Harry MacKay, Ph.D.

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Education

2011-2015 | **Ph.D. Neuroscience** Carleton University, Ottawa, ON
Exploring the neurobiological basis of the obesogenic effects of perinatal exposure to the endocrine disruptor Bisphenol-A; advisor Dr. Alfonso Abizaid

2009-2011 | **M.Sc. Psychology** (specialization in neuroscience) Carleton University, Ottawa, ON
Fast-tracked into Ph.D. program

2004-2009 | **B.A. (Hons) Psychology** St. Francis Xavier University, Antigonish, NS
The role of histone acetylation in the development and persistence of cocaine-induced behavioural sensitization; advisor Dr. Karen Brebner

Academic Employment History

2015-present | **Postdoctoral Associate** Dept. of Pediatrics, Baylor College of Medicine, Houston, TX
Epigenetic mechanisms of hypothalamic development; advisor Dr. Robert Waterland

Refereed Publications

2019 | **MacKay H**, Scott CA, Duryea JD, Baker MS, Laritsky E, Elson AE, Garland T, Fiorotto ML, Chen R, Li Y, Coarfa C, Simerly RB, and Waterland RA. DNA methylation in AgRP neurons regulates voluntary exercise behaviour. *Nature Communications*, 2019

2019 | Ren YA, Monkkonen T, Lewis MT, Bernard DJ, Christian HC, Jorgez CJ, Moore JA, Landua JD, Chin HM, Chen W, Singh S, Kim IS, Zhang XHF, Xia Y, Philips KJ, **MacKay H**, Waterland RA, Ljungberg MC, Pradip S, Hartig SM, Coll TF, and Richards JS. S100a4-Cre-mediated deletion of Patched1 causes hypogonadotropic hypogonadism and unveils a role for pituitary immune cells in endocrine regulation. *JCI Insight*, 2019

2019 | Gunasekara CJ, Scott CA, Laritsky E, Baker MS, **MacKay H**, Duryea JD, Kessler NJ, Hellenthal G, Wood AC, Hodges KR, Gandhi M, Hair AB, Silver MJ, Moore SE, Prentice AM, Li Y, Chen R, Coarfa C, and Waterland RA. A genomic atlas of systemic interindividual epigenetic variation in humans. *Genome Biology*, 2019

2017 | **MacKay H** and Abizaid A. A plurality of molecular targets: The receptor ecosystem for Bisphenol-A (BPA). *Hormones and Behavior*, 2017

2017 | Klein MO, **MacKay H**, Edwards A, Park S, Kiss ACI, Felicio LF, and Abizaid A. POMC and NPY mRNA expression during development is increased in rat offspring brains from mothers fed with a high fat diet. *International Journal of Developmental Neuroscience*, 2017

2017 | **MacKay H**, Patterson ZR, and Abizaid A. Perinatal exposure to low-dose Bisphenol-A (BPA) disrupts the structural and functional development of the hypothalamic feeding circuitry. *Endocrinology*, 2017

2017 | **MacKay H**, Heindel JJ, Ross MG, and Waterland RA. Meeting summary: The inaugural meeting of the US DOHaD society. *Environmental Epigenetics*, 2017

2016 **MacKay H**, Charbonneau VR, St-Onge V, Murray E, Watts A, Wellman MK, and Abizaid A. Rats with a truncated ghrelin receptor (GHSR) do not respond to ghrelin, and show reduced intake of palatable, high-calorie food. *Physiology and Behavior*, 2016

2016 Agil R, Patterson ZR, **MacKay H**, Abizaid A, and Hosseinian F. Triticale bran alkylresorcinols enhance resistance to oxidative stress in mice fed a high-fat diet. *Foods*, 2016

2015 Wellman MK, Patterson ZR, **MacKay H**, Darling JE, Mani BK, Zigman JM, Hoagland JL, and Abizaid A. Novel regulator of acylated ghrelin, CF801, reduces weight gain, rebound feeding after a fast, and adiposity in mice. *Frontiers in Endocrinology*, 2015

2014 **MacKay H** and Abizaid A. Embryonic development of the hypothalamic feeding circuitry: Transcriptional, nutritional, and hormonal influences. *Molecular Metabolism*, 2014

2014 Jodayree S, Patterson ZR, **MacKay H**, Abizaid A, and Tsopmo A. Blood and liver antioxidant capacity of mice fed high fat diet supplemented with digested oat bran proteins. *International Journal of Food Science and Nutrition Engineering*, 2014

2013 **MacKay H**, Patterson ZR, Khazall R, Patel S, Tsirlin D, and Abizaid A. Organizational effects of perinatal exposure to Bisphenol-A and Diethylstilbestrol on arcuate nucleus circuitry controlling food intake and energy expenditure in male and female CD-1 mice. *Endocrinology*, 2013

2013 **MacKay H**, Khazall R, Patterson ZR, Wellman M, and Abizaid A. Rats perinatally exposed to food restriction and high-fat diet show differences in adipose tissue gene expression under chronic caloric restriction. *Adipocyte*, 2013

2013 Patterson ZR, Khazall R, **MacKay H**, Anisman H, and Abizaid A. Central ghrelin signaling mediates the metabolic response of C57BL/6 male mice to chronic social defeat stress. *Endocrinology*, 2013

Book Chapters

2020 Weeks M, Park S, Ghanem S, Plebon-Huff S, Robert A-M, **MacKay H**, and LeBlanc AG. Prevalence of post-traumatic stress disorder in Canada: A systematic review. In Ricciardelli R, Bornstein S, Hall A, and Carleton N, editors, *Handbook of Post-Traumatic Stress: Psychological, Cultural, and Biological Perspectives*. Taylor & Francis, 2020

Selected Talks

2019 DNA Methylation in AgRP Neurons Regulates Voluntary Exercise Behaviour. *International Society for Developmental Origins of Health and Disease World Congress*, Melbourne, AU.

2016 Deficiency of De-Novo DNA Methyltransferase Dnmt3a in Agouti-Related Peptide (AgRP) Neurons Induces Sex-Specific Alterations in Energy Expenditure and Physical Activity. *United States Developmental Origins of Health and Disease Society Annual Meeting*, Detroit, MI.

2015 Early-life Bisphenol-A (BPA) Exposure Impairs Adult Leptin Sensitivity and Predisposes to Obesity. *Canadian Neurometabolic Club Meeting*, Toronto, ON.

2015 Bisphenol-A (BPA) as an Obesogen: Developmental Programming of Leptin Sensitivity. *Endocrine Society Annual Meeting*, San Diego, CA.

2012 Perinatal exposure to the endocrine disruptor Bisphenol A (BPA) predisposes offspring to diet-induced obesity and metabolic alterations in adulthood. *IMHR Young Researcher's Forum Annual Conference*, Ottawa, ON.

Peer Review Experience

2019 **Ad-Hoc Reviewer:** Journal of Nutrition, Environmental Epigenetics

2018 **Ad-Hoc Reviewer:** European Neuropsychopharmacology, Environmental Health Perspectives

2017 **Ad-Hoc Reviewer:** Journal of Neuroendocrinology, Nutrition Reviews

Teaching Experience

2013-2015	**Contract Instructor**, Neuroscience Department, Carleton University Designed and taught *NEUR1201: Introduction to mental health & disease* (Fall 2013, Summer 2014, Fall 2014, Summer 2015) *Average teaching evaluation score:* 4.76/5.00 Designed and taught *NEUR4200: Seminar on current research in neuroscience* (Winter 2014) *Teaching evaluation score:* 4.83/5
2012-2013	**Tutor**, Paul Menton Centre, Carleton University Tutored undergraduate students with cognitive or physical disabilities in university neuroscience, psychology, philosophy and statistics courses.
2011-2015	**Teaching Assistant**, Neuroscience Department, Carleton University Performed teaching assistant duties including: delivering guest lectures, grading exams and quizzes, meeting with students.
2011-2014	**Instructor**, Enrichment Mini-Course Program (EMCP), Carleton University Co-developed and taught *The brain: exploring its mysteries*, a full-day, weeklong course for students in middle school.

Poster Presentations

2019	Weeks M, Park S, Ghanem S, Plebon-Huff S, Robert AM, **MacKay H**, and LeBlanc A. A systematic review of the prevalence of PTSD in Canada. *Canadian Mental Health Association National Conference*, Toronto, ON, 2019
2018	**MacKay H**, Scott CA, Duryea JD, Baker MS, Laritsky E, Elson AE, Garland T, Fiorotto ML, Chen R, Li Y, Coarfa C, Simerly RB, and Waterland RA. DNA methylation in AgRP neurons regulates voluntary exercise behaviour. *5th Canadian Conference on Epigenetics*, Estérel, QC, 2018
2018	Duryea JD, Gunasekara CJ, **MacKay H**, Scott CA, Coarfa C, and Waterland RA. Imputing latent CpG methylation data with machine learning. *Rice University Undergraduate Research Symposium*, Houston, TX, 2018
2017	**MacKay H**, Duryea JD, Baker MS, Elson AE, Garland T, Fiorotto ML, Chen R, Li Y, Coarfa C, Simerly RB, and Waterland RA. Epigenetic perturbation of hypothalamic AgRP neurons alters voluntary physical activity. *Wellcome Trust Epigenomics of Common Diseases Conference*, Cambridge, UK, 2017
2015	Khazall R, **MacKay H**, and Abizaid A. Investigating the role of ghrelin in food anticipatory activity of a scheduled treat. *Society for Neuroscience Annual Conference*, Chicago, IL, 2015
2015	Hay RE, Smorenburg M, Rodrigues T, Edwards A, Klein M, Hyland L, **MacKay H**, Karatosoreos I, Hill M, and Abizaid A. The role of ghrelin in a chronic corticosterone model of obesity. *Society for Neuroscience Annual Conference*, Chicago, IL, 2015
2015	Park SB, Rodrigues T, Wallace C, Mezher K, Hyland L, Klein M, Edwards A, Patterson ZR, **MacKay H**, and Abizaid A. Ghrelin receptors in the VTA mediate stress-induced changes in caloric intake during chronic social defeat. *Society for Neuroscience Annual Conference*, Chicago, IL, 2015
2015	Park SB, Rodrigues T, Patterson ZR, **MacKay H**, and Abizaid A. Chronic social defeat paradigm effects on GHSR and NR3C1 mRNA expression in the PFC, HIPP and VTA of C57/BL6 male mice. *Canadian Neurometabolic Club Meeting*, Toronto, ON, 2015
2014	**MacKay H**, Patterson ZR, and Abizaid A. Mice exposed perinatally to the obesogenic endocrine disruptor Bisphenol-A (BPA) show impaired central and behavioral leptin sensitivity in advance of diet-induced obesity: evidence for developmental programming of hypothalamic Pro-Opiomelanocortin (POMC) regulation. *Society for Neuroscience Annual Conference*, Washington, DC, 2014
2014	**MacKay H**, St-Onge V, Gabrys R, McQuaid R, McInnis O, Rustom N, Hudson S, Friberg L, King SJ, Wartman B, Parno T, Syed S, Farmer K, Rudyk C, Smith C, Wellman M, and Abizaid A. Three years of the brain & mental health art show in Ottawa: Carleton University's Brain Awareness Week. *Society for Neuroscience Annual Conference*, Washington, DC, 2014

2014 Parno T, Patterson ZR, **MacKay H**, and Abizaid A. Ghrelin signaling targeting the paraventricular nucleus of the hypothalamus influences UCP-1 activity within brown fat during stress. *IMHR Young Researcher's Forum*, Ottawa, ON, 2014

2014 **MacKay H**, Patterson ZR, Khazall R, and Abizaid A. Alterations in hypothalamic feeding circuitry and leptin response in mice perinatally exposed to the endocrine disruptor Bisphenol-A (BPA). *Canadian Association for Neuroscience Annual Conference*, Montreal, QC, 2014

2014 **MacKay H**, Patterson ZR, Khazall R, and Abizaid A. Possible involvement of leptin in the obesogenic effects of early-life Bisphenol-A (BPA) exposure. *Keystone Symposium*, Vancouver, BC, 2014

2013 **MacKay H**, Patterson ZR, St-Onge V, Abizaid A, Gabrys R, McQuaid R, McInnis O, Rustom N, Rodrigues T, Hanea S, Hudson S, King SJ, Comba R, Cahill S, Wartman BC, Parno T, Al-Yawer F, Rudyk C, Smith C, and Wellman M. Art, science, and hockey: Carleton University's Brain Awareness Week. *Society for Neuroscience Annual Conference*, San Diego, CA, 2013

2012 Hanea S, Patterson ZR, Al-Yawer F, Charbonneau V, Davis-MacNevin P, Gabrys RL, Howell JW, King SJ, **MacKay H**, Rodrigues T, Rudyk C, Rustom NY, Smith CA, St-Onge V, Wartman BC, Wellman MK, Messier C, and Abizaid A. Brainophilia: Society for Neuroscience Ottawa Chapter. *Society for Neuroscience Annual Conference*, New Orleans, LA, 2012

2012 Salamani A, **MacKay H**, and Abizaid A. The effect of perinatal Bisphenol-A exposure on hypothalamic expression of proteins related to energy balance. *Undergraduate Research Day at Carleton University*, Ottawa, ON, 2012

2012 Charbonneau V, **MacKay H**, and Abizaid A. Fawn-hooded rats resists diet-induced obesity. *IMHR Young Researcher's Forum*, Ottawa, ON, 2011

2011 **MacKay H**, Khazall R, Patterson Z, Wellman MK, and Abizaid A. The effect of perinatal exposure to the endocrine disruptor Bisphenol-A on metabolism and the development of diet-induced obesity in adulthood. *Society for Neuroscience Annual Conference*, Washington, DC, 2011

2011 Tsirlin D, **MacKay H**, and Abizaid A. The effect of perinatal BPA exposure on the synaptic architecture of anorexigenic neurons in the arcuate nucleus. *Undergraduate Research Day at Carleton University*, Ottawa, ON, 2011

2010 Wellman MK, Khazall R, **MacKay H**, Woodside B, and Abizaid A. Ghrelin O-acyltransferase mRNA levels in the hypothalamus are differentially affected in two different models of negative energy balance. *Society for Behavioural Neuroendocrinology*, Toronto, ON, 2010

2009 **MacKay H** and Brebner K. The role of histone acetylation in the development and persistence of cocaine induced behavioural sensitization. *Rising Stars of Research*, Vancouver, BC, 2009

Published Commentary

2018 Pietrzak B, Sharma V, Wasalathanthri D, Ellwanger JH, Sanganyado E, Buschke F, Beardsley FR, Agarwal D, Jensen MM, Easun TL, Han L, Zhou K, Jordan EJ, Oda FS, **MacKay H**, Coffey E, Yoho R, and Winter M. Nurturing connections to the environment. *Science*, 362(6417):886–888, 2018

2018 Adamowicz BM, Chong DHY, Gutiérrez C, Matz J, Fer E, Polat EO, **MacKay H**, Galagedara R, Coste A, Pupkaite J, et al. Broad interests reap benefits for science. *Science*, 361(6397):24–26, 2018

Student Mentorship

2009-2015 **Carleton University:** Dina Tsirlin (Undergraduate), Shoyeb Patel (Undergraduate), Alicia Salamani (Undergraduate), Valerie Carbonneau (M.Sc. student), Rebecca Hay (Undergraduate)

Leadership and Service

2017-2019 **Judge**, Harmony Public Schools Science Fair, Houston, TX

	Judged science fair projects at the middle- and high-school levels.
2017	**Judge**, International Sustainable World (Engineering Energy Environment) Project Olympiad, Houston, TX
2013-2014	**President**, Ottawa Chapter of the Society for Neuroscience Lead society of graduate students in neuroscience in organizing local and regional programming related to neuroscience and mental health including: Brain Awareness Week, The Brain & Mental Health Art Show, and the Ottawa Brain Bee
2012-2015	**Judge**, Undergraduate Research Day, Carleton University Judged undergraduate honours thesis research posters.
2012-2015	**Judge**, Ottawa Regional Science Fair, Ottawa, ON Judged regional science fair projects at the middle- and high-school levels.
2009-2015	**Demonstrator**, Ottawa Chapter of the Society for Neuroscience Designed and delivered interactive presentations for Ottawa's Brain Awareness Week.

Awards and Honours

2018	Poster Presentation Award ($400), 5th Canadian Conference on Epigenetics
2015-2017	Children's Nutrition Research Center (CNRC) Postdoctoral Research Fellowship, Baylor College of Medicine (NIH Scale - Appx. US $47,000 per annum)
2015	P.D. McCormack Travel Award ($1800), Carleton University
2015	Contract Instructor Teaching Award ($1500), Carleton University
2014	Carleton University Research Impact Endeavour (CURIE) Fund ($2000), Carleton University
2014	Graduate Chapter Travel Award ($1000), Society for Neuroscience
2014	Best Basic Research Poster ($500), IMHR Young Researcher's Forum Annual Conference
2014	P.D. McCormack Travel Award ($600), Carleton University
2014-2015	Ontario Graduate Scholarship ($15,000 per annum)
2012, 2013	Institute Community Support Travel Grant ($1500), Canadian Institutes of Health Research
2011	Research/Travel Bursary ($400), Carleton University
2012	Best Scientific Talk ($500), IMHR Young Researcher's Forum Annual Conference
2011-2012	P.D. McCormack Doctoral Fund ($7000), Carleton University
2011-2015	Domestic Entrance Scholarship ($3000), Carleton University
2010-2012	Ontario Graduate Scholarship ($15,000 per annum)
2009-2010	Canadian Institutes of Health Research Frederick Banting and Charles Best Canada Graduate Scholarship Master's Award ($17,500)
2009-2012	Graduate Scholarship ($8500 per annum), Carleton University
2009-2011	P.D. McCormack Fund ($3000 per annum), Carleton University
2009	G.P. Brooks History of Psychology Prize ($400), St. Francis Xavier University
2009	Craig McDonald Mooney Prize for Psychology ($400), St. Francis Xavier University
2007-2009	Dean's Honour List ($1000 per annum), St. Francis Xavier University

Submitted Fellowships

2018	CIHR Postdoctoral Fellowship, *Cell type-specific neuroepigenomic approaches to understand central regulation of energy balance*
2016	CIHR Postdoctoral Fellowship, *Epigenetic Mechanisms Regulating Development of Hypothalamic Metabolic Circuitry*
2017	Thrasher Research Fund, *Exploring the role of DNA methylation in the development of the hypothalamic metabolic circuitry*
2016	Thrasher Research Fund, *Epigenetic Mechanisms Regulating Development of Hypothalamic Metabolic Circuitry*

Instructional Material

2015	A Utility-Grade Atlas of the Rat Hypothalamus and Environs (self-published book)
2014	The Neuroscience of Concussions (video lecture - `www.youtube.com/watch?v=IqG8xIKOacE&t=34s`)

Citizenship

Canadian