Jason Chung Lim Tong

Wolfson College, Linton Road, Oxford OX26UD, United Kingdom

EDUCATION

D.Phil *2020–*

University of Oxford

Thesis title: Investigation of inter-islet synchronicity at the whole-pancreas level

Project details: It has long been known that the secretion of insulin from β-cells in the pancreas is pulsatile, and moreover, this signature is disrupted in the diabetic pancreas. The purpose and function of this pulsatility remains unclear however, due to technical constraints and it is unknown how the loss of this phenotype contributes to the onset of diabetes. This project will therefore use novel models such as the perfused pancreas, combined with cutting-edge imaging techniques to characterise the nature of these insulin oscillations, and shed more light into their onset, and dysfunction. Success in this project will enhance our understanding of healthy pancreatic function, and inform future treatment regimens for diabetes.

Supervisors: Professor Patrik Rorsman, Professor David Ray, Dr. Linford Briant, Dr. Thomas Hill

M.Phil *2017–2019*

University of Sydney

Thesis title: Biofunctionalisation enhances cell-based type 1 diabetes therapies via recreation of the native β-cell micro-environment

Project details: Contemporary implantation techniques for pancreatic beta-cells in the treatment of type 1 diabetes currently faces several challenges, notably those of survival and function. To address these issues, novel plasma physics techniques were used to biologically activate synthetic substrates with extracellular matrix proteins, with the aim of recreating a microenvironment for islet β-cells *in vitro* resembling their native niche. β-cells were functionally characterised in these conditions using techniques such as flow cytometry, insulin secretion assays and live-cell imaging, including Fura-2 and GCaMP6 calcium imaging techniques. The findings of this project revealed a restoration in native β-cell function *in vitro* through interactions with extracellular matrix proteins via potential integrin-mediated mechanisms.

Supervisors: Professor Peter Thorn, Dr. Melkam Kebede

B.Sc (Honours) *2013–2016*

University of Sydney

Grade: **First Class Honours**

Majors: Physiology, Anatomy & Histology

Thesis title: An Arp2/3 complex-mediated contractile actin coat on granules facilitates insulin secretion in beta cells

Project details: Exocytosis has been studied within various secretory systems, and a myriad of biomechanical actors have been identified in this process. However, while insulin secretion is the principal function of pancreatic β-cells, technological limitations have until now impeded the study of the exocytic processes of insulin. To this end, advanced live-cell super-resolution microscopy techniques were used to characterise insulin granules, which are sub-diffraction limit and cannot be closely observed using conventional techniques. Multiphoton live-cell microscopy was also used to track the temporal and spatial localisation of cytoskeletal regulators. A contractile actin coat was found to localise to fused insulin granules, with evidence that it is essential to efficient secretion. Molecular and pharmacological techniques were used to further elucidate this process through manipulation of actin nucleating proteins, and it was discovered that this contractile actin coating is nucleated by the recruitment of an Arp2/3 complex on granules. The findings highlight new targets for the study of the insulin secretory deficit, characteristic of diabetes.

Supervisor: Professor Peter Thorn

TEACHING EXPERIENCE

Casual academic *2017–*

Sydney Medical School, The University of Sydney;
Faculty of Science, The University of Sydney

- MEDS1X01 – Human Biology
- OLET1504 – Health Challenges: Diabetes
- BIOL1996 – Life and Evolution
- NEUR3X06 – Neural Information Processing
- NUTM3X01 – Nutrition and Metabolism
- PHSI2008 – Integrated Physiology
- PHSI3X09 – Frontiers in Cellular Physiology
- PHSI3X11 – Frontiers in Whole Body Physiology

Taught tutorials, laboratory practicals, led problem-based learning sessions, marking and student consultations.

CONFERENCE ABSTRACTS

2019

Australasian Diabetes Congress

Tong J*, Gan WJ, Cottle, L, Thorn P. Re-introduction of native extracellular matrix proteins recapitulates the native oscillatory Ca^{2+} phenotype in primary mouse beta-cells. Poster presented at: Australasian Diabetes Congress 2019, Australian Diabetes Society; 2019 Aug 21-23; Sydney, Australia.

Finalist and 1st prize winner of Basic Science Poster Award

Germanos M*, Yau B, **Tong J**, Havula E. A Cab for Insulin: The Role of Cab45 in Pancreatic β-cells. Talk presented at: Australasian Diabetes Congress 2019, Australian Diabetes Society; 2019 Aug 21-23; Sydney, Australia.

2018

Australian Islet Study Group Meeting

Tong J*, Kosobrodova E, Bilek MMM, Thorn P. Polymer biofunctionalisation to enhance a microenvironment for β-cell encapsulation. Talk presented at: Australian Islet Study Group Meeting; 2018 Nov 30; Canberra, Australia.

Winner of the JDRF Travel Award (Type 1 Diabetes)

2017

Annual Scientific Meeting of the Australian Diabetes Society

Tong J*, Gan WJ, Kosobrodova E, Weiss AS, Wise SG, Bilek MMM, Thorn P. Bioengineering a biofunctionalised synthetic capsule for in vivo implantation of MIN6 beta-cells. Poster presented at Annual Scientific Meeting of the Australian Diabetes Society; 2017 30 Aug-1 Sep; Perth, Australia.

Australian Islet Study Group Meeting

Tong J*, Gan WJ, Kosobrodova E, Yeo GC, Weiss AS, Wise SG, Bilek MMM, Thorn P. A biocompatibility screen of polymers for synthetic encapsulation of beta-cells in type 1 diabetes. Poster presented at Australian Islet Study Group Meeting; 2017 Sep 1-2; Perth, Australia.

Winner of the Best Poster Award

2016

Australian Islet Study Group Meeting

Tong J*, Ma W, Thorn P. An Arp2/3 complex-mediated contractile actin coat on insulin granules facilitates secretion in beta-cells. Talk presented at: Australian Islet Study Group Meeting; 2016 Nov 18; Melbourne, Australia.

AWARDS AND PRIZES

2020

- The Boulton Scholarship, University of Sydney Travelling Scholarship
- Eleanor Sophia Wood Postgraduate Research Travelling Scholarship

2019

- Basic Science Poster Award, Australasian Diabetes Congress
- Selected as "Poster Discussion session" finalist, Australasian Diabetes Congress
- Invited to present one of three 1 hour research seminars for 2019 (compared to standard 15 minute student talks), due to scoring within the top 3 best research student presentations at the Charles Perkins Centre in 2018

2018

- JDRF Travel Award (Type 1 Diabetes), Australian Islet Study Group Meeting

2017

- University of Sydney Postgraduate Research Support Scheme travel grant
- Australian Islet Study Group Meeting Poster Award
- Bosch Institute Micrograph of the Month, March 2017

2016

- The University of Sydney Honour Roll 2016, Honours Class I
- Honours Summer Scholarship, Physiology 2016
- Bosch Institute Micrograph of the Year finalist

2015

- Invited to participate in the Discipline of Anatomy's Special Studies Program unit for human cranial and cervical dissection

RESEARCH SKILLS AND TECHNIQUES

Key interest in *imaging and microscopy*, particularly novel and emerging techniques including super-resolution microscopy and live-cell imaging.

- Extensive microscopy experience including super-resolution techniques (STED, STORM, GSD), multiple modalities of live-cell imaging (multiphoton, calcium [Fura-2], spinning disc), confocal, widefield, image-stitching, bioluminescence
- Immunofluorescence, Immunohistochemistry
- Molecular biology techniques (quantitative RT-PCR, PCR, nucleic acid extraction and purification, gel electrophoresis, Western blotting, bacterial culture, gene cloning, gene silencing)
- Cell culture (primary cells and cell lines, co-culture, extracellular matrix, transfection, viral transduction)
- Viral culture and production (lentivirus, adenovirus)
- Immunoassays, ELISA, BCA, HTRF
- Mouse handling and husbandry (primary islet isolations, genotyping)
- Flow cytometry (FACS)
- Human dissection (cranial and cervical)

SERVICE TO THE UNIVERSITY

The University of Sydney, School of Biological Sciences *2013*

Student Liaison Officer

Elected to the faculty board as a student representative, communicating student feedback for first-year biology units of study.

LEADERSHIP EXPERIENCE

Oxford University Australia & New Zealand Society

President *2021–*

Sydney University Disney Appreciation Society

President *2014–2016*

Vice–president *2014*

General executive officer *2013*

Sydney University Wind Orchestra

Publicity officer *2015*

Sydney University Chocolate Society

General executive officer *2013–2015*