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Employment:

- 2022 - 2027 **MRC Career Development Fellow**, Department of Obstetrics & Gynaecology, University of Cambridge.
- 2018 – 2022: **Next Generation Fellow**, Centre for Trophoblast Research and Department of Obstetrics & Gynaecology, University of Cambridge.
- 2015 – 2018: **Research Associate**, Department of Obstetrics & Gynaecology, University of Cambridge.
- 2014 – 2015: **Instructor (Research)**, Division of Basic Reproductive Science, Department of Obstetrics & Gynecology, University of Colorado School of Medicine, Colorado, USA
- 2012 – 2014: **Post-doctoral Fellow**, Center for Pregnancy and Newborn Research, Department of Obstetrics & Gynecology, University of Texas Health Science Center San Antonio

Education:

- 2007 – 2012: **Ph.D.** School of Women's and Infants' Health, University of Western Australia
Thesis title: Cholesterol and oxysterol transport in the human placental trophoblasts: Implications for placental cell viability, differentiation and inflammation.
- 2005 – 2007: **MSc. First class honors (A+ grade)**, Liggins Institute & Department of Pharmacology, University of Auckland, New Zealand
Thesis title: Expression, localization and activity of ABC drug transporters in human amnion membranes.
- 2001– 2004: **BSc.** Pharmacology, University of Auckland, New Zealand

Current Research Interests:

1. Metabolic regulation of epigenetics during early placental development.
2. Impact of fetal sex on placental function in normal and complicated pregnancies
3. Placental metabolism in preeclampsia and fetal growth restriction

Supervision:

1. Giulia Avellino. **PhD student:** 2020-2023. Department of Obstetrics & Gynaecology, and Centre for Trophoblast Research, University of Cambridge. Primary supervisor with Prof Stephen Charnock-Jones (co-supervisor).
2. Roberta Barbagallo. **Erasmus Plus visiting student from Italy.** January-June 2019. Primary supervisor. Roberta has gained full-time employment as a Biomedical Scientist at the Histocompatibility and Immunogenetics laboratory, Addenbrooke's Hospital.

Research Funding

Independent grants & Fellowships:

1. **Career Development Award** from the Medical Research Council UK, 2022
"Metabolic determinants of early placental development: Acetyl-coA metabolism and histone acetylation during trophoblast differentiation"
GBP £1,353,552
2. **Short-Term Fellowship** awarded by the European Molecular Biology Organization, 2018
Euro €5762
3. **Next Generation Fellowship** awarded by the Centre for Trophoblast Research, University of Cambridge, 2018
"Polyamine pathway is crucial for remodelling of placental energy metabolism and is regulated by fetal sex and preeclampsia"
GBP £206,272
4. **K99 Pathway to Independence** (1K99HD086249-01) awarded by the National Institutes of Health USA, 2015. (*Declined due to relocation to Cambridge*)
"Regulation of adipose tissue adiponectin secretion by ubiquitination"
USD \$208,906
5. **Research Development Award** (seed grant), Center for Women's Health Research, University of Colorado School of Medicine, 2015
"Regulation of adiponectin in GDM Pregnancies"
USD \$25,000

Co-investigator grants:

6. **Africa Research Excellence Fund,**
Dorotheah Obiri (PI), Andrew Sharkey (Co-Investigator), Irving Aye (Co-Investigator)
GBP £25,500
7. **Cambridge Africa ALBORADA Research Fund,** ALBORADA Trust, University of Cambridge,
Dorotheah Obiri (PI), Andrew Sharkey (Co-Investigator), Irving Aye (Co-Investigator)
GBP £19,618

Selected Awards & Scholarships

1. President's plenary award* (Top 4 abstract), Society for Reproductive Investigations, Vancouver, Canada, 2020. *Senior author on abstract
2. Pfizer president's presenter award (Top 25 abstract), Society for Reproductive Investigations, Paris, France, 2019
3. Top Reviewer for Placenta Journal 2016-2017, International Federation of Placental Associations (IFPA), Manchester, UK, 2017
4. Pfizer president's presenter award (Top 25 abstract), Society for Reproductive Investigations, Orlando FL, USA, 2017
5. Pfizer president's presenter award (Top 25 abstract), Society for Gynecological Investigations, Florence, Italy, 2014
6. National Institutes of Health Travel Award, International Federation of Placental Associations (IFPA), Vancouver, Canada, 2013
7. First prize award, Endocrine and Reproductive Sciences Symposium, Perth, Australia, 2010
8. Oral presentation award, Australian Society for Medical Research Scientific Symposium, Perth, Australia, 2010
9. Y.W. Loke new investigator Award, IFPA, Adelaide, Australia 2009
10. PhD Top-Up scholarship, Women's & Infants Research Foundation, 2008
11. Australian Postgraduate Award, Department of Education, Government of Australia, 2008
12. Doctoral Scholarship (Faculty Guarantee), University of Auckland, 2006 (*Declined due to relocation to Western Australia*)
13. Faculty of Science Masters Award, University of Auckland, 2005

Peer-Reviewed Publications

First/equal first author = 20, H-index = 20, Total citations = 1910 (google scholar, Apr 2022)

1. **Aye ILMH†**, Gong S, Avellino G, Barbagallo R, Gaccioli F, Jenkins BJ, Koulman A, Murray AJ, Charnock-Jones DS, Smith GCS.
Placental sex-dependent spermine synthesis regulates trophoblast gene expression through acetyl-coA metabolism and histone acetylation.
Nature Communications Biology 2022; 15;5(1):586 (†corresponding author)
2. **Aye ILMH†**, Rosario FJ, Kramer A, Kristiansen O, Michelsen T, Powell TL, Jansson T.
Insulin-stimulated adiponectin secretion in pregnancy is mediated by inhibition of adiponectin ubiquitination and degradation and is impaired in obesity.
J Clin Endocrinol Metab 2022; 107(1):53-66 (†corresponding author)
3. **Aye ILMH†**, Aiken CE, Charnock-Jones DS, Smith GC. Placental energy metabolism in health and disease - significance of development and implications for preeclampsia.
Am J Obstet Gynecol. 2022; 226(2S):S928-S944 (†corresponding author)
4. Gong S*, Sovio U*, **Aye ILMH***, Gaccioli F*, Dopierala J, Johnson MD, Wood AM, Cook E, Jenkins BJ, Koulman A, Casero Jr. RA, Constancia M, Charnock-Jones DS, Smith GCS.

Placental polyamine metabolism differs by fetal sex, fetal growth restriction and preeclampsia.

JCI Insight. 2018; 3(13): e120723. (*equal contribution)

5. **Aye ILMH**, Moraitis AA, Stanislaus D, Charnock-Jones DS, Smith GCS.
Retosiban prevents stretch-induced human myometrial contractility and delays labor in Cynomolgus monkeys.
J Clin Endocrinol Metab. 2018; 103(3): 1056-1067.
6. Gaccioli F, **Aye ILMH**, Sovio U, Charnock-Jones DS, Smith GCS.
Screening for fetal growth restriction using fetal biometry combined with maternal biomarkers.
Am J Obstet Gynecol. 2018; 218(2S):S725-S737.
7. **Aye IL†**, Rosario FJ, Powell TL, Jansson T.
Adiponectin supplementation in pregnant mice prevents the adverse effects of maternal obesity on placental function and fetal growth.
Proc Natl Acad Sci U S A. 2015; 112(41):12858-12863. (†corresponding author)
8. **Aye IL**, Rosario FJ, Powell TL, Jansson T.
Fetal/placental weight ratio and placental function.
Proc Natl Acad Sci U S A. 2016; 113(3):E261.
9. **Aye IL†**, Jansson T, Powell TL.
TNF- α stimulates System A amino acid transport in primary human trophoblast cells mediated by p38 MAPK signaling.
Physiol Rep. 2015; 3(10):e12594. (†corresponding author)
10. Pantham P, **Aye IL**, Powell TL.
Inflammation in maternal obesity and gestational diabetes mellitus.
Placenta 2015; 36(7):709-715.
11. Gaccioli F*, **Aye IL***, Roos S, Lager S, Ramirez VI, Kanai Y, Powell TL, Jansson T. Expression and functional characterization of System L amino acid transporters in the human term placenta.
Reprod Biol Endocrinol 2015; 13(1):57 (*equal contribution)
12. Lager S*, **Aye IL***, Gaccioli F, Ramirez VI, Jansson T, Powell TL.
Labor inhibits placental mechanistic target of rapamycin complex 1 signaling.
Placenta. 2014; 35(12):1007-1012 (*equal contribution).
13. **Aye IL*†**, Lager S*, Ramirez VI, Gaccioli F, Dudley DJ, Jansson T, Powell TL.
Increasing maternal BMI is associated with systemic inflammation in the mother and the activation of distinct placental inflammatory pathways.
Biol Reprod. 2014; 90(6):129. (*equal contribution, †corresponding author).
14. **Aye IL†**, Gao X, Weintraub S, Jansson T, Powell TL.
Adiponectin inhibits insulin function in primary trophoblasts by PPAR α -mediated ceramide synthesis.
Mol Endocrinol. 2014; 28 (4):512-524. (†corresponding author)

15. Abumaree MH, Alahari S, Albrecht C, **Aye IL**, et al.
IFPA Meeting 2013 Workshop Report I: diabetes in pregnancy, maternal dyslipidemia in pregnancy, oxygen in placental development, stem cells and pregnancy pathology.
Placenta 2014; 35(S):4-9
16. **Aye IL**†, Jansson T, Powell TL.
Interleukin-1 β inhibits insulin signaling and prevents insulin-stimulated System A amino acid transport in primary human trophoblasts.
Mol Cell Endocrinol. 2013; 381 (1-2):46-55. (†corresponding author)
17. **Aye IL** and Keelan JA.
Placental ABC transporters, cellular toxicity and stress in pregnancy.
Chem Biol Interact. 2013; 203 (2):456-466.
18. **Aye IL**, Powell TL, Jansson T.
Adiponectin – The missing link between maternal adiposity, placental transport and fetal growth?
Placenta. 2013; 34 (Suppl A):S40-S45. **(Selected for issue cover)**
19. Jansson T, **Aye IL**, Goberdhan DC.
The emerging role of mTORC1 signalling in placental nutrient-sensing.
Placenta 2012; 33(Suppl 2):e23-29.
20. Singh AT, Dharmarajan A, **Aye IL**, Keelan JA.
Ceramide biosynthesis and metabolism in trophoblast syncytialization.
Mol Cell Endocrinol. 2012;362(1-2):48-59.
21. **Aye IL**†, Waddell BJ, Mark PJ and Keelan JA.
Oxysterols exert proinflammatory effects in placental trophoblasts via TLR4-dependent, cholesterol-sensitive activation of NF-kappaB.
Mol Hum Reprod. 2012;18(7):341-53. (†corresponding author)
22. Singh AT, Dharmarajan A, **Aye IL**, Keelan JA.
Sphingosine-sphingosine-1-phosphate pathway regulates trophoblast differentiation and syncytialization.
Reprod Biomed Online. 2012;24(2):224-234.
23. Keelan JA, **Aye IL**, Mark PJ, Waddell BJ.
ABCA1 and placental cholesterol efflux.
Placenta. 2011;32(9):708-709.
24. Al-Khan A, **Aye IL**, et al. IFPA Meeting 2010 Workshops Report II: Placental pathology; trophoblast invasion; fetal sex; parasites and the placenta; decidua and embryonic or fetal loss; trophoblast differentiation and syncytialisation.
Placenta. 2011; 32(Suppl2):S90-99.
25. **Aye IL**, Waddell BJ, Mark PJ and Keelan JA.
Oxysterols inhibit differentiation and fusion of term primary trophoblasts by activating liver X receptors.

Placenta. 2011;32(2):183-91.

26. **Aye IL**, Waddell BJ, Mark PJ and Keelan JA.

Placental ABCA1 and ABCG1 transporters efflux cholesterol and protect trophoblasts from oxysterol induced toxicity.

Biochim Biophys Acta. 2010;1801(9):1013-24.

27. **Aye IL**, Singh AT and Keelan JA.

Transport of lipids by ABC proteins: interactions and implications for cellular toxicity, viability and function.

Chem Biol Interact. 2009;180(3):327-39.

28. **Aye IL**, Paxton JW, Evseenko DA and Keelan JA.

Expression, localisation and activity of ATP binding cassette (ABC) family of drug transporters in human amnion membranes.

Placenta. 2007;28(8-9):868-77.

[Pubmed bibliography](#)

Book Chapter

1. **Irving L.M.H. Aye**, Susanne Lager, Theresa L. Powell, Chapter 6: The role of placental inflammasomes in linking the adverse effects of maternal obesity on fetal development. In: *Metabolic Syndrome and Complications of Pregnancy*. Enrico M. Ferrazzi & Barry Sears (Editors). Springer Press.

Selected Conference Abstracts

1. G Avellino, D.S. Charnock-Jones, G.C. Smith, **I Aye**. Placental central carbon metabolism links polyamines to histone acetylation. Society for Reproductive Investigations*, Vancouver, Canada, Mar 2020 **(Selected for plenary oral presentation) •President's Plenary Award (ranked in the top 4 out of >1000 abstracts)**. *Conference was cancelled last minute due to COVID-19.
2. **Aye I**, Moraitis A, Charnock-Jones DS, Smith GCS. Mechanisms underlying the effects of retosiban/GSK221149A on the response to mechanical stretch in human myometrial explants, Society for Reproductive Investigations, Orlando, USA, Mar 2017 **(Selected for oral presentation) •President's Presenters Award**
3. **Aye I**, Rosario F, Gao X, Weintraub S, Powell T, Jansson T. Maternal adiponectin inhibits placental insulin-signaling by PPAR α -mediated ceramide synthesis and prevents fetal overgrowth associated with maternal obesity, Society for Gynaecologic Investigations, Florence, Italy, Mar 2014. **(Selected for oral presentation) •President's Presenters Award**
4. **Aye IL**, Powell TL, Goberdhan DC, Jansson T. Proton-assisted amino acid transporter 1 (PAT1) is required for amino acid sensing by mammalian target of rapamycin complex 1 (mTORC1) in Primary Human Trophoblast Cells, International Federation of Placenta Associations, Vancouver, Canada, September 2013. **•NIH New Investigator Travel Award**

5. **Aye IL**, Waddell BJ, Mark PJ, Keelan JA. Oxidised cholesterol metabolites impair placental cell differentiation and promote cytotoxicity, but are protected by ABCA1 and ABCG1 transporters, Reproductive Sciences Symposium, Perth, Australia, Aug 2010. •**First Prize**
6. **Aye IL**, Waddell BJ, Mark PJ, Keelan JA. Placental cholesterol transporters ABCA1 and ABCG1 protect trophoblast cells against oxidised cholesterol metabolites. Australian Society for Medical Research, Perth, Australia, June 2010. •**ANRI Award**
7. **Aye IL**, Waddell BJ, Mark PJ, Keelan JA. Expression, localisation and regulation of ATP-binding cassette transporters A1 and G1 in human gestational tissues and differentiating trophoblasts. International Federation of Placenta Associations, Adelaide, Australia Oct 2009. •**Y.W. Loke New Investigator Travel Award** •**Finalist for the Trophoblast Research Award**

Selected Invited Seminars

1. Functional consequences of X chromosome inactivation escape in the placenta.*
Invited Symposium Speaker, **Society for Reproductive Investigation** meeting, Denver CO, USA, March 2022. *Presented virtually due to COVID-19 travel restrictions.
2. Sex differences in placental metabolism: X marks the spot.*
Invited Symposium Speaker at the Placental Satellite Session of the **Society for Reproductive Investigation** meeting, Boston, USA, July 2021. *Presented virtually due to COVID-19 travel restrictions.
3. X chromosome inactivation escape as a novel mechanism underlying sex differences in placental metabolism.
Invited Speaker at **Eurotoxemia** Virtual Conference, September 2020.
4. Sex differences in placental metabolism and preeclampsia
Invited Speaker at **Centre for Trophoblast Research Annual Meeting**, Cambridge UK, July 2019.
5. Adiponectin in pregnancy: A crucial endocrine link between maternal adipose tissue and the placenta.
Invited Speaker at **Reproductive Sciences Seminar**, University of Colorado School of Medicine, USA, April 2015.
6. Maternal obesity, placental inflammation and fetal growth.
Invited Symposium Speaker at **Immunology American Association of Immunologists Annual Meeting**, Pittsburgh, USA, May 2014.

Outreach and Community Service

- Editorial Board Member of **Trophoblast Research**.
- Early Career Committee Member and Career Development Committee Representative, Society for Reproductive Investigations, 2020-2023.
- Departmental Science Festival Coordinator, University of Cambridge, co-applicant on the public engagement starter fund.

- Fellows Chalk Talk: Program Director for “research in progress” seminars by clinical and post-doctoral fellows, Basic Reproductive Sciences, University of Colorado School of Medicine.
- Faculty of 1000, Associate Faculty Member, 2010-2013

Peer Review

- Regular reviewer for • Am J Obstet Gynecol, • Placenta, • Endocrinology
- Ad hoc reviewer for • Nature Comms • Proc Natl Acad Sci U S A, • Physiol Genomics, • Mol Cell Endocrinol, • Cell Physiol Biochem • Int J Mol Sci, • Cell Mol Life Sci, • Bioorg Med Chem Lett, • Am J Physiol Regul Integr Comp Physiol, • Int J Obes, • Endocrinol, • Mol Hum Reprod,
- Publons ID: <https://publons.com/author/1261012/irving-aye#profile>

Collaborators

University of Cambridge:

- Professor Gordon Smith (Head of Department), Department of Obstetrics & Gynaecology
- Professor Stephen Charnock-Jones, Department of Obstetrics & Gynaecology
- Dr Catherine Aiken, Assistant Professor, Department of Obstetrics & Gynaecology
- Dr Miguel Constancia, Associate Professor, Department of Obstetrics & Gynecology
- Dr Andrew Murray, Associate Professor, Department of Physiology, Development and Neuroscience
- Dr Andrew Sharkey, Associate Lecturer, Department of Pathology
- Dr Naomi McGovern, Group Leader, Department of Pathology

External Collaborators:

- Dr Saverio Tardito, Group Leader, Oncometabolism Lab, Cancer Research UK Beatson Institute, University of Glasgow
- Professor Masahito Ikawa (Head of Department), Department of Experimental Genome Research, Research Institute for Microbial Diseases, University of Osaka, Japan