

# SAMANTHA L. WILSON

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## CURRENT ACADEMIC APPOINTMENT

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Assistant Professor, Department of Obstetrics and Gynecology, McMaster University

July 2022 -

## EDUCATION AND TRAINING

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Postdoctoral Fellow, Princess Margaret Cancer Centre

February 2018 - June 2022

Supervisor: Dr. Michael Hoffman

Doctor of Philosophy, Medical Genetics, University of British Columbia

January 2013-February 2018

Supervisor: Dr. Wendy Robinson

Dissertation: Genetic and epigenetic profiling of placental insufficiency: Identifying biomarkers of preeclampsia and intrauterine growth restriction

Bachelor of Science, The University of Western Ontario

September 2008-June 2012

Honours Specialization in Genetics

## PUBLICATIONS, N=20

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underline = I supervised student

### Original Research

1. **Wilson, S.L.**, Shen, S.Y., Harmon, L.M., Burgener, J., Triche, T., Bratman, S.V., De Carvalho, D.D., Hoffman, M.M. Synthetic spike-in controls enable sensitive and reproducible cell-free methylome interrogation. *Cell Reports Methods*. **In Press**.
2. Brockway, H.B., **Wilson, S.L.**, Kallapur, S.K., Buhimschi, C.S., Muglia, L.J., Jones, H.N. Characterization of methylation signatures in spontaneous preterm birth. **Under revision**.
3. Lee, Y., Choufani, S., Weksberg, R., **Wilson, S.L.**, Yuan, V., Robinson, W.P., Burt, A., Marsit C., Lu, A., Binder, A., Ritz, B., Bohlin, J., Gjessing, H., Harris, J., Magnus, P., Jugessur, A., Horvath, S. Placental epigenetic clocks: estimating gestational age using placental DNA methylation levels. *Aging*. 11 (12), 4238. 2019.
4. Konwar, C., Price, E.M., Wang, L., **Wilson, S.L.**, Terry, J., Robinson, W.P. DNA methylation profiling of acute chorioamnionitis-associated placentas and fetal membranes: insights into epigenetic variation in spontaneous preterm births. *Epigenetics and Chromatin*. 11 (1), 63. 2018.
5. Leavey, K., **Wilson, S.L.**, Robinson, W.P., Cox, B. Epigenetic Regulation of Placental Gene Expression in Transcriptional Subclasses of Preeclampsia. *Clinical Epigenetics*. 10 (1), 28. 2018.
6. Magee, L.A., Synnes A., von Dadelszaen, P., Hutfield A., Chainoine, J.P., Cote, A.M., Devlin, A., Dorling, J., Gafni, A., Ganzevoort, W., Gruslin, A., Helewa, M., Hutton, E., Koren, G., Lee, S.K., McArthur, D., Rey, E., Robinson, W.P., Roseboom, T., Singer, J., **Wilson S.L.**, Moutquin, J.M., and CHIPS-Child Study consortium. CHIPS-Child: Testing the developmental programming hypothesis in the offspring of the CHIPS Trial. *Pregnancy and Hypertension*. 14, 15-22. 2017.
7. **Wilson, S.L.**, Leavey, K., Cox, B., Robinson, W.P. Mining DNA methylation alteration towards classification of placental pathologies. *Human Molecular Genetics*. 27 (1), 135-146. 2017.
  - This work won the Elsevier Trophoblast Research New Investigator Award at the 2016 International Federation of Placenta Association meeting.
8. Barha, C.K., Salvante, K., Hanna, C.W., **Wilson, S.L.**, Robinson, W.P., Altman, R.M., Nepromnaschy, P. Hypothalamic-pituitary-adrenal axis activity and cellular aging in mothers. *PLOS One*. 12 (5), e0177869. 2016.

9. **Wilson, SL.**, Liu, Y., Robinson, WP. Placental telomere length decline with gestational age differs by sex and TERT, DNMT1, and DNMT3A DNA methylation. *Placenta*. 48, 26-33. 2016
  - This work was selected as part of the inaugural *poster walks* session at the American Society of Human Genetics 2015 meeting.
10. Barha, C., Hanna, CW., Salvante, K., **Wilson, SL.**, Robinson, WP., Nepromnaschy, P. Number of Children and Telomere Length in Women: A Prospective, Longitudinal Evaluation. *PLOS One*. 11 (1), e0146424. 2016.
11. **Wilson, SL.**, Blair, JD., Hogg, K., Langlois, S., von Dadelszen, P., Robinson, WP. Placental DNA methylation at term reflects maternal serum levels of INHA, but not PAPP A or FN1, early in pregnancy. *BMC Medical Genetics*. 16 (1), 111. 2015.

## Review articles, proceedings, and letters

1. **Wilson, S.L.** and Wallingford, M. Epigenetic regulation of molecular reproduction in human and animal models. *Molecular Human Reproduction*. 27 (7), gaab041. 2021.
2. **Wilson, S.L.**, Way, G.P., Bittremieux, W., Armache, J-P., Haendel, M., Hoffman, M.M. Sharing biological data: Why, when and how. *Federation of European Biochemical Societies Letters*. 595 (7), 847-863. 2021.
3. **Wilson, SL.**, Robinson, WP. Utility of DNA methylation to assess placental health. *Trophoblast Research*. 64, S23-S28. 2017.
4. Manokhina, I., Konwar, C., Del Gobbo, GF., **Wilson, SL.**, Robinson, WP. Placental biomarkers for assessing fetal health. *Human Molecular Genetics*. 26 (R2), R237-R245. 2017.
5. Albrecht, C., Baker, JC., Blundell, C., Chavez, SL., Carbone, L., Chamley, L. Hannibal, RL., Illsley, N., Kurre, P., Laurent, LC., McKenzie, C., Morales-Prieto, D., Pantham, P., Paquette, A., Powell, K., Price, N., Rao, BM., Sadovsky, Y., Salomon, C., Tuteja, G., **Wilson, S.**, O'Tierney-Ginn, PF. IFPA meeting 2016 workshop report 1: Genomic communication, bioinformatics, trophoblast biology and transport systems. *Placenta*. 60, S5-S9. 2017.
6. Manokhina, I., **Wilson, SL.**, Robinson, WP. Non-invasive nucleic-acid based approaches to monitor placental health in pregnancy. *AJOG*. 213 (4), S197-S206. 2015.
7. Cohen, ASA., **Wilson, SL.**, Trinh, J., Ye, XC. Detecting Somatic Mosaicism: Considerations and Clinical Implications. *Clin Genet*. 87 (6), 554-562. 2014.

## Book Chapters

1. Robinson, WP., Penaherrera, MS., Konwar, C., Yuen, V., **Wilson, SL.** Epigenetic Modifications in the Human Placenta. *Human Reproductive and Prenatal Genetics*. Elsevier. 293-311. 2019.

## Theses

1. **Wilson, SL.** Genetic and epigenetic profiling of placental insufficiency: identifying biomarkers of preeclampsia and intrauterine growth restriction. *University of British Columbia*. 2017.

## PATENTS

### Patent Applications

1. International Patent Application No. PCT/CA2020/051507 SYNTHETIC SPIKE-IN CONTROLS FOR CELL-FREE MEDIP SEQUENCING AND METHODS OF USING SAME. November 6, 2020.

**R package: Spiky**

2020

*Contributor*

Spiky is a package designed to use synthetic spike-in control data for cfMeDIP-seq to absolutely quantify molar amount of experimental cell-free DNA. I created the code and worked with programmers, Dr. Tim Triche and Lauren Harmon to create spiky and make it accessible to everyone. Spiky is available on GitHub, and Bioconductor.

<https://github.com/trichelab/spiky>

<https://bioconductor.org/packages/spiky>

**FUNDING, N=9****Research Grants, N=3**

1. **Preeclampsia Foundation Vision Grant (\$20,000.00USD)** 2023  
Preeclampsia Foundation Canada  
Non-invasively assessing placental aging and oxidative stress as markers for preeclampsia  
Role: Principal Investigator
2. **Accelerator grant in genome medicine (\$80,000.00CAD)** 2019-2020  
McLaughlin Centre, University of Toronto  
Genome-wide cell-free DNA methylation enrichment and sequencing for preeclampsia diagnosis  
Role: Co-investigator
3. **CIHR project grant (\$1,212,525.00CAD)** 2019-2024  
Canadian Institute of Health Research  
DNA methylation profiling in cell-free DNA: a non-invasive method to screen for pre-term birth  
Role: Co-investigator

**Salary Awards, N=6**

1. **CIHR Fellowship (\$135,000.00CAD)** 2020-2023  
Canadian Institute of Health Research
2. **Molly Towell Perinatal Research Foundation Fellowship (National) (\$60,000.00CAD)** 2019-2021  
Molly Towell Perinatal Research Foundation  
Declined in 2020 to hold CIHR fellowship
3. **Princess Margaret Postdoctoral Fellowship (\$50,000.00CAD)** 2018-2019  
Princess Margaret Cancer Research Centre
4. **UBC Four Year Doctoral Fellowship (\$92,800.00CAD)** 2015-2019  
University of British Columbia  
Declined in 2018 as PhD was completed
5. **BC Children's Hospital Research Institute Graduate Studentship (\$40,000.00CAD)** 2014-2016  
BC Children's Hospital Research Institute  
Declined in 2015 to hold the UBC 4 Year Doctoral Fellowship
6. **NSERC Undergraduate Research Student Award (\$4500.00CAD)** 2011  
National Sciences of Engineering Research Council

**Presentation awards, N=8**

1. **Elsevier Placenta New Investigator Award (International)(\$1000.00USD)** 2021  
International Federation of Placenta Association  
Awarded to top oral presentation.
2. **JW Knox Ritchie Research Award: best poster presentation by a postdoc** 2019  
University of Toronto, Dept. of Obstetrics and Gynecology
3. **Medical Genetics Research Day Poster Prize** 2017  
University of British Columbia, Department of Medical Genetics
4. **BC Children's Hospital Research Institute Poster Presentation Award** 2017  
BC Children's Hospital Research Institute
5. **CIHR Poster Presentation Award Silver** 2017  
Canadian Student Health Research Forum  
Canadian Institute of Health Research
6. **Elsevier Trophoblast Research New Investigator Award (International) (\$1500.00USD)** 2016  
International Federation of Placenta Association  
Awarded to the top poster presentation (>200 presenters). Along with the award, was invited as a plenary speaker to IFPA 2017 meeting in Manchester, UK, and invited to write a review article on my work in placental DNA methylation in the Trophoblast Research Journal.
7. **Academic Day Best Oral Presentation** 2016  
University of British Columbia, Department of Obstetrics and Gynecology
8. **Medical Genetics Research Day Poster Prize** 2015  
University of British Columbia, Department of Medical Genetics

**Teaching awards, N=2**

1. **Teaching Assistant Award** 2017  
University of British Columbia, Department of Medical Genetics
2. **Teaching Assistant Award** 2014  
University of British Columbia, Department of Medical Genetics

**Travel awards, N=8**

1. **Elsevier New Investigator Travel Award (€120.00)** 2021  
International Federation of Placenta Association
2. **CIHR, Institute Community Support Travel Award (\$1000.00CAD)** 2019  
Institute of Human Development, Child and Youth Health  
Canadian Institute of Health Research
3. **CIHR Travel Award (\$1000.00CAD)** 2017  
Canadian Institute of Health Research  
Nominated as being within the top 5% of doctoral students
4. **Loke Travel Award (\$500.00USD)** 2016  
International Federation of Placenta Association
5. **BC Children's Hospital Research Methodology Grant (\$1200.00CAD)** 2016  
BC Children's Hospital Research Institute
6. **CEEHRC Travel Award (\$1000.00CAD)** 2016  
Canadian Epigenetics, Environment and Health Research Consortium Network

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|--|------|
| 7. <b>BC Children's Hospital Research Institute Travel Grant (\$1200.00CAD)</b><br>BC Children's Hospital Research Institute | 2015 |
| 8. <b>Wellcome Trust Epigenomics of Common Diseases Travel Bursary (£100.00)</b><br>Wellcome Trust                           | 2014 |

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**PRESENTATIONS, N=33**

**Invited talks, N=9**

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|--|-----------------|
| 1. <b>University of Ottawa: Ottawa Data Champions</b><br>Title: Practicalities of preparing data for sharing and reproducibility<br>Seminar  | September 2022  |
| 2. <b>Colorado Center for Personalized Medicine</b><br>Title: Towards non-invasive prediction of pregnancy complications using epigenomics<br>Seminar  | March 2022      |
| 3. <b>Columbia University, Department of Obstetrics and Gynecology</b><br>Title: Towards non-invasive prediction of pregnancy complications using epigenomics<br>Seminar                                   | December 2021   |
| 4. <b>University of Florida, Department of Physiology and Functional genomics</b><br>Title: Towards non-invasive prediction of pregnancy complications using epigenomics<br>Seminar                        | September 2021  |
| 5. <b>PACE consortium annual meeting</b><br>Title: A new method to enrich and amplify the DNA methylation signature of cell-free placental DNA from maternal plasma<br>Virtual meeting                     | April, 2021     |
| 6. <b>Tufts Medical Center, Mother and Infant Research Institute</b><br>Title: Towards non-invasive prediction for screening of pregnancy complications<br>Seminar   | January, 2021   |
| 7. <b>R ladies Toronto</b><br>Title: Machine learning approaches to predict preterm birth in R<br>Toronto, ON, Canada  | September, 2019 |
| 8. <b>International Federation of Placental Association 2017 Annual Meeting</b><br>Title: Placental molecular profiling in preeclampsia: Utility, reproducibility and biological meaning<br>Manchester, UK | September, 2017 |
| 9. <b>International Federation of Placental Association 2016 Annual Meeting</b><br>Title: Epigenomics and the Placenta<br>Portland, OR, USA  | September, 2016 |

**Selected talks, N=11**

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|---|----------------|
| 1. <b>International Federation of Placenta Association 2021 meeting: Oral presentation</b><br>Title: A new method to absolutely quantify and enrich for circulating placenta DNA from maternal blood<br>Virtual meeting   | September 2021 |
| 2. <b>American Society of Human Genetics 2020 meeting: Platform oral presentation</b><br>Title: Enrichment, sequencing, and absolute quantification of circulating placental DNA in maternal blood, using DNA methylation<br>Virtual meeting<br>Top 9% of abstracts of 2186 abstracts that were submitted were chosen for an oral presentation. | October, 2020  |
| 3. <b>Placental-Interface Virtual Seminar Series</b><br>Title: A new method to absolutely quantify and enrich for circulating placenta DNA from maternal blood, using   | May, 2020      |

DNA methylation  
Virtual seminar

4. **Princess Margaret Cancer Enlightening Day** October, 2019  
Title: Synthetic spike-in controls to account for biological and technical bias in cfMeDIP-seq  
Toronto, ON, Canada
5. **UBC Faculty of Medicine Student Research Day** May, 2017  
Title: DNA methylation: Reproducibility, utility and biological meaning  
Vancouver, BC, Canada
6. **UBC Dept. of Medical Genetics Research Day** November, 2016  
Title: DNA methylation gives insight into different etiologies in early-onset and late-onset preeclampsia and intrauterine growth restriction  
Vancouver, BC, Canada
7. **UBC Dept. of OBGYN Academic Day** May, 2016  
Title: DNA methylation profiling gives insight into the relationship between early-onset and late-onset Preeclampsia, Intrauterine growth restriction and healthy placentas  
Vancouver, BC, Canada
8. **Canadian National Perinatal Research Meeting** February, 2016  
Title: DNA methylation profiling gives insight into the relationship between early-onset and late-onset Preeclampsia, Intrauterine growth restriction and healthy placentas  
Banff, AB, Canada
9. **American Society of Human Genetics 65th Annual Meeting** October, 2015  
Title: Sexual dimorphism in placental telomere length over gestational age  
Baltimore, MD, USA  
Selected for featured poster talk in the prenatal, perinatal and reproductive genetics category.
10. **Pacific Northwest Genetics exchange** September 2015  
Title: Assessing biomarkers of pregnancy complications through placental DNA methylation profiles  
Vancouver, BC, Canada
11. **The Tree of Life: Placenta Workshop** September 2014  
Title: Identifying biomarkers through placenta DNA methylation profiles: Preliminary Data  
Vancouver, BC, Canada

#### Other seminars, N = 2

1. **Western University, Schulich School of Medicine seminar** September 2021  
Title: Towards non-invasive prediction of pregnancy complications using epigenomics
2. **McMaster University, Department of OBGYN seminar** August 2021  
Title: Towards non-invasive prediction of pregnancy complications using epigenomics

#### Poster presentations, N=11

1. **Society of Reproductive Investigation** July 2021  
Title: Enrichment and Absolute Quantification of Cell-Free Placenta DNA in Maternal Blood  
Virtual Meeting
2. **Canadian National Perinatal Research Meeting** February 2021  
Title: Enrichment, sequencing, and absolute quantification of circulating placental DNA in maternal blood, using DNA methylation  
Virtual Meeting

3. **Epigenomics of Common Diseases Meeting** November, 2019  
 Title: Synthetic spike-in controls to account for biological and technical bias in cfMeDIP-seq  
 Cambridge, UK
4. **University of Toronto OBGYN Research day** May, 2019  
 Title: Developing predictive models of preterm birth using DNA methylation profiling in cell-free DNA: A study design  
 Toronto, ON, Canada
5. **Canadian Student Research Forum** June, 2017  
 Title: DNA methylation: Reproducibility, utility and biological meaning  
 Winnipeg, MB, Canada
6. **GenomeBC 15th Annual Genomics Forum** May, 2017  
 Title: DNA methylation: Reproducibility, utility and biological meaning  
 Vancouver, BC, Canada
7. **American Society of Human Genetics 66th Annual Meeting** October, 2016  
 Title: DNA methylation gives insight into different etiologies in early-onset and late-onset preeclampsia and intrauterine growth restriction  
 Vancouver, BC, Canada
8. **International Federation Placenta Association Annual Meeting** September, 2016  
 Title: Unravelling the relationship between early and late-onset preeclampsia. What does the placental DNA methylation profile reveal?  
 Portland, OR, USA
9. **BC Children's Hospital Research Institute Research Forum** September, 2016  
 Title: Sexual dimorphism in placental telomere length over gestational age  
 Vancouver, BC, Canada
10. **UBC Medical Genetics Research Day** November, 2016  
 Title: Sexual dimorphism in placental telomere length over gestational age  
 Vancouver, BC, Canada
11. **American Society of Human Genetics 63rd Annual Meeting** October, 2013  
 Title: DNA methylation profiling reveals distinct subgroups  
 Boston, MA, USA

## TEACHING

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### University of Toronto, Department of Molecular Genetics

*MMG3003Y: Genomic Methodologies*

Guest Lecturer

*April and June 2018-June 2021*

- Class size: 30
- Gave 2 lectures to graduate students
  - i) DNA methylation microarrays: Everything to consider in an experiment
  - ii) Analyzing DNA methylation experiments and data visualization using ggplot2 in R

### University of Toronto, Department of Molecular Genetics

*MMG3001Y: Advanced Human Genetics*

Guest Lecturer

*November 2018-November 2021*

- Class size: 30
- Gave 2 lectures to graduate students
  - i) Fundamentals of epigenetics
  - ii) Epigenetics and development

### University of British Columbia, Department of Medical Genetics

*MEDG419: Developmental Origins of Human Disorders*

Teaching Assistant

*January 2017-April 2017*

- Class size: 20
- Marked student participation, presentations, midterm and final exams

- Lead the biweekly tutorial sessions reviewing class lectures
- Won the Department of Medical Genetics Teaching Assistant Award 2017 for work in this class

**University of British Columbia, Department of Medical Genetics**  
*MEDG420: Human Genomics and Medical Genetics*

Teaching Assistant  
*September 2015-December 2015*

- Class size: 20
- Marked student participation, presentations, midterm and final exams

**University of British Columbia, Department of Medical Genetics**  
*MEDG419: Developmental Origins of Human Disorders*

Teaching Assistant  
*January 2014-April 2014*

- Class size: 20
- Marked student participation, presentations, midterm and final exams
- Lead the biweekly tutorial sessions reviewing class lectures in more detail and focusing of material student's were struggling with
- Won the Department of Medical Genetics Teaching Assistant Award 2014 for work in this class

**University of British Columbia, Medical School**  
*Topics in Genetics*

Problem Based Learning Facilitator  
*April 2013-April 2016*

- Class size: 10-50
- Facilitated group discussions on first and second year medical school genetics curriculum. Class sizes ranged from 10-50 students
- Lead discussions on: Principles of Human Genetics, Calculating Genetic Risks, Chromosomal Abnormalities, and Prenatal Diagnosis

## WORK EXPERIENCE

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**McMaster University, Department of Obstetrics and Gynecology**  
**Assistant Professor**

July 2022 -

My lab focuses on understanding pregnancy complications pertaining to placental dysfunction. We use multi-omics data such as, epigenomics, transcriptomics, genomics, and proteomics, along with bioinformatics to understand disease etiology. We also focus on developing non-invasive methods to assess placental health and use machine learning approaches to predict pregnancies at risk of complications prior to the onset of clinical symptoms.

**Princess Margaret Cancer Centre**  
**Postdoctoral Research Fellow**

February 2018 - June 2022

Developing machine learning approaches to predict disease in the context of both cancer and preterm birth. Both these projects have goals to develop non-invasive biomarkers using DNA methylation profiles in circulating cell free nucleic acids. In cancer, circulating tumour DNA is being studied and in preterm birth, cell free placental DNA is being studied. We are using cell free meDIP-seq approaches to measure DNA methylation at low levels.

**London Health Science Centre, Medical Genetics Clinic**  
**Research Assistant (0.8FTE)**

September 2011-August 2012

- Developed and maintained database of BRCA1 and BRCA2 variants in local patient population
- Reviewed family histories, made pedigrees, and performed cancer risk assessments on patients
- Observed genetic counselling sessions in cancer genetics, prenatal genetics, and paediatric genetics
- Participated in Medical Genetics rounds and patient review

**London Health Science Centre, Medical Diagnostic Laboratory**  
**Research Assistant (0.2FTE)**

May 2012-August 2012

- Designed PCR tests for identifying mutations diagnostic of Charcot-Marie-Tooth Syndrome and Hemochromatosis

**Norgen Biotek Corp.**  
**Research Assistant**

May 2011-August 2011



- Performed DNA and RNA extractions on multiple organisms (plant, bacteria, blood, saliva, and tissue)
- Investigated RNA degradation in plants with different extraction methods and different processing time

## CREDENTIALS

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| <b>CIHR Institute of Gender and Health Core Competency Module for Sex and Gender Biomedical Research</b>                        | April 2022   |
| Canadian Institutes of Health Research  |              |
| <b>SciNet summer school: Introduction to machine learning, Introduction to python, and Python in high performance computing</b> | July 2019    |
| SciNet  |              |
| <b>Scientific computing: Introduction to machine learning and Machine learning in python</b>                                    | May 2019     |
| Krembil Centre for Neuroinformatics   |              |
| <b>Compute Ontario Summer School on High Performance Computing</b>  | June 2018    |
| SciNet and Compute Ontario  |              |
| <b>Data Analysis with Python</b>  | October 2016 |
| Carpentry Software Workshops  |              |
| <b>Epigenomic Data Analysis</b>   | June 2016    |
| Canadian Bioinformatics Workshops   |              |
| <b>Instructional Skills Workshop</b>  | July 2015    |
| University of British Columbia  |              |

## SUPERVISION AND MENTORSHIP

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**McMaster University, Wilson Lab** September 2022 - Present  
*Volunteer student*  
*Student: Natalie Yuen*

- Devised experimental design to use public data and assess whether DNA methylation patterns can adequately label tissue of origin for each DNA fragment in an experiment.
- Guided student through a computational biology analysis, from preprocessing, experimental design and critical thinking, and communicating her results to other students and scientists

**McMaster University, Wilson Lab** September 2022 - Present  
*Biomedical Discovery and Commercialization Graduate Program*  
*Student: Jasrita Singh*

- Faculty mentor for the Biomedical Discovery and Commercialization Graduate Program. This involves meeting with the student monthly and helping students navigate their coursework, projects and their community internship.

**McMaster University, Wilson Lab** September 2022 - Present  
*Biology Fourth Year Thesis, Supervisor*  
*Student: Mehroop Randhawa*

- Devised the experimental design to perform a meta analysis on gene ontology analyses in reproduction cohorts. Assess how often the same GO terms come up by chance, and what we can do to improve these analyses in the reproduction field.
- Guided student through a computational biology analysis, from preprocessing, experimental design and critical thinking, and communicating her results to other students and scientists

**McMaster University, Wilson Lab** September 2022 - Present  
*Biomedical Discovery and Commercialization Fourth Year Thesis, Supervisor*  
*Student: Ahmed Berih*

- Devised the experimental design to assess immune cell proportion in blood of pregnant people with and without a preeclampsia diagnosis.
- Guided student through a computational biology analysis, from preprocessing, experimental design and critical thinking, and communicating his results to other students and scientists

**Princess Margaret Cancer Centre, Hoffman Lab**

May 2021-May 2022

*Amgen Scholars, Summer student co-supervisor*

*Student: Veronica Alba*

- Devised the experimental design to improve the synthetic spike-in controls for cfMeDIP-seq experiments
- Guided student through a computational biology analysis, from preprocessing, experimental design and critical thinking, and communicating her results to other students and scientists

**Princess Margaret Cancer Centre, Hoffman Lab**

May 2020-June 2022

*University of Toronto, Undergraduate research student co-supervisor*

*Student: Esther Yoo*

- Devised the experimental design to develop an epigenetic clock for circulating cell-free DNA. Guided student to use epigenetic clock to look at differences in epigenetic aging in different cancers
- Guided student through a computational biology project, from preprocessing, experimental design and critical thinking, machine learning, and communicating her results to other students and scientists

**Princess Margaret Cancer Centre, Hoffman Lab**

May 2019-December 2019

*McMaster University Co-op student Co-supervisor*

*Student: Sid Reed*

- Devised the experimental design to investigate differences and similarities between different cancer types and the placenta over development
- Guided student through a computational biology project, from preprocessing to choosing statistical tests to answer our experimental questions

**BC Children's Hospital Research Institute, Robinson Lab**

May 2016-December 2017

*Summer Student Co-Supervisor*

*Student: Li Qing Wang*

- Devised the experimental design to investigate variation in CCR5 gene is relation to reduced susceptibility to preeclampsia
- Taught gel electrophoresis and pyrosequencing to student
- Introduced student to bioinformatics and aided in bioinformatic analysis of the results
- Li Qing is now an MD/PhD student at UBC and is completing her PhD in the Robinson lab, having expanded this project to a wider scope. She is preparing a publication on this work

**BC Children's Hospital Research Institute, Robinson Lab**

July 2014-July 2015

*UBC Directed Studies Student Co-Supervisor*

*Student: Yao Liu*

- Devised the design experiment to investigate telomere length dynamics in the placenta over gestation and whether telomere length differ between placental insufficiency pathologies and controls
- Measured telomere length using qPCR and taught the technique to student
- Aided student in analysis and write up of his year end report

**CONTRIBUTIONS TO SCIENTIFIC COMMUNITY**

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**REVIEW SERVICE**

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**CIHR Doctoral Research Awards Committee**

2021-2022

*Reviewer, Canadian Institute of Health Research*

Reviewed applications for the CIHR doctoral fellowship awards

**Student committees and examinations**

May 2020

*External examiner, University of Adelaide, Adelaide, SA, Australia*

## Journal Service

February 2018-Present

*Peer review articles submitted to:*

- Placenta (N=5)
- Clinical Epigenetics (N=7)
- Molecular Autism (N=1)
- Scientific Reports (N=2)
- Bioinformatics (N=1)
- Gynecological Endocrinology (N=1)
- European Journal of Neuroscience (N=1)
- Epigenetics (N=1)
- Journal of Developmental Origins of Health and Disease (N=1)
- Communication Biology (N=1)

## INSTITUTIONAL LEADERSHIP AND COMMITTEES

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### Placenta central slack organizer

May 2020 - present

*312 members*

- Set up a slack work space for pregnancy and reproduction researchers to converse, meet people with similar interests, set up collaborations, share new research and ideas, and form collaborations.
- Manage a team of co-organizers and hold biannual meetings on how to improve the slack work space.
- Target audience: pregnancy and reproduction research of all levels.

### Graduate Student Representative

September 2016-June 2017

*Faculty of Medicine Advisory Committee, University of British Columbia*

- Committee met to evaluate funding applications for the Graduate Student Initiative, providing funds for student led projects collaborating across many departments in the Faculty of Medicine
- Committee also started the first Faculty of Medicine research day to promote collaboration and connection between the departments within the Faculty of Medicine

### Graduate Student Representative

September 2015-June 2016

*Department of Medical Genetics Advisory Committee, University of British Columbia*

- Committee met to evaluate many aspects of the Medical Genetics Department including: enrollment, awards, program application and pre-requisites, and implantation of the rotation program.

## EVENT ORGANIZER

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### Virtual Canadian Placenta Meeting Co-organizer

December 2022

- Co-organized the logistics of the event including: setting up online registration, abstract submitting, inviting individuals to the event and moderating.
- Target audience: pregnancy and reproduction research of all levels.

### Event Lead, Annual Placenta Workshop

2015 & 2016

*BC Children's Hospital Research Institute*

- Recruited and organized volunteers
- Organized the logistics of the event, including: schedules, catering, hotels, speaker invitations, airport pickups, registration and set-up, obtaining funding from institutional and private vendors
- Target audience: scientists, clinicians and trainees specializing in the research and management of pregnancy complications

### Committee Member, Maternal Fetal Medicine Symposium

July 2015-November 2015

*BC Women's Hospital*

- Obtained funding for this inaugural symposium to highlight new research in reproductive mental health
- Target audience: clinicians, trainees and basic scientists interested in mental illness pathogenesis and management during pregnancy.

## KNOWLEDGE TRANSLATION

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### MEDIA

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#### Article written about ASHG 2020 presentation

November 2020

*GenomeWeb*

- Article written about my work using the cell-free methylated DNA immunoprecipitation technique to enrich for cell-free placental DNA. Shows widespread interest in this work and communicates the broad implications to non-scientists.

#### Science Expert

February 2020

*The Science Pawdcast*

- *The Science Pawdcast* is an online podcast run by high school chemistry teacher, Jason Zackowski, featuring his twitter science dog, Bunsen the Bernese mountain dog. The podcast aims to make science accessible and engaging to the public. I was interviewed as a science expert in episode 3 of season 2.

### OUTREACH

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#### Scientist Volunteer

June 2018-June 2020

*Letters to Pre-Scientists*

- This program assigns young students, interested in science, to a current scientist. Students and scientists exchange letters for the duration of the school year.
- Target audience: elementary and high school students aged 5-18

#### Scientist Speaker

March 2018- June 2020

*Skype a Scientist*

- Used skype to video call high school classes worldwide to talk about my research and discuss careers in research.
- Target audience: high school students aged 14-18

## CONTRIBUTIONS TO COMMUNITY

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#### Peer Counselor, AMS Speakeasy

September 2013-April 2014

*Alma Mater Society, University of British Columbia*

- Speakeasy provides emotional support and resources to students at UBC
- Topics trained in: LGBTQ+ issues, stress, anxiety, bereavement, sexual assault, and suicidal thoughts

#### Crisis Hotline Operator

March 2013-June 2013

*Vancouver Rape Relief and Women's Shelter*

- I operated crisis calls from women. This entailed listening to the women, grounding their fears, and ensuring that they are safe. Vancouver Rape Relief provides emotional support and a safe comforting environment, as well as practical services including help reporting to the police and accompanying women to hospital
- I also participated in daily activities ongoing in the women's shelter, provided emotional support and physical help (cooking dinner, watching children etc.) while they attend to their own personal needs

## ACADEMIC MEMBERSHIPS

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| <b>Placental interface seminar series</b><br>Virtual seminar series  | 2020-Present                 |
| <b>R Ladies Toronto</b><br>R Ladies Toronto  | 2019-Present                 |
| <b>International Federation of Placenta Association</b><br>International Federation of Placenta Association  | 2016-Present                 |
| <b>Canadian Society for Molecular Biosciences Membership</b><br>Canadian Society for Molecular Biosciences   | 2018-2020                    |
| <b>Placentomics Consortium</b><br><i>University of California, Los Angeles</i>   | September 2016-Present       |
| · The consortium houses DNA methylation data on hundreds of placenta samples which are used in a number of ongoing projects. (Lead: Dr. Karin Michels, UCLA) |                              |
| <b>Combined Placental Research Group</b><br><i>BC Children's Hospital Research Institute</i>   | September 2013-December 2017 |
| · Group lead from 2015-2017  |                              |
| · Group met once a month to discuss current placental research. Individuals present on new research happening within the group.                              |                              |
| <b>Illumina 450K/EPIC Working Group</b><br><i>BC Children's Hospital Research Institute</i>  | September 2013-April 2017    |
| · Group met once a month to discuss problems and recent research using the Illumina DNA methylation microarrays  |                              |
| <b>Developmental Origins of Health and Disease Journal Club</b><br><i>University of British Columbia</i>   | January 2013-September 2016  |
| · Group met once a week to discuss recent research in epigenetics relating to the developmental origins of health and disease hypothesis.                    |                              |
| <b>American Society of Human Genetics Membership</b><br>American Society of Human Genetics   | 2013, 2015-2016, 2020        |

## ABSTRACTS, N=23

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1. **Wilson, SL.**, Shen, SY., Triche, T., De Carvalho, DD., Hoffman, MM. A new method to absolutely quantify and enrich for circulating placenta DNA from maternal blood. International Federation of Placenta Association, Virtual. August 30 - September 2, 2021.
2. **Wilson, SL.**, Shen, SY., Triche, T., De Carvalho, DD., Hoffman, MM. Enrichment and Absolute Quantification of Cell-Free Placenta DNA in Maternal Blood. Society of Reproductive Investigation, Virtual. July 5 - 9, 2021.
3. Harmon, L., **Wilson, SL.**, Shen, SY., Burgener, J.M., Bratman, S.v., De Carvalho, D.D., Hoffman, M.M., Triche, T. Spiky: standardizing cfMeDIP-seq data with spike-in controls. BioC 2021 conference. August 4, 2021.
4. **Wilson, SL.**, Shen, SY., Triche, T., De Carvalho, DD., Hoffman, MM. Enrichment, sequencing, and absolute quantification of circulating placental DNA in maternal blood, using DNA methylation. Canadian National Perinatal Research Meeting. Virtual. February 8 - 12, 2021.
5. **Wilson, SL.**, Shen, SY., Triche, T., De Carvalho, DD., Hoffman, MM. Enrichment, sequencing, and absolute quantification of circulating placental DNA in maternal blood, using DNA methylation. American Society of Human Genetics, Virtual. October 27-31, 2020.
6. **Wilson, SL.**, Shen, SY., De Carvalho, DD., Hoffman, MM. Synthetic spike-in controls to account for biological and technical bias in MeDIP-seq experiments. Epigenomics of common diseases, Cambridge, UK. November 6-8, 2019.

7. Konwar, C., Price, EM., Del Gobbo, GF., **Wilson,SL.**, Manokhina, I., Terry,J., Robinson,WP. Insights into epigenetic, genetic and miRNA variation associated with acute chorioamnionitis placentas. International Federation of Placenta Associations Annual Meeting, Tokyo, Japan. September 21-24,2018.
8. **Wilson, SL.**, Leavey, K.,Cox, BJ., Robinson, WP. Placental molecular profiling in preeclampsia: Utility, reproducibility and biological meaning. International Federation of Placenta Associations Annual Meeting, Manchester,UK. August 30-September 2,2017.
9. Konwar, C.,Price, EM., Del Gobbo GF.,**Wilson, SL.**, Jefferson T., Robinson, WP. Genetic and epigenetic profiling of acute chorioamnionitis associated placentas. International Federation of Placenta Associations Annual Meeting, Manchester,UK. August 30-September 2,2017.
10. **Wilson, SL.**,Leavey,K., von Dadelzen,P., Cox, BC., Robinson, WP. Unravelling the relationship between early and late-onset preeclampsia. What does the placental DNA methylation profile reveal? Canadian Student Health Research Forum, Winnipeg,Canada. June 6-9, 2017.
11. **Wilson, SL.**, Leavey, K., Cox, BJ., Robinson, WP. DNA methylation gives insight into different etiologies in early-onset and late-onset preeclampsia and intrauterine growth restriction. American Society of Human Genetics 66th Annual Meeting,Vancouver, Canada. October 18-22, 2016.
12. Magee,LA., Synnes,A., von Dadelszen,P., Hutfield, A., Chanoine,JP., Cote,AM., Devlin,A., Gafni,A., Ganzevoort,W., Gruslin,A., Helewa,M., Hutton,E., Koren,G., Lee,SK., McArthur,D., Rey,E., Robinson,WP., Roseboom,T.,Singer, J.,**Wilson, SL.**, Mountquin,JM. CHIPS-Child: Testing the developmental programming hypothesis in the offspring of the CHIPS Trial. International Society of the Study of Hypertension in Pregnancy World Congress, Sao Paulo, Brazil. October 23-26,2016.
13. Robinson,WP., Liu,Y, **Wilson, SL.** Placental telomere length decline with gestational age differs by sex and TERT, DNMT1 and DNMT3a DNA methylation. IFPA Meeting, Portland,USA. September 13-16, 2016.
14. **Wilson, SL.**,Leavey, K., von Dadelzen,P., Cox,BJ., Robinson,WP. Unravelling the relationship between early and late-onset preeclampsia. What does the placental DNA methylation profile reveal? IFPA Meeting, Portland, USA. September 13-16, 2016.
15. Leavey,K.,**Wilson, SL.**, Bainbridge, S, Robinson,WP, Cox,BJ. Epigenetic Regulation of Placental Gene Expression in Transcriptional Subclasses of Preeclampsia. IFPA Meeting, Portland,OR,USA. September 13-16, 2016.
16. Barha, CK., Salvante,KG., Hanna,CW.,**Wilson, SL.**, Robinson, WP., Altman,RM., Nepomnaschy,PA. Stressful Life Events, the Hypothalamic-Pituitary-Adrenal Axis and Cellular Aging in Women. 2016 Annual Conference of the Human Biology Association. Atlanta,USA. April 13-14, 2016.
17. **Wilson, SL.**, Blair,JD.,Langlois, S., von Dadelszen,P.,Robinson, WP. DNA methylation profiling gives insight into the relationship between early-onset and late-onset Preeclampsia, Intrauterine growth restriction and healthy placentas. Canadian National Perinatal Research Meeting, Banff,Canada. February 10-13,2016.
18. Barha,CK., Salvante,KG., Hanna,CW.,**Wilson,SL.**,Robinson,WP., Altman,RM., Nepomnaschy,PA. Women's Aging: The Role of the Hypothalamic-Pituitary-Adrenal Axis. Annual Conference of the Canadian Association of Physical Anthropology. Winnipeg,Canada., October 28-31, 2015.
19. **Wilson,SL.**, Liu,Y., Robinson,WP. Sexual dimorphism in placental telomere length over gestational age. American Society of Human Genetics 65th Annual Meeting. Baltimore,USA. October 6-10, 2015.
20. Leavey,K.,**Wilson, SL.**, Bainbridge,S., Robinson,WP, Cox,BJ. An Integrated Transcriptional, Epigenetic, and Clinical Analysis of Preeclamptic Placentas. IFPA Meeting. Brisbane,Australia. September 9-12, 2015.
21. **Wilson, SL.**, Blair,JD., Hogg,K., Langlois,S., von Dadelszen,P., Robinson,WP. The relationship of placental DNA methylation to maternal serum proteins Inhibin- and Pregnancy associated plasma protein A. Epigenomics of common diseases. Cambridge, UK. October 28-31, 2014.
22. **Wilson, SL.**,Blair,JD., von Dadelszen,P., McFadden,DE., Langlois,S., Robinson,WP. DNA methylation profiling reveals distinct subgroups. American Society of Human Genetics 63rd Annual Meeting. Boston,USA. October 22-26, 2013.

23. Blair,JD.,**Wilson, SL.**, Yuen,RYC., von Dadelszen,P., Robinson,WP. Altered DNA methylation in preeclampsia placentas. International Federation of Placentas Association Meeting 2013. Whistler, Canada. September 11-14, 2013.