**Madeleine S. Gastonguay**

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**Education**

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| **University of Connecticut,** Storrs, CT | May 2020 | |
| Bachelor of Science, Applied Mathematics  Summa Cum Laude with Honors; GPA: 3.98/4.00  Minor: Bioinformatics  Thesis: A Quantitative Pipeline for the Identification of Combinations of f. Targets for Claudin-Low Triple Negative Breast Cancer Reversion  Advisor: Dr. Paola Vera-Licona |  | |
| **La Sorbonne University**, Paris, France  Course de Civilisation Française | | Jan. 2018-May 2018 |

**Research Experience**

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| **The Jackson Laboratory (JAX)**, Bar Harbor, ME  *Research Data Analyst I* | June 2020 - present |

Topic: A Bayesian approach to mediation analysis of complex traits with measurement noise

* Contributed to the development and validation of an R package implementation of a Bayesian model selection approach to mediation analysis that is flexible in both data inputs and potential inferences, and extended it to moderated mediation
* Diagnosed the effect of measurement noise on the inference of mediation
* Applied these tools to better understand the mechanisms underlying the effects of sex and diet on protein and gene expression in the livers of genetically diverse mice

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| **UConn Health Center for Quantitative Medicine,** Farmington, CT  *Undergraduate Research Assistant* | Sept. 2018 - May 2020 |

Topic: A quantitative pipeline for cancer reversion analysis in triple negative breast cancer

* Constructed a static intracellular signaling network for a claudin-low triple negative breast cancer (CL TNBC) cell line with multi-omics data using bioinformatics techniques
* Applied a structure-based control method for nonlinear systems, implemented in python, to identify putative targets that steer the system to any desired attractor
* Conducted virtual screenings using a network-based approach and a signal propagation algorithm to estimate long term behaviors to identify concerted perturbations of control nodes resulting in reversion of the CL TNBC phenotype

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| **Metrum Research Group**, Simsbury, CT  *Summer Intern* | June 2018 – Aug. 2018 |

Topic: A maternal-fetal physiologically based pharmacokinetic model for drugs metabolized by cytochrome P450 isoenzymes

* Modeled maternal and fetal drug exposures at varying gestational ages by incorporating anatomical, biochemical, and physiological changes associated with pregnancy as a system of ordinary differential equations using R and *mrgsolve*
* Performed local sensitivity analysis, optimized model parameters, and validated the model by comparing model predictions to external published data

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| **University of Connecticut,** Department of Molecular and Cellular Biology, Storrs, CT  *Undergraduate Research Assistant/Holster Scholar* | Jan. 2017 – Sept. 2017 |

Topic: The effect of host genetic variability on Epstein Barr Virus (EBV)-associated cancer susceptibility

* Reviewed relevant literature to identify genes that may impact EBV-associated cancer susceptibility
* Used wet lab techniques such as Polymerase Chain Reactions, Gel Electrophoresis, and Sanger Sequencing to sequence the genes of interest in several EBV-associated cancer cell lines and a non-cancerous EBV+ control cell line
* Aligned the genetic sequence of target genes to identify common and distinct single nucleotide polymorphisms (SNPs) across EBV-associated cancer cell lines using the software Geneious and BLAST

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| **Children’s Hospital of Philadelphia,** Philadelphia, PA and **Metrum Research Group,** Simsbury, CT  *High School Independent Study* | Sept. 2015 – Aug. 2016 |

Topic: A pharmacogenomic study of midazolam and morphine clearance in critically ill pediatric patients

* Analyzed variability of SNPs in the sample dataset for inclusion in the analysis
* Estimated the effect of pediatric risk of mortality score on drug clearance using population pharmacokinetic modeling
* Identified a SNP in UGT2B7 whose minor allele frequency is associated with increased midazolam clearance

**Manuscripts in Preparation**

Gastonguay, M. S., Keele, G. R., & Churchill, G. A. (2021). The impact of measurement noise in mediation analysis.

**Publications and Preprints**

Crouse, W. L., Keele, G. R., Gastonguay, M. S., Churchill, G. A., & Valdar, W. (2021). A Bayesian model selection approach to

mediation analysis. *BioRxiv*, 2021.07.19.452969. https://doi.org/10.1101/2021.07.19.452969

Utsey, K., Gastonguay, M. S., Russell, S., Freling, R., Riggs, M. M., & Elmokadem, A. (2020). Quantification of the Impact of

Partition Coefficient Prediction Methods on Physiologically Based Pharmacokinetic Model Output Using a Standardized

Tissue Composition. *Drug Metabolism and Disposition*, *48*(10), 903 LP – 916. https://doi.org/10.1124/dmd.120.090498

Zuppa, A. F., Benitez, G. R., Zane, N. R., Curley, M. A. Q., Bradfield, J., Hakonarson, H., Gastonguay, M. S., Moorthy, G., Prodell,

J., & Gastonguay, M. R. (2019). Morphine Dose Optimization in Critically Ill Pediatric Patients with Acute Respiratory

Failure. *Critical Care Medicine*, *47*(6), e485–e494. https://doi.org/10.1097/CCM.0000000000003741

Zuppa, A. F., Conrado, D. J., Zane, N. R., Curley, M. A. Q., Bradfield, J., Hakonarson, H., Gastonguay, M. S., Moorthy, G., Prodell,

J., & Gastonguay, M. R. (2019). Midazolam Dose Optimization in Critically Ill Pediatric Patients with Acute Respiratory

Failure. *Critical Care Medicine*, *47*(4), e301–e309. https://doi.org/10.1097/CCM.0000000000003638

**Selected Oral Presentations**

Gastonguay MS, Russell S, Freling R, Utsey K, and Elmokadem A, *Prediction of maternal-fetal exposures of CYP450-metabolized*

*drugs using physiologic pharmacokinetic modeling implemented in R and mrgsolve.,* R/Pharma Conference, Cambridge, MA,

August 23rd, 2019

Gastonguay MS, Marazzi L, Vera-Licona P, *Identification of Combinations of Targets for Claudin-Low Triple Negative Breast*

*Cancer Reversion,* UConn Center for Cell Analysis and Modeling Summer Seminar, July 26th, 2019

Gastonguay MS, Russell S, Freling R, Utsey K, and Elmokadem A, *Development of an Open and General Physiologically Based*

*Pharmacokinetic Model to Predict Maternal-Fetal Exposures for Drugs Metabolized by CYP Isoenzymes,* R/Medicine

Conference, New Haven, CT, September 8th, 2018

**Poster Presentations**

Gastonguay MS, Marazzi L, Vera-Licona P, *Identification of Combinations of Pharmacologic Targets for Claudin-Low Triple*

*Negative Breast Cancer Reversion,* International Society of Pharmacometrics Quantitative Systems Pharmacology Student

Symposium, Virtual, April 28th, 2021

Gastonguay MS, Marazzi L, Vera-Licona P, *Identification of Combinations of Targets for Claudin-Low Triple Negative Breast*

*Cancer Reversion,* Joint Meeting in Mathematics, Denver, CO, January 15th – 18th, 2020

Gastonguay MS, Russell S, Freling R, Utsey K, and Elmokadem A, *Development of an Open-source Physiologically-Based*

*Pharmacokinetic Model to Predict Maternal-Fetal Exposures of CYP450-Metabolized Drugs,* International Society of

Pharmacometrics Regional Quantitative Systems Pharmacology Day, Princeton, NJ, July 16th, 2019

Gastonguay MS, Russell S, Freling R, Utsey K, and Elmokadem A, *Development of an Open-source Physiologically-Based*

*Pharmacokinetic Model to Predict Maternal-Fetal Exposures of CYP450-Metabolized Drugs,* University of Connecticut

Frontiers in Undergraduate Research, April 2019

**Fellowships and Grants**

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| **Summer Undergraduate Research Fund,** University of Connecticut Office of Undergraduate Research   * Awarded funding for a 9-week summer research project | May 2019 |
| **Holster Scholar**, University of Connecticut Honors Program   * Offered enrollment in a semester-long course to learn how to develop and write a project proposal * Selected as one of 8 students awarded funding for a 10-week summer research project | May 2017 |

**Honors and Awards**

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| **Blue Ribbon Poster Award,**ISoP Quantitative Systems Pharmacology Student Symposium | April 2021 |
| **Dean’s List**, The University of Connecticut | Sept. 2016 - May 2020 |
| **Academic Excellence Scholarship**, The University of Connecticut | Sept. 2016 - May 2020 |
| **Babbidge Scholar**, The University of Connecticut | Dec. 2017, 2019 |
| **New England Scholar**, The University of Connecticut | Dec. 2018 |

**Skills & Certifications**

**Technical:** R; Python; basic Matlab, SQL, Julia, and bash shell; Git; LaTeX; OpenRefine; High Performance Computing with SLURM; *mrgsolve*; *shiny*; *tidyverse; plotly;* JAGS;Bayesian Data Analysis

**Wet Lab:** Polymerase Chain Reactions, Gel Electrophoresis, Gel Extraction, Sanger sequencing

**Language:** Proficient in French conversation, reading, and writing; Certified in French level B1.2 by La Sorbonne in Paris

**Teaching:** Certified Instructor with The Carpentries

**Teaching Experience** (\* indicates upcoming)

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| **Data Carpentry Ecology with R Workshop\***, Bioinformatics Training Program at JAX (Instructor) | Dec. 2021 |
| **Data Carpentry Genomics Workshop**, Bioinformatics Training Program at JAX (Instructor) | Nov. 2021 |
| **Introductory Statistics with R,** Bioinformatics Training Program at JAX (TA) | Sept. 2021 |
| **Introduction to R and RStudio,** Bioinformatics Training Program at JAX (TA) | June 2021 |