com/cole-brokamp/geocoder

`R Shiny`
Several R Shiny Applications.
https://colebrokamp.com

Awards and Memberships

CCHMC Division of Biostatistics & Epidemiology Travel Award	*2016*
Member - International Society of Exposure Science	*2014 – present*
Member - American Statistical Assocation	*2013 – present*
Choose Ohio First Scholarship Recipient	*2010 – 2015*
University Graduate Scholarship Recipient	*2010 – present*
Distinguished Honors Scholar, UC Engineering	*2010*
University of Cincinnati Alumni Scholarship	*2008 – 2009*
University Cincinnatus Scholar Recipient	*2005 – 2010*

Leadership and Service

Journal Reviewer for:
Journal of Exposure Science and Environmental Epidemiology
Environmental Pollution

Grant Reviewer for:
Puerto Rico Science, Technology & Research Trust

Chair of the Land Use Regression Modeling Session,
International Society of Exposure Science Annual Meeting *2016*

Co-founded Biostatistics Student Journal Club,
Department of Biostatistics, University of Cincinnati *2013*

Student Representative to Graduate Education Committee,
Department of Pharmacology, University of Cincinnati *2010 – 2011*

Grant Funding

CCHMC Arnold W. Strauss Fellowship Award (Brokamp, PI) *7/1/2016-7/1/2017*

Assessing Exposure to Air Pollution Across Time and Space

The primary objective of this award is to combine satellite-based measurements, land use characteristics, and meteorologic data to create a hybrid spatiotemporal model for ground level exposure to particulate matter. This model will be applied to estimate trimester specific exposures to air pollution in an existing childhood cohort (CCAAPS) and used to determine the association of these

exposures with respiratory and mental health outcomes at age 12.

CCTST Processes and Methods Award (Brokamp, PI) *1/24/2017-6/30/2017*

Validating a Geocoding Approach for Multi Site Studies

The primary objective of this award is to compare the geocoding (assigning latitude and longitude coordinates to addresses) accuracy of our software DeGAUSS (DEcentralized Geomarker Assessment for mUlti Site Studies) to with other common geocoding software. Furthermore, each method will be evaluated based on it ability to correctly estimate environmental exposures and community-level characteristics.