BIOGRAPHICAL SKETCH

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NAME: Mason, Jeremy

eRA COMMONS USER NAME (credential, e.g., agency login): JMASON23

POSITION TITLE: Assistant Professor of Research Urology

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
Georgia Institute of Technology	B.S.	05/2009	Mechanical Engineering
University of Southern California	M.S.	12/2010	Mechanical Engineering
University of Southern California	Ph.D.	08/2013	Mechanical Engineering
University of Southern California	Postdoctoral	08/2018	Biological Sciences
University of Southern California	M.S.	Enrolled	Clinical, Biomedical, and Translational Investigations

A. Personal Statement

I have the leadership, background, expertise, and motivation necessary to successfully carry out and complete the proposed research project. I have a unique background in mechanical engineering, applied mathematics, and computational biology, with diverse training and experience with large clinical cancer datasets from private and governmental institutions. My research is focused on forecasting the spatiotemporal spread of metastatic cancer with dynamical systems modeling, as well as disease-related event prediction models via machine learning and deep learning architectures. The knowledge that I have gained as a Big Data Scientist Training Enhancement Program (BD-STEP) fellow, an Oak Ridge Institute for Science and Education (ORISE) fellow, and a Mentored Career Development in Clinical and Translational Science scholar have illuminated the utility and benefit of developing predictive models for clinical utility. Additionally, these have provided me the skills required to integrate multiple data streams together, while addressing common difficulties such as missing data or varying levels of detail (e.g. – Stage IIIA vs T1N2M0) as documented in the following publications. From my past experiences with multi-disciplinary collaborators and numerous graduate and undergraduate students, I understand the importance of consistent communication and contribution.

1. **Mason J**, Gong Y, Amiri-Kordestani L, Wedam S, Gao JJ, Singh H, et al. *Abstract PD2-07: Prediction of CDK inhibitor efficacy in ER+/HER2- breast cancer using machine learning algorithms*. Cancer Research. 2020;80(4 Supplement):PD2-07-PD2-. doi: 10.1158/1538-7445.Sabcs19-pd2-07.
2. Bazhenova L, Newton P, **Mason J**, Bethel K, Nieva J, Kuhn P. *Adrenal metastases in lung cancer: clinical implications of a mathematical model*. J Thorac Oncol. 2014;9(4):442-6. Epub 2014/04/17. doi: 10.1097/jto.0000000000000133. PubMed PMID: 24736064; PubMed Central PMCID: PMCPMC3989547.
3. Newton PK, **Mason J**, Venkatappa N, Jochelson MS, Hurt B, Nieva J, et al. *Spatiotemporal progression of metastatic breast cancer: a Markov chain model highlighting the role of early metastatic sites*. NPJ Breast Cancer. 2015;1:15018.
4. In GK, **Mason J**, Lin S, Newton PK, Kuhn P, Nieva J. *Development of metastatic brain disease involves progression through lung metastases in EGFRmutated non-small cell lung cancer*. Converg Sci Phys Oncol. 2017;3. doi: https://doi.org/10.1088/2057-1739/aa7a8d.

B. Positions and Honors

Positions and Employment

2018- Assistant Professor of Research Urology, Department of Urology, University of Southern California, Los Angeles, CA
2018-2020 Oak Ridge Institute for Science and Education (ORISE) Fellow, Food and Drug Administration, Silver Spring, MD
2015-2017 Big Data Scientist Training Enhancement Program (BD-STEP) Fellow/Trainee, Michael E. DeBakey VA Medical Center, Houston, TX
2014-2018 Postdoctoral Scholar – Research Associate, Biological Sciences, University of Southern California, Los Angeles, CA
2014-2014 Research Associate, Biological Sciences, The Scripps Research Institute, San Diego, CA
2013-2014 Professional Scientific Collaborator, Biological Sciences, The Scripps Research Institute, San Diego, CA
2013-2014 Research Specialist, Aerospace and Mechanical Engineering, University of Southern California, Los Angeles, CA

Other Experience and Professional Memberships

2015- Member, American Association for Cancer Research (AACR)
2012- Member, Society for Mathematical Biology (SMB)

Honors

2019- Mentored Career Development in Clinical and Translational Science Award
2018 Landahl Travel Award for SMB Annual Meeting
2016 Minority in Cancer Research travel award for AACR Annual Meeting
2013 Aerospace & Mechanical Engineering Excellence in Research Award, University of Southern California, Los Angeles, CA
2009 B.S. awarded with high honors, Georgia Institute of Technology, Atlanta, GA
2004-2009 Dean's List, Georgia Institute of Technology, Atlanta, GA
2004-2013 Gates Millennium Scholarship, Bill and Melinda Gates Foundation

C. Contributions to Science

1. The ultimate outcome of a cancer patient is largely dependent on how and where their disease progresses to. Each metastatic site, just like the primary tumor, has the potential to spread cancer throughout the body and thus alter the potential outcomes of each patient. Using the progression pathways to and from each tumor, we were able to quantify and classify each metastatic site based on their propensity to spread the cancer[1,2]. This demonstrated that not only do metastatic sites for a particular primary cancer behave differently within the body, but they also behave differently between various primary types.
    1. Newton PK, **Mason J**, Bethel K, Bazhenova LA, Nieva J, Kuhn P. *A stochastic Markov chain model to describe lung cancer growth and metastasis*. PloS one. 2012;7(4):e34637.
    2. Newton PK, **Mason J**, Venkatappa N, Jochelson MS, Hurt B, Nieva J, et al. *Spatiotemporal progression of metastatic breast cancer: a Markov chain model highlighting the role of early metastatic sites*. NPJ Breast Cancer. 2015;1:15018.

2. Lung cancer staging is largely based on if and where the cancer has metastasized to and plays a major role in what therapeutic treatments are available to the patient. The work that I completed during my graduate study indicated that metastases to the adrenal gland in primary lung cancer patients more closely resembled those to the lymph nodes, in terms of progression time, as opposed to other locations throughout the body[1]. Clinically, this indicated that solitary, ipsilateral adrenal metastases likely resulted from a lymphatic spread as opposed to a circulatory spread and would thus reduce the staging for a patient from Stage IV to Stage II or III. This would give the patient additional treatment options aimed at curative intent (as opposed to palliative) such as surgical resection of the adrenal gland(s) by means of an adrenalectomy.
    1. Bazhenova L, Newton P, **Mason J**, Bethel K, Nieva J, Kuhn P. *Adrenal metastases in lung cancer: clinical implications of a mathematical model*. J Thorac Oncol. 2014;9(4):442-6. Epub 2014/04/17. doi: 10.1097/jto.0000000000000133. PubMed PMID: 24736064; PubMed Central PMCID: PMCPMC3989547.

3. Visualizing trends in big data to determine emerging patterns has always been a challenge to scientists and researchers. I have developed an interactive, web-based platform that can be used to analyze longitudinal datasets of disease progression[1]. Data is presented in an easy to read, easy to understand manner such that any lay person can operate the webpage and make sensible conclusions based on the data available. With the option to select specific subgroups, side-by-side comparisons can be made from contrasting groups (i.e. – male vs female) on various graphs highlighting unique aspects of the data. As the field of data science evolves, and data becomes more complex, this resource will expand and update as well. Over the past year, there have been 1300 page views spread across the 4 primary cancer pages of breast (806), bladder (265), lung (112), and liver (106).
    1. http://kuhn.usc.edu/forecasting

4. When a person is diagnosed with cancer, a major emotion that they are faced to deal with is anxiety. They do not know what will happen next; if their cancer will spread, where it will spread, or when it will spread. Being able to predict these events can ultimately alleviate these feelings of anxiety and is largely a problem of data. As a result, the forecasting work that I have shaped my research around has served as the building block for a global patient database, CancerBase, aimed at crowd-sourcing patient data with the intent of using it to help all others within the community[1]. Since its initial inception, the idea of CancerBase being one webpage has evolved into an Ecosphere of applications aimed at helping with anxiety, treatment side effects, medication scheduling, and other aspects that tend to dominate cancer patients' lives throughout their disease. To date, 900 cancer patients have signed up on CancerBase.
    1. http://www.cancerbase.org

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/1Z7MvgpK9gw5B/bibliography/public/

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

Ongoing Research Support
KL2TR001854 Mason 06/01/19-05/31/22
NIH/Southern California Clinical and Translational Science Institute
Enhancing patient care via predictive models of cancer-related events
The goal of this work is to develop a modeling network capable of predicting individual patient events using retrospective, longitudinal patient clinical and demographic data. This network will consist of machine learning and Markov chain models capable of simulating disease progression and treatment response in real-time. Common computer science techniques will be used to train, validate, and test the models with appropriate performance metrics to assess the accuracy and effectiveness. The rationale behind using machine learning models is rooted by the fact that these techniques have been successfully used in other, non-health related research fields. Thus, using individual patient data to build the modeling network is expected to result in individual patient predictions. If properly applied, precisely and accurately predicting cancer-related events have the potential to extend life and improve outcomes for patients.
Role: Scholar

Completed Research Support
PRSUPON/S3410160 Kuhn (PI) 03/01/18 – 06/30/19
Novartis Foundation
Mapping disease and treatment patterns in breast cancer
The goal of Real-Time-Oncology (RTO) is to develop treatment pathways that identify therapeutic opportunities with high precision, follow the therapeutic response with high accuracy, and translate emerging resistance into follow-on therapeutic opportunities. WP1: Model development and integration of market analysis. The aim of Phase 1 is to build a software application from open-source and readily available computational tools to enable rapid re-analysis of a patient cohort to predict outcomes such as overall survival, metastatic development, and therapy response.
Role: Co-Investigator

Mason J, Gong Y, Amiri-Kordestani L, Wedam S, Gao JJ, Singh H, et al. *Abstract PD2-07: Prediction of CDK inhibitor efficacy in ER+/HER2- breast cancer using machine learning algorithms*. Cancer Research. 2020;80(4 Supplement):PD2-07-PD2-. doi: 10.1158/1538-7445.Sabcs19-pd2-07.

Bazhenova L, Newton P, **Mason J**, Bethel K, Nieva J, Kuhn P. *Adrenal metastases in lung cancer: clinical implications of a mathematical model*. J Thorac Oncol. 2014;9(4):442-6. Epub 2014/04/17. doi: 10.1097/jto.0000000000000133. PubMed PMID: 24736064; PubMed Central PMCID: PMCPMC3989547.

Newton PK, **Mason J**, Venkatappa N, Jochelson MS, Hurt B, Nieva J, et al. *Spatiotemporal progression of metastatic breast cancer: a Markov chain model highlighting the role of early metastatic sites*. NPJ Breast Cancer. 2015;1:15018.

In GK, **Mason J**, Lin S, Newton PK, Kuhn P, Nieva J. *Development of metastatic brain disease involves progression through lung metastases in EGFR mutated non-small cell lung cancer*. Converg Sci Phys Oncol. 2017;3. doi: https://doi.org/10.1088/2057-1739/aa7a8d.

Newton PK, **Mason J**, Bethel K, Bazhenova L, Nieva J, Norton L, et al. *Spreaders and sponges define metastasis in lung cancer: a Markov chain Monte Carlo mathematical model*. Cancer research. 2013;73(9):2760-9.

Newton PK, **Mason J**, Bethel K, Bazhenova LA, Nieva J, Kuhn P. *A stochastic Markov chain model to describe lung cancer growth and metastasis*. PloS one. 2012;7(4):e34637.

Fujii T, **Mason J**, Chen A, Kuhn P, Woodward WA, Tripathy D, et al. *Prediction of Bone Metastasis in Inflammatory Breast Cancer Using a Markov Chain Model*. Oncologist. 2019;24(10):1322-30. Epub 2019/04/05. doi: 10.1634/theoncologist.2018-0713. PubMed PMID: 30952823; PubMed Central PMCID: PMCPMC6795167.

Hasnain Z, **Mason J**, Gill K, Miranda G, Gill IS, Kuhn P, et al. *Machine learning models for predicting post-cystectomy recurrence and survival in bladder cancer patients*. PLOS ONE. 2019;14(2):e0210976. doi: 10.1371/journal.pone.0210976.