OMB No. 0925-0001 and 0925-0002 (Rev. 03/2020 Approved Through 02-28-2023)

BIOGRAPHICAL SKETCH

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NAME: **Playdon, Mary C**

eRA COMMONS USER NAME: MARYPLAYDON

POSITION TITLE: Assistant Professor

EDUCATION/TRAINING

| INSTITUTION AND LOCATION | DEGREE | COMPLETION DATE | FIELD OF STUDY |
| --- | --- | --- | --- |
| Queensland University of Technology, Australia | BS  | 12/2003 | Nutrition and Dietetics |
| Queensland University of Technology, Australia | MPH | 12/2010 | Epidemiology |
| Yale University, New Haven, CT | MPhil | 12/2015 | Chronic Disease Epidemiology |
| Yale University, New Haven, CT | PhD | 05/2016 | Chronic Disease Epidemiology |
| National Cancer Institute, Division of Cancer Epidemiology & Genetics, Bethesda, MD | Postdoc Fellowship | 04/2018 | Cancer Epidemiology |

**A. Personal Statement**I am a nutritional and cancer epidemiologist with expertise in conducting studies related to diet, metabolism and cardiometabolic diseases including cancer. My research projects apply molecular approaches like metabolomics to explore the interface of diet and obesity with human metabolism and cancer. Studies have spanned disease etiology to survivorship, including both observational research and clinical trials.

As a research dietitian and then a graduate research fellow, I assisted in the design and implemented some of the first weight loss studies among cancer patients: the LEAN study (PI Melinda Irwin NCT02109068) and CHOICE study (PI Henry Thompson NCT01315483). I am the recipient of a National Cancer Institute R00 Pathway to Independence Award, titled: “Blood metabolite profile and risk of developing endometrial cancer”. This study was a meta-analysis of blood metabolites from three large cohort studies including the Prostate, Lung, Colorectal and Ovarian (PLCO) Cancer cohort. I identified metabolites prospectively associated with endometrial cancer, including ceramides that are potent biomarkers of cardiometabolic disease risk, and metabolic mediators of the relationship between obesity and endometrial cancer (*In Preparation*). The findings highlight the metabolic pathways to intervene upon for endometrial cancer prevention. One such intervention is a form of intermittent fasting, time restricted eating (TRE), where all daily calories are consumed in a particular window of time during the day (e.g., 8-10 hours). TRE has been shown to modulate the pathways we identified as critical in my R00 study, many of which were also associated with breast cancer risk in prior large-scale metabolomics studies that I conducted at the NCI. This underscores the shared biology of female cancers. I am also currently Principal Investigator on two funded pilot studies evaluating the feasibility and acceptability of TRE for effects on metabolic health parameters and gut microbial diversity among (i) endometrial cancer survivors (NCT04783467) and (ii) Native Hawaiian and Pacific Islander Women at Risk for Developing Endometrial Cancer (NCT04763902). These studies will form the foundation for testing TRE as a dietary strategy for reducing risk of female cancers and improving outcomes among cancer survivors. I am also PI on several studies interrogating the lifestyle, medical (e.g., cancer treatment) and metabolic (glycomics, metabolomics) predictors of new-onset type 2 diabetes after cancer diagnosis. Collectively, these studies highlight the metabolic pathways to intervene upon for endometrial cancer prevention and survival. I currently Chair the international Consortium of Metabolomics Studies (COMETS) Diet Working Group and Co-chair the ColoCare Diet Working Group (PI Ulrich), which comprises of colorectal cancer survivors. These roles enable me to grow my leadership skills by coordinating research efforts among international research leaders on the topics of diet, metabolism, and metabolic disease.

Ongoing and recently completed projects that I would like to highlight include:

5 for the Fight Fellowship

Playdon (PI)

07/01/2021-06/30/2024

Investigating metabolic obesity, meal timing and diet quality in the development of cardiometabolic outcomes in endometrial cancer patients

American Cancer Society Research Scholar Grant CCE – 135107

Tabung (PI), Role: Co-Investigator

01/01/2021-12/30/2025

Metabolomics of Insulinemic Diets and Colon Cancer Risk

NCI R00CA218694

Playdon (PI)

05/01/2018-04/30/2022

Blood Metabolite Profiles and Risk of Developing Endometrial Cancer

Cancer Control and Population Sciences Pilot Grant, Huntsman Cancer Institute

Playdon (PI)

5/1/2021 – 4/30/2022

Dietary botanical diversity in relation to gut microbial diversity and activity and gastrointestinal symptoms among colorectal cancer patients

Women’s Cancers Center Research Seed Grant, Huntsman Cancer Institute

Playdon (PI)

12/23/2019-12/23/2022

Feasibility and Acceptability of Time Restricted Eating among Endometrial Cancer Patients (NCT04783467)

Recent publications highlighting work related to epidemiological studies of metabolism and cardiometabolic diseases including cancer:

1. Poss A, Maschek JA, Cox JE, Hauner BJ, Hopkins PN, Hunt SC, Holland WL, Summers SA, **Playdon MC**. Machine Learning Reveals Serum Sphingolipids as Cholesterol-Independent Biomarkers of Coronary Artery Disease. *J Clin Invest.* 2020; 130(3): 1363-76. PMCID: PMC7269567
2. **Playdon MC**, Ziegler RG, Sampson JN, Stolzenberg-Solomon R, Thompson HJ, Irwin ML, Mayne ST, Hoover RN, Moore SC. Nutritional metabolomics and breast cancer risk in a prospective study. *Am J Clin Nutr*. 2017; 106(2): 637-49. PMCID: PMC5525118
3. Moore SC, **Playdon MC**, Sampson JN, Hoover RN, Trabert B, Matthews CE, Ziegler RG. A metabolomics analysis of body mass index and postmenopausal breast cancer risk. *J Natl Cancer Inst*. 2018; 110(6): 588-97. PMCID: PMC6279273

**B. Positions, Scientific Appointments, and Honors**

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| --- |
| **Positions** |
| May 2018- | Assistant Professor, Nutrition & Integrative Physiology; Investigator, Huntsman Cancer Institute (HCI), University of Utah (UU), Salt Lake City, UT |
| May 2016-May 2018 | Post-doctoral Fellow, Metabolic Epidemiology Branch, Division of Cancer Epidemiology and Genetics (DCEG), National Cancer Institute (NCI) |
| **Scientific Appointments** |
| 2020- | Chair, Data Stewardship, Women’s Cancers Center, Huntsman Cancer Institute |
| 2020- | Member, Women’s Cancers Center Biospecimen Committee |
| 2019- | Co-Chair, ColoCare Cohort Diet Working Group |
| 2019- | Member, Translational Research, Women’s Cancers Center, Huntsman Cancer Institute |
| 2018- | Chair, Consortium of METabolomics Studies (COMETS) Diet Working Group |
| 2018 | Co-Chair, Consortium of METabolomics Studies (COMETS) Early Career Scientist working group |
| 2015- | Member: Society for Epidemiologic Research (SER); Metabolomics Society; American Society of Clinical Oncology (ASCO) |
| 2015- | Member, Consortium of METabolomics Studies (COMETS) Data Harmonization and Trainee Working Groups |
| 2015- | Member, trans-NIH Metabolomics Working Group |
| 2015- | Ad Hoc Reviewer: American Journal of Epidemiology; Cancer Epidemiology, Biomarkers & Prevention; Supportive Care in Cancer; European Journal of Nutrition; American Journal of Clinical Nutrition; British Journal of Nutrition; British Journal of Cancer |
| 2014-2015 | Co-chair, NCI DCEG Fellow’s Training Symposium |
| 2014- | Member: NCI DCEG Fellow’s Editorial Board (DFEB); NCI Metabolomics Special Interest Group; trans-NIH Metabolomics Working Group |
| **Honors** |
| 2021 | Preceptor of the Year Award 2020, College of Health, Department of Nutrition and Integrative Physiology, University of Utah |
| 2020 | Teacher of the Year Award 2020, College of Health, Department of Nutrition and Integrative Physiology, University of Utah |
| 2019 | Training Fellowship, Transdisciplinary Research on Energetics and Cancer (TREC), CT |
| 2017 | Division of Cancer Epidemiology and Genetics Fellowship Achievement Award, NIH, NCI, DCEG |
| 2016 | Division of Cancer Epidemiology and Genetics Fellows Award for Research Excellence, NIH, NCI, DCEG |
| 2015 | Student Workshop Award, 2015 Society for Epidemiologic Research (SER) |
| 2013 | Travel Award, Mary Frances Picciano Dietary Supplement Research Practicum |
| 2013 | Special Speaker Honorarium, Academy of Nutrition and Dietetics (AND) Food and Nutrition Conference Expo (FNCE) |
| 2013 | Conference Scholarship, American Institute for Cancer Research (AICR) Annual Conference |
| 2012-2016 | T32/CRTA Cancer Prevention Training Award, Yale/NCI partnership training program |

**C. Contributions to Science**

**1. Energy Balance and Breast Cancer:** Excess adiposity is a convincing risk factor for postmenopausal breast cancer and is associated with poor prognosis. I have explored how changes in body weight and adiposity associate with prognostic biomarkers among cancer survivors and provided evidence for the efficacy and effectiveness of weight loss intervention in this population. This research encompassed two large weight loss intervention trials among breast cancer survivors: (1) comparing low fat/low carbohydrate dietary patterns and (2) telephone versus in-person counselling. Since these weight loss studies were some of the first to be conducted among breast cancer survivors, this work laid the foundation for current recommendations that breast cancer survivors manage their body weight to improve clinical outcomes. The first study showed that statistically significant and clinically meaningful weight loss was achievable using either a low fat or low carbohydrate dietary pattern. The magnitude and time to maximal weight loss was not modified by diet composition. Weight loss improved blood lipid profile irrespective of diet, and leptin, but not adiponectin, was associated with fat mass **[a]**. In the second study, both in-person and telephone counseling were effective weight loss strategies, including favorable effects on prognostic biomarkers such as C-reactive protein **[b]**. In addition, I conducted two systematic reviews of weight loss interventions among breast cancer survivors, and alternately weight gain and its impact on mortality in this population. These studies support that weight management is critical for breast cancer prognosis, and weight loss interventions are, indeed, feasible for breast cancer survivors **[c, d]**. Current clinical recommendations now align with the results of these studies, whereby breast cancer patients are recommended to achieve and maintain a body mass in the healthy range.

1. Thompson HJ, Sedlacek SM, **Playdon MC**, Wolfe P, McGinley JN, Paul D et al. Weight loss interventions

for breast cancer survivors: impact of dietary pattern. *PLoS One*. 2015;10(5):e0127366. PMCID: PMC4443974

1. Harrigan M, Cartmel B, Loftfield E, Sanft T, Chagpar AB, Zhou Y, **Playdon M**, Li F, Irwin ML. Randomized Trial Comparing Telephone Versus In-Person Weight Loss Counseling on Body Composition and Circulating Biomarkers in Women Treated for Breast Cancer: The Lifestyle, Exercise, and Nutrition (LEAN) Study. *J Clin Oncol.* 2016; 34(7):669-76. PMCID: PMC4872022
2. **Playdon MC**, Thomas G, Sanft T, Harrigan M, Ligibel J, Irwin, M. Weight Loss Intervention for Breast Cancer Survivors: A Systematic Review. *Curr Breast Cancer Rep.* 2013; 5:222-46. PMCID: PMC4655116
3. **Playdon MC**, Bracken MB, Sanft TB, Ligibel JA, Harrigan M, Irwin ML. Weight Gain After Breast Cancer Diagnosis and All-Cause Mortality: Systematic Review and Meta-Analysis. *J Natl Cancer Inst.* 2015;107(12): djv275. PMCID: PMC4715249

**2. Nutritional and Cancer Metabolomics:** A large body of work has focused on identifying biomarkers of modifiable disease exposures using metabolomics and applying them to understand disease etiology. This included comparing serum and urine for their utility in identifying nutritional biomarkers in large-scale epidemiological studies, identifying nutritional biomarkers of dietary patterns, and exploring the associations between nutritional and adiposity biomarkers and breast cancer risk, and the association of BMI-related metabolites with cancer. I am currently completing similar analyses focused on endometrial cancer risk as part of my NCI R00 award. These studies provide a foundation for the use of metabolomics in epidemiology, which is an emerging field. I have identified candidate biomarkers of specific foods, beverages, dietary supplements, and dietary patterns, including replication across diverse large-scale cohorts **[a, b]**. These data have been largely replicated in a unique ancillary feeding study of habitual diet in the Women’s Health Initiative in collaboration with Drs. Marian Neuhouser and Johanna Lampe (Ancillary Study AS560, In Preparation). In addition, I carried out a nested breast cancer case-control study within the Prostate, Lung, Colorectal and Ovarian Cancer cohort (PLCO) that provided biological evidence that diet may play a role in breast cancer etiology, particularly for estrogen-receptor positive tumors. I identified potential roles of vitamin E/tocopherol metabolism and dairy-derived saturated fatty acids in breast cancer etiology, in addition to supporting the accepted association between alcohol consumption and breast cancer risk. Androgen metabolism was implicated as a mechanism for alcohol-induced carcinogenesis. This work was some of the first of its kind and has encouraged a surge of excitement and interest in nutritional metabolomics **[c, d]**.

a) **Playdon MC**, Sampson, JN, Cross AJ, Sinha R, Guertin KA, Moy K, Rothman N., Irwin ML, Mayne ST, Stolzenberg-Solomon R, Moore SC. Comparing metabolite profiles of habitual diet in serum and urine. *Am J Clin Nutr.* 2016; 104(3):776-89. PMCID: PMC4997302

1. Playdon MC, Moore SC, Derkach A, Reedy J, Subar AF, Sampson JN, Albanes D, Gu F, Kontto J, Lassale C, Liao LM, Männistö S, Mondul AM, Weinstein SJ, Irwin ML, Mayne ST, Stolzenberg-Solomon R. Identifying biomarkers of dietary patterns using metabolomics. *Am J Clin Nutr*. 2016; 105(2):450-465. PMCID: PMC5267308
2. **Playdon MC**, Ziegler RG, Sampson JN, Stolzenberg-Solomon R, Thompson HJ, Irwin ML, Mayne ST, Hoover RN, Moore SC. Nutritional metabolomics and breast cancer risk in a prospective study. *Am J Clin Nutr*. 2017; 106(2): 637-49. PMCID: PMC5525118
3. Moore SC, **Playdon MC**, Sampson JN, Hoover RN, Trabert B, Matthews CE, Ziegler RG. A metabolomics analysis of body mass index and postmenopausal breast cancer risk. *J Natl Cancer Inst*. 2018; 110(6): 588-97. PMCID: PMC6279273
4. **Cancer Survivorship:** I have contributed to research on understanding the role of diet in cancer prognosis and other health needs among cancer survivors. Diet and nutrition have important roles in cancer prevention and for prognosis, particularly body weight management. However, supporting evidence for the role of many foods and nutrients in cancer prevention has been perceived as being inconsistent, and data among cancer survivors are limited. In an analysis of data from the Australian Ovarian Cancer Study (AOCS), I explored pre-diagnosis diet and survival after diagnosis of ovarian cancer. This large analysis found that components of a healthy diet, including fiber intake, were associated with ovarian cancer survival, and supports future investigations into changes in dietary pattern after diagnosis and effects on prognosis. This work strengthens the evidence base for providing dietary guidance for ovarian cancer survivors **[a]**.
5. **Playdon MC**, Nagle, CM, Ibiebele TI, Ferrucci LM, Protani MM, Carter J, Hyde SE, Neesham D, Nicklin JL, Mayne ST, Webb PM. Pre-diagnosis diet and survival after a diagnosis of ovarian cancer. *Br J Cancer.* 2017; 116(12):1627-1637. PMCID: PMC5518850

More recently, I was senior author on a study with MPI Ulrich interrogating the interface of B-vitamin metabolism with systemic inflammation and angiogenesis among colorectal cancer survivors participating in the ColoCare cohort **[b]**. Active vitamin B6 was inversely related to inflammatory and angiogenesis biomarkers.

1. Kiblawi R, Holowatj A, Gigic B, Brezina S, Geijsen A, Ose J, Lin T, Hardikar S, Himbert C, Warby CA, Böhm J, Bours MJL, van Duijnhoven FJB, Gumpenberger T, Kok DE, Koole JL, van Roekel EH, Schrotz-King P, Ulvik A, Gsur A, Habermann N, Weijenberg MP, Ueland PM, Schneider M, Ulrich A, Ulrich CM, **Playdon M**. One-carbon metabolites, B-vitamins and associations with systemic inflammation and angiogenesis biomarkers among colorectal cancer patients: results from the ColoCare Study. (2020) Br J Nutr, 5:1-32; PMCID: PMC7425811

I joined a transdisciplinary team leveraging data from the Utah Population Database (UPDB) to determine the long-term risk of new-onset diabetes among endometrial cancer patients **[c]**. Endometrial cancer survivors had higher risk of diabetes than body mass index matched women in the population, both in the short (up to 5-years) and long-term (>5 years after diagnosis).

1. Kim S, Chen Y, Rowe K, Snyder J, Fraser A, Smith K, Deshmukh VG, Newman M, Herget K, Porucznik C, Ose D, **Playdon M**, Gaffney D, Hashibe M (2019) Long-term Diabetes Risk among Endometrial Cancer Survivors in a Population-Based Cohort Study.(2019) Gynecol Oncol, 156(1):185-193. PMCID: PMC7083523

Collectively, these studies have identified important domains of diet and metabolism that may impact survival among cancer patients, and underscore the ongoing need for dietary information years after cancer diagnosis.

**4. Etiology of Cardiometabolic Disease:** My early publications describe the work of a translational research team in the Department of Endocrinology, Metabolism and Diabetes at the University of Colorado, Denver, that have conducted transformational studies to understand insulin resistance and propensity to develop Type 2 diabetes. These publications have formed the basis for research in the field. Among US adults, more than 1-in-3 have pre-diabetes, a condition of dysglycemia strongly associated with progression to type 2 diabetes. Our team explored the etiology of insulin resistance and different forms of pre-diabetes in relation to intramuscular lipid. I served as co-author and contributed to the clinical study coordination, data collection and wet laboratory methods as part of the multidisciplinary team. Intramuscular triglyceride (IMTG) concentration is elevated in insulin-resistant individuals. Initial studies identified that saturated diacylglycerol (including intracellular location and molecular species) was positively associated with insulin resistance. Novel potential therapeutic targets for diabetes prevention were identified **[a]**. Subsequent studies explored the “athletes’ paradox”, where elite trained athletes have high IMTG but high insulin sensitivity. Findings demonstrated that, in athletes, IMTG synthesis rates influence insulin sensitivity by altering localization of intramuscular lipids and decreasing ceramides that promote insulin resistance **[b]**. Additionally, we demonstrated that combined impaired fasting glucose/impaired glucose tolerance (IFG/IGT) was a distinct prediabetes syndrome rather than representing progression from IFG, with implications for specific treatment and prevention strategies **[c].**

1. Bergman BC, Hunerdosse DM, Kerege A, **Playdon MC**, Perreault L. Localisation and composition of skeletal muscle diacylglycerol predicts insulin resistance in humans. *Diabetologia.* 2012; 55(4):1140-50. PMCID: PMC3296871

b) Bergman B, Perreault L, Strauss A, Bacon S, Kerege A, Harrison K, Brozinick J, Hunderdosse D, **Playdon M**, Holmes W, Bui H, Sanders P, Siddall P, Wei T, Thomas M, Kuo MS, Eckel R. Intramuscular triglyceride synthesis- importance in trafficking muscle lipids in humans. American Journal of Physiology-Endocrinology and Metabolism. 2017. *Am J Physiol Endocrinol Metab.* 2018; 314(2): E152-64. PMCID: PMC5866414

c) Perreault L, Bergman BC, **Playdon MC**, Man CD, Cobelli C, Eckel RH. Impaired fasting glucose with or without impaired glucose tolerance: progressive or parallel states of prediabetes? *Am J Physiol Endocrinol Metab.* 2008; 295(2):E428-E35. PMCID: PMC2519761

My expertise in molecular epidemiology has translated to research being conducted at University of Utah to explore the role of ceramides in cardiometabolic disease with MPI Scott Summers. We utilized machine learning approaches to identify a biomarker panel of sphingolipids (including ceramides) that predicts coronary artery disease more robustly that existing clinical risk markers **[d]**.

d) Poss A, Maschek JA, Cox JE, Hauner BJ, Hopkins PN, Hunt SC, Holland WL, Summers SA, **Playdon MC**. Machine Learning Reveals Serum Sphingolipids as Cholesterol-Independent Biomarkers of Coronary Artery Disease. *J Clin Invest.* 2020; 130(3): 1363-76. PMCID: PMC7269567

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